

Decentralised Solid Waste Management Project

**NIRMALA bhavanam
Nirmala NAGARAM**

**ALAPPUZHA
MUNICIPALITY**

Decentralised Solid Waste Management Project

ALAPPUZHA MUNICIPALITY

❖ Coastal Municipality

❖ Sandwiched between
vembanadu lake and
arabian sea

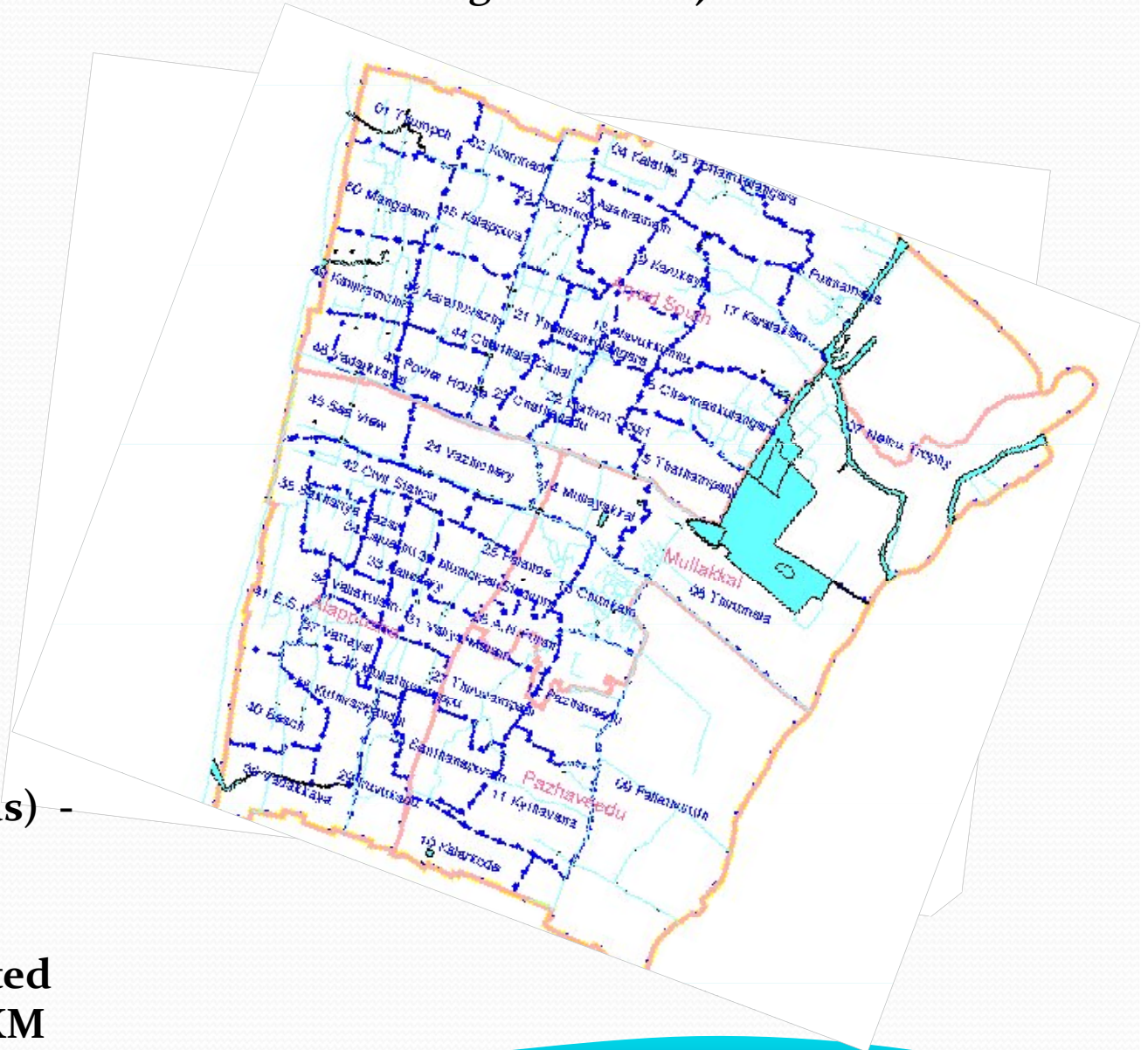
❖ Wards 52

❖ 20 wards Rural

❖ Area 46.77 Sq. KM

❖ Population (2011 census) -
197029

❖ Most Densely Populated
Municipality- 4212/Sq. KM



MSW Crisis in Alappuzha

- 50 tones waste per day (per capita daily waste Generation 210-350 gms- NEERI 1996) in Alleppey it is taken as 250 gms/person/ day

Centralised Dumping Yard at Sarvodayapuram

Public Opposition due to Environmental Problems

Local Residents blocked transportation of MSW

Agreed to reopen the yard – condition – bring down the MSW to 5 tons per day

hOW?

Waste piles up in streets

Decentralised Solid Waste Management Project

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“Make the houses clean and thereby the streets”

attempts to process biodegradable domestic waste at source

domestic bio degradable waste 35 %

Methods

1. Composting – pipe composting and aerobic composting bins
2. Family type biogas plants

Technology Participants

1. IRTC
2. ANERT
3. KERALA Veterinary and Animal Science University
4. Kerala Agriculture University

Decentralised Solid Waste Management Project



Decentralised Solid Waste Management Project



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1. Biodegradable Domestic Waste – composting and bio methanation
2. Hotels, Shops, slaughter houses etc– contract with a private party (pig and fish farms)
3. Plastic etc – periodic collection by the municipality (resource recovery centre)
4. Hazardous Waste – periodic collection by the municipality (resource recovery centre)
5. Hospital Waste – IMA

***Pilot project in 12 Wards
Extended to the whole of Municipality***

achievements

(upto March 2015)

1. 1 m³ portable biogas plants IRTC – 1850 (Digester – 600 ltrs, Gas holder – 400 ltrs)
2. KVIC Model fixed biogas plants ANERT 290 (Digester – 1620 ltrs, Gas holder – 550 ltrs)
3. Pipe compost units – 1234 (2 PVC pipes of 8” diameter and 1 m length –1 unit)
4. Aerobic composting bins (Thumboormuzhy model) 166 (4 x 4 x 4 ft Ferro cement bin)

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Waste Management

Solid waste

- ❑ IRTC Biogas plants 1850*3kgs/ day - 2025.75 Tons/ year
- ❑ ANERT Biogas plants 290* 6 Kgs/ day - 635.1 Tons/ year
- ❑ Pipe compost units 1234*1kg/ day - 450.41 Tons / year
- ❑ ACBs 166* 6 Tons/ year - 996 Tons / year

Total Solid waste management

4107.26 tons / year

Decentralised Solid Waste Management Project

Quantity of Liquid waste Managed

- IRTC Biogas plants $1850 \times 5 \text{ kgs/day}$ - 3372.61 Tons/ year
- ANERT Biogas plants $290 \times 10 \text{ Kgs/day}$ - 1058.5 Tons/ year

Total Liquid Waste managed - 4431.10 Tons/ year

Energy Conservation

Biogas production

IRTC Biogas plants - 83538.07 kg LPG equivalent/year

ANERT Biogas Plants - 31428.38 kg LPG equivalent/year

TOTAL - 114966.45 kg LPG equivalent/year

(non subsidized cost 11496645 rupees per year)

❑ 1 M³ Biogas is Equivalent to

- 0.433 Kg of LPG
- 3.474 Kg of Firewood
- 0620 Litres of Kerosine

Decentralised Solid Waste Management Project

- ❑ Diesel Savings (Due to abandoning of transportation of waste)
20525.35 Ltrs/year (Rs 1026267.5 per year)
- ❑ Organic manure production
433.92tons per year (from 1446.41 tones of waste ie, 30 percent manure)
- ❑ LED street lighting scheme
(upcoming project) 2062170 kwh
(Rs 24746040 savings expected per year)

Decentralised Solid Waste Management Project

Quantity of Equivalent LPG Saved in Alappuzha Municipality

Sl No	Model	No of Biogas Plants Installed	No of Hours Biogas Used in 8cft Burner per day	Equivalent LPG saved Per Year in Kg	No of LPG Domestic Cylinder Saved per Year	Total amount Saved Year Rs
1	IRTC	1850	1.25	83538.07	5883	8353800
2	ANERT	290	3	31428.38	2213.27	3142838
Total		2140		114966.45	8096	11496638

Burner used is 8 Cft

1M³ Biogas is Equivalent to 0.433Kg of LPG

Cost of 1 Kg of LPG Rs 100

Weight of Domestic LPG Cylinder is 14-2 KG

Efficiency reckoned 75 %

Decentralised Solid Waste Management Project

Diesel savings Due to abandoning of waste transportation					
SI No	Model	Number	Total Solid waste processed Tons/year	Qty of Diesel saved Litres per year	Total amount Saved per Year
1	IRTC Biogas Plant	1850	2025.75	10128.75	506437.5
2	IRTC Pipe Compost	1234	450.41	2252.05	112602.50
3	ANERT Biogas plant	290	635.10	3175.50	158775
4	KVASU Aerobic Composting Bin	166	996.00	4980.00	249000
Total			4107.26	20536.3	1026815

Waste Processed in IRTC plant/day is taken as 3 Kg

Waste Processed in ANERT plant/day is taken as 6Kg

Waste Processed in Pipe Compost/day is taken as 1 Kg

Waste Processed in Aerobic Compost Bin /Year is taken as 6 ton

Diesel Required for Collection and transportation of 1 Ton waste taken as 5 Litres

Energy Conservation in a Decentralised Solid Waste Management Project

Quantity of Equivalent LPG /Kerosine/Firewood Saved						
SI No	Model	No of Biogas Plants Installed	No of Hours Biogas Used in 8cft Burner per day	Equivalent LPG saved Per Year in Kg per Year	Equivalent Fire wood saved Per Year in Kg per Year	Equivalent Kerosine saved Per Year in Litres per Year
1	IRTC	1850	1.25	83538.07	670233.86	119615.71
2	ANERT	290	3	31428.38	252152.84	45001.38
		2140		114966.45	922386.70	164617.09

1M³ Biogas is Equivalent to 0.433 Kg of LPG

1M³ Biogas is Equivalent to 3.474 Kg of Firewood

1M³ Biogas is Equivalent to 0.620 Litres of Kerosene

Energy Conservation in a Decentralised Solid Waste Management Project

Quantity of organic Manure Produced from Aerobic Bins and Pipe Compost

SI No	Model	Qty	Total waste processed in Tons/year	Organic Manure Produced in Tons/year	Value Rs
1	Aerobic Composting Bin	166	996	298.8	4482000
2	Pipe Compost	1234	450.41	135.12	2026800
Total			1446.41	433.92	6508800

Manufacturing 1 ton chemical fertilizer requires 1 ton natural gas

Energy Conservation in a Decentralised Solid Waste Management Project

On completion of the project.... Diesel savings

SI No	Model	Model to be Installed	Qty	Waste processing expected (tones per year)	Qty of Diesel expected to be saved Litres per year	Total amount expected to be Saved per Year
1	IRTC	Biogas plant	2500	2737.50	13687.50	821250.00
2	IRTC	Pipe Compost	5000	1825.00	9125.00	547500.00
3	ANERT	Biogas plant	500	1095.00	5475.00	328500.00
7	KVASU	Aerobic Composting Bin	200	1200.00	6000.00	360000.00
Total				6857.50	34287.50	2057250.00

Waste Processed in IRTC plant/day is taken as 3 Kg

Waste Processed in ANERT plant/day is taken as 6Kg

Waste Processed in Pipe Compost/day is taken as 1 Kg

Waste Processed in Aerobic Compost Bin /Year is taken as 6 ton

Diesel Required for Collection and transportation of 1 Ton waste taken as 5 Litres

Energy Conservation in a Decentralised Solid Waste Management Project

On completion of the project.... Biogas production (LPG Equivalent)

SI No	Model	No of Biogas Sanctioned	No of Hours Biogas expected to be Used in 8cft Burner per day	Equivalent LPG expected to be saved Per Year in Kg	No of LPG Domestic Cylinder expected to be Saved per Year	Total amount expected to be Saved Year Rs
1	IRTC	2500	1.25	112889.29	7949.95	11288929
2	ANERT	500	3	54186.86	3815.98	5418686
	Total	3000		167076.14	11765.93	16707614

Burner used is 8 Cft

1M³ Biogas is Equivalent to 0.433Kg of LPG
Cost of 1 Kg of LPG Rs 100

Weight of Domestic LPG Cylinder is 14-2 KG

Waste to wealth

- Bio degradable waste converted to fuel and manure
- Waste menace managed.
- Prevented epidemic out break
- Litter free streets – a boost to tourism economy
- Centralised dumping yard closed down
- Systematic collection of non degradable waste

What a waste

decentralized management is the answer..

Cleaning of canal



Cleaning of canal



എഎസ് കനാലിൽ ഉപയോഗിച്ചിരുന്ന വാട്ടർ സൈക്കിളിന്റെ പ്രൊപ്പല്ലർ ഭാഗം മോഷ്ടിച്ച നിലയിൽ.

കണ്ടു കൊതി തിരും മുമ്പേ കട്ടു കൊണ്ടുപോയല്ലോ?

ആലപ്പുഴ • എത്തിയിട്ട് ഒരാഴ്ചയായില്ല. വാട്ടർ സൈക്കിളിന്റെ പ്രൊപ്പല്ലർ മോഷ്ടിച്ചു.

ആലപ്പുഴ-ചേർത്തല എഎസ് കനാൽ വൃത്തിയാക്കിയതിനോടൊപ്പം മാലിന്യം തള്ളൽ അവസാനിപ്പിക്കാനും ജലകായിക വിനോദം പ്രോത്സാഹിപ്പിക്കാനുമായി ആരംഭിച്ച വാട്ടർ സൈക്കിളിന്റെ പ്രൊപ്പല്ലറാണു സാമൂഹിക വിരുദ്ധർ അടിച്ചുമാറ്റിയത്.

പെഡൽ ചവിട്ടുമ്പോൾ പ്രൊപ്പല്ലർ കറങ്ങിയാണു വാട്ടർ സൈക്കിൾ വെള്ളത്തിലൂടെ മുന്നോട്ടു പോകുന്നത്. കനാലിൽ കായിക വിനോദങ്ങൾ സജീവമാകുന്ന തോടെ ഇവിടെ മാലിന്യം തള്ളു

ന്ന സാധാരണ മാറുമെന്ന പ്രതീക്ഷയോടെയല്ലാത്തു വാട്ടർ സൈക്കിൾ എത്തിച്ചത്.

കനാൽക്കരയിലെ കുട്ടികൾ ഉൾപ്പെടെയുള്ളവർ വിനോദത്തിനു വാട്ടർസൈക്കിൾ ഉപയോഗിച്ചു തുടങ്ങിയതോടെ പകൽസമയത്തു കനാലിൽ മാലിന്യം തള്ളുന്നതു കുറഞ്ഞുതുടങ്ങിയിട്ടുണ്ട്. വള്ളങ്ങളുടെ മോട്ടോറിനൊപ്പം ഘടിപ്പിക്കാൻ വേണ്ടിയാണ് ഈ പ്രൊപ്പല്ലർ മോഷ്ടിച്ചതെന്നാണു കരുതുന്നത്. പ്രതികരണ കണ്ടെത്തി കർശന നടപടി സ്വീകരിക്കാനുള്ള നടപടികൾ സ്വീകരിക്കുമെന്നു തോമസ് ഐസക് എംഎൽ എ അറിയിച്ചു.



കുടിശ്ശിക





Energy Conservation in a Decentralised Solid Waste Management Project

Thank you