Household Waste Composting & MSW Recycling in Sri Lanka

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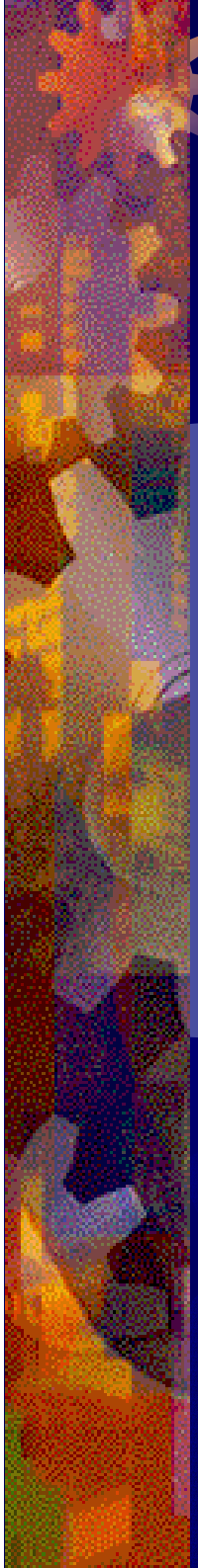
Introduction

- Total collection of MSW by local authorities in Sri Lanka is around 2900 tones/day
- Around 60% [1663 tones] collected in the Western Province[9 provinces in Sri Lanka]
- Around 43% [1257 tones] collected in Colombo District
- Around 25% [700 tones] collected within Colombo Municipal limits, the most urbanized area
- Legal responsibility of MSW management is with Local Authorities [There are 311 Local Authorities]
- No proper management of MSW except few cases where compost and biogas produced
- In most of cases MSW being dumped haphazard manner creating several negative environmental impacts



Different Ranges of Daily MSW Collection[tones/day]-2005

Ranges[tones/day]	***Number of Local Authorities***
Up to 1	111
1-2	48
2-5	76
5-10	26
10-20	23
20-50	19
50-100	5
100-150	2
>150	1
Total Number of Local Authorities	111

Average Composition of MSW of Sri Lanka

Item	***Percentage***
Biodegradable[short term]	56.57
Paper	6.47
Wooden	6.35
Saw dust/paddy husk & cloth/garments waste	6.04
Biodegradable[long term]	5.94
Polythene & plastic	5.91
Demolition wastes	3.89
Metals	2.76
Slaughter house wastes	2.34
Glass	2.03
Other	1.68
Total	***100***

National Strategy of Solid Waste Management

- Prioritize waste avoidance over recycling and recycling over the other forms of environmentally sound disposal
- Reuse non-avoidable wastes as far as possible
- Maintain the content of hazardous substances in waste at the lowest possible level, and
- Guarantee an environmentally sound residual waste treatment and disposal as basic prerequisites for human existence

National Color Codes for Waste Separation Containers

- Green- Organic Waste
- Blue- Paper wastes
- Red – Glass, Bottles
- Brown – Metals, Coconut Shells
- Orange – Plastics/Polythene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Composting Bins


COMPOST OUT
COMPOST BIN

Distribution of Compost Bins

Organization	***Number***
Central Environmental Authority of Sri Lanka	>18000
Sevanatha[An NGO]	>30000
Wyamba Polymers Ltd	>5000
CIC Ltd	>6000
Arpico Plastics Ltd	>11000
Total	***>70000***

Composting of MSW

- Only one large scale commercial level composting plant -***BURNS Environmental Technologies Ltd***
- Becoming popular
- Other examples;

University of Peradeniya-ISG

Dambulla-ISG

Kalutara-ISG

Mawanella-ISG

Udunuwara-Windrow System

Balangoda Urban Council- Windrow System

Kuruvita Pradeshiya Sabaha- Windrow System

Compost Plant-BURNS Environmental Technologies LTD

BURNS *Contd;*

BURNS *Contd;*

BURNS – *Contd;*


Thurusara
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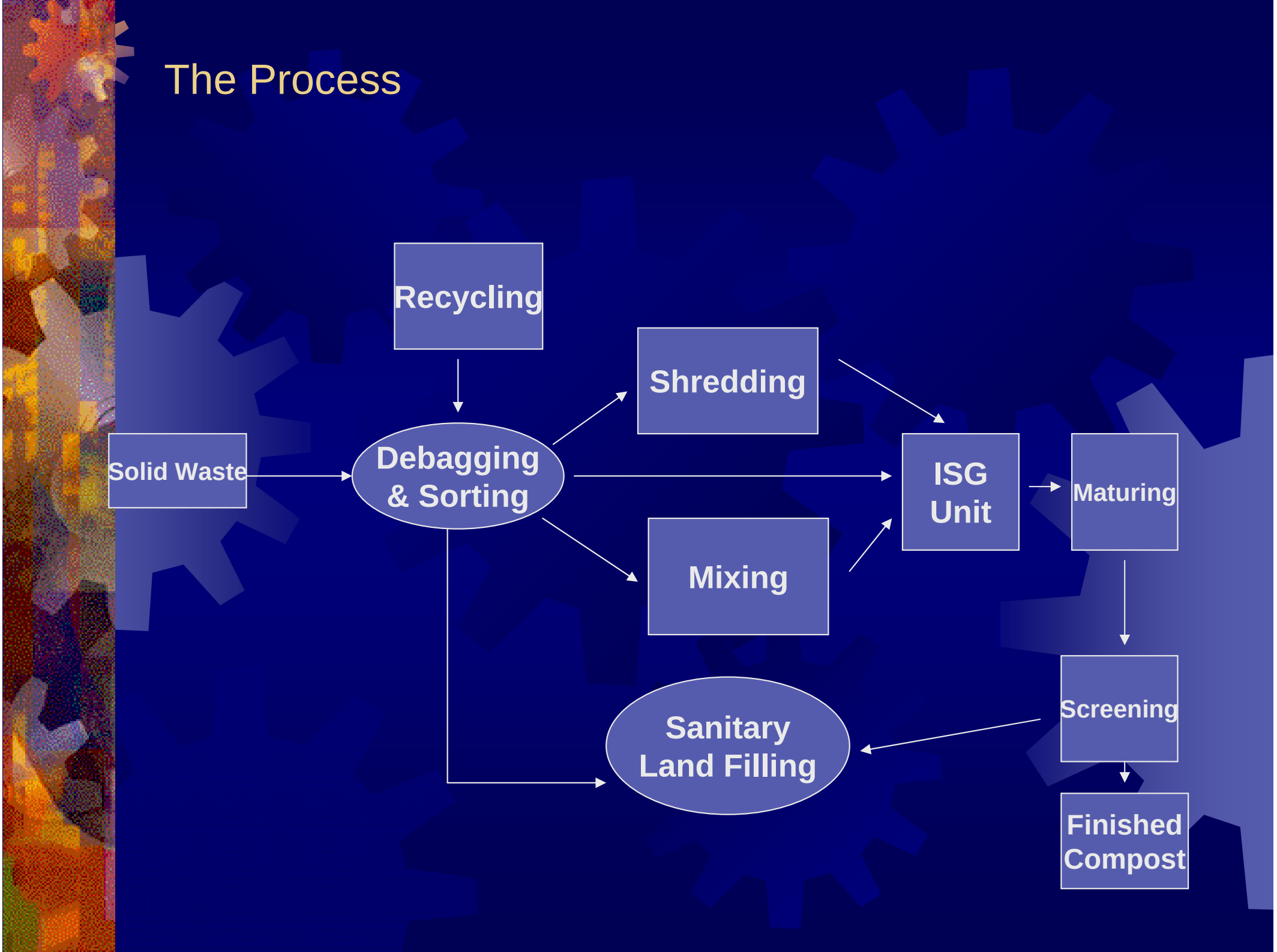
Mawanella Composting Plant

- ISG System
- Cost of the vessel around Rs 5 million
- Established in 1992
- Capacity- 8 tones/day
- Production- 40 tones/month

Future Plans;

- Control of house flies
- Landfill for nonrecyclables
- Improve the road network

The Process


Recycling
Shredding
Solid Waste
Debagging & Sorting
ISG Unit
Maturing
Mixing
Screening
Sanitary Land Filling
Finished Compost

The Plant

Front View

Back End

Shredder

Compost

Scattered Polythene

New Landfill Site

Udunuwara Composting Plant

- Simple windrow system
- Run by the Local Authority
- Cost Rs 1.2 million
- 2 tones/day processed

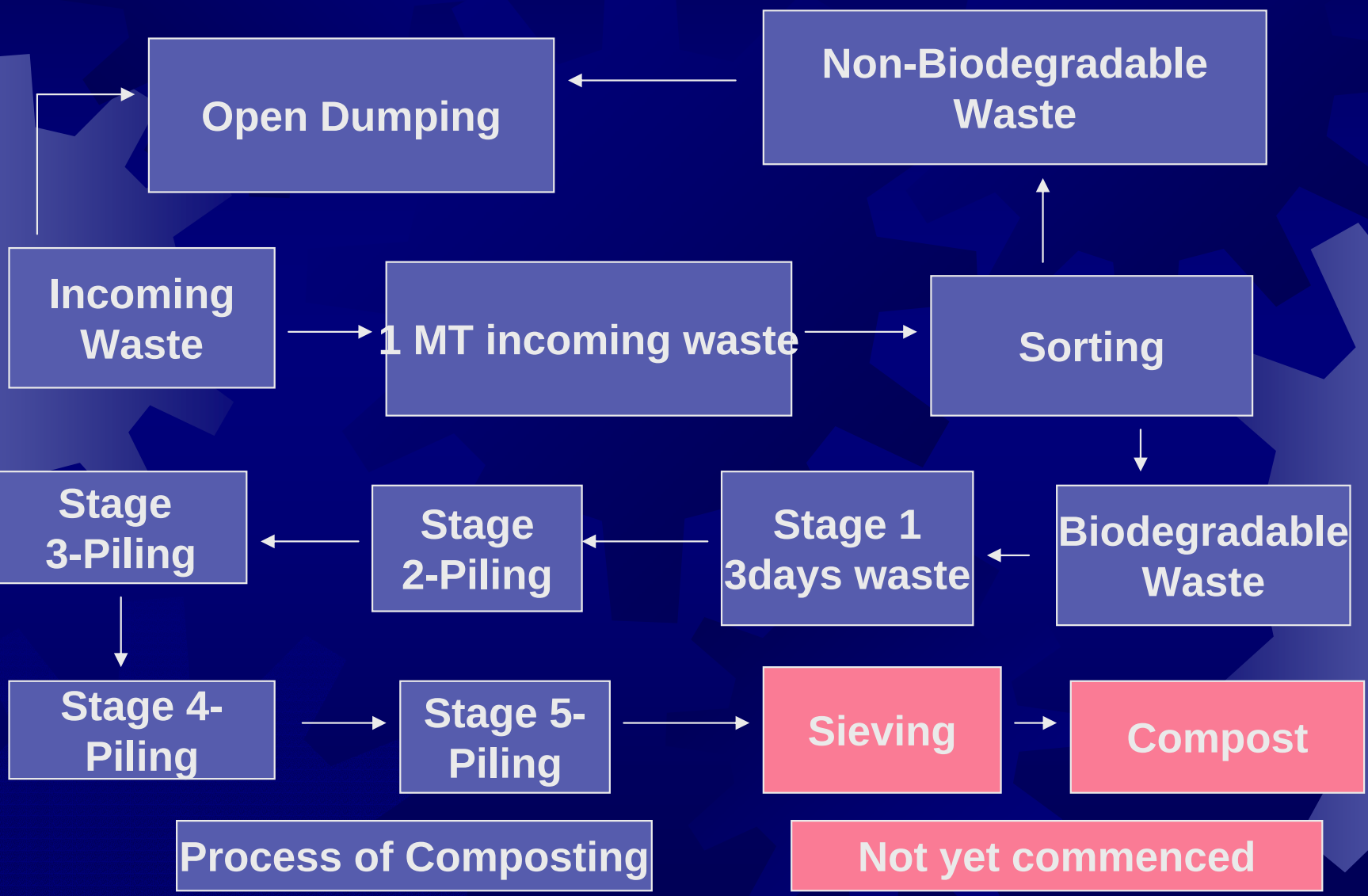
Shortcomings;

- Inadequate number of workers
- Local population does not support
- Fly infesations
- Composting process is incomplete

Future Plans;

- Introduction of household level composting

The Process


Open Dumping
Non-Biodegradable Waste
Incoming Waste
1 MT incoming waste
Sorting
Stage 3-Piling
Stage 2-Piling
Stage 1 3days waste
Biodegradable Waste
Stage 4-Piling
Stage 5-Piling
Sieving
Compost
Process of Composting
Not yet commenced

The Plant

Wastes to be sorted

Windrows

Screener

Open dumping

Sri Lanka Standards-Specifications for Compost from MSW & Agricultural Waste

- Physical Requirements

Color-Brown/Grey to Dark Black

Keeping properties-Not less than 12 months at room temperature

Moisture-Should not more than 25%[dry basis]

Odor- Should not have any unpleasant odor

Particle size –Should not leave residues more than 2 %

Sand content- Should not more than 10%

Sri Lanka Standards-Specifications for Compost from MSW & Agricultural Waste ***Contd;***

- Nutrient Requirements

Characteristic	***Requirement***
pH	6.5-8.5
Organic Carbon	20% by mass min
Nitrogen	1.0% by mass min
Phosphorous	0.5% by mass min
Potassium	1.0% by mass min
Magnesium	0.5% by mass min
Calcium	0.7% by mass min

Sri Lanka Standards-Specifications for Compost from MSW & Agricultural Waste ***Contd;***

- Biological Requirements

Should not contain more than 16 viable weed seeds per square meter

- Microbiological Requirements

Faecal coliforms per gram-free

Salmonella per 25 g-free

- Packaging & Marking requirements also has been specified

Sri Lanka Standards-Specifications for Compost from MSW & Agricultural Waste ***Contd;***

- C to N ratio-should be in range of 10 to 25
- Limits for Heavy Metals;

Element	***Requirement[ppm, max]***
Cd	10
Cr	1000
Cu	400
Pb	250
Hg	02
Ni	100
Zn	1000

Biogas from MSW

- 1960s-Dept of Agriculture introduced 3000 small scale plants-Chinese method
- Present-Dept. of Animal Production & Health has introduction of 300 to 400 plants per year e.g Anuradapura
- Standards for Biogas has been formulated
- Biogas National Technical Committee to be formed and subsequently a Biogas Network
- Most number of plants are Chinese type
- Very few Indian types
- NERD Dry Batch Method becoming popular

Biogas from MSW ***Contd;***

- ***National Engineering Research Development Center[NERD]***
- Has introduced Dry Batch Method[Won the Silver Award in 1996 at the International Inventors Competition in Switzerland, as one of the environmentally friendly system of Biogas generation, and patented
- Apply to houses, local authorities
- 10 to 15 proposals per year, Make 1 to 2 per year
- Kakirawa and Pollonnaruwa completed
- Tissamaharama and Padukka on going
- ***Advantage;*** A garbage disposal system
- ***Problems;***
- Small scale level –repairing when clogged
- Several abandoned units because no technical support
- Cow dung units-abandon when no cattle
- Straw units-abandon when no paddy cultivation/straws
- No government support for next steps, no implementation schedule
- Expertise available but not organized

Biogas & Biofertilizer Project at Muthurajawela

- Established in 2002 by NERD
- Funded by GOSL- Rs 40 million
- ***Project outputs;***
- Method of disposing market garbage[40 tones/week]
- Method of cleaning and maintaining inland water ways[Process *Salvinia molesta-2.5 tones/week]*
- Biogas as an alternative fuel[750 m3/day]
- Employment opportunities

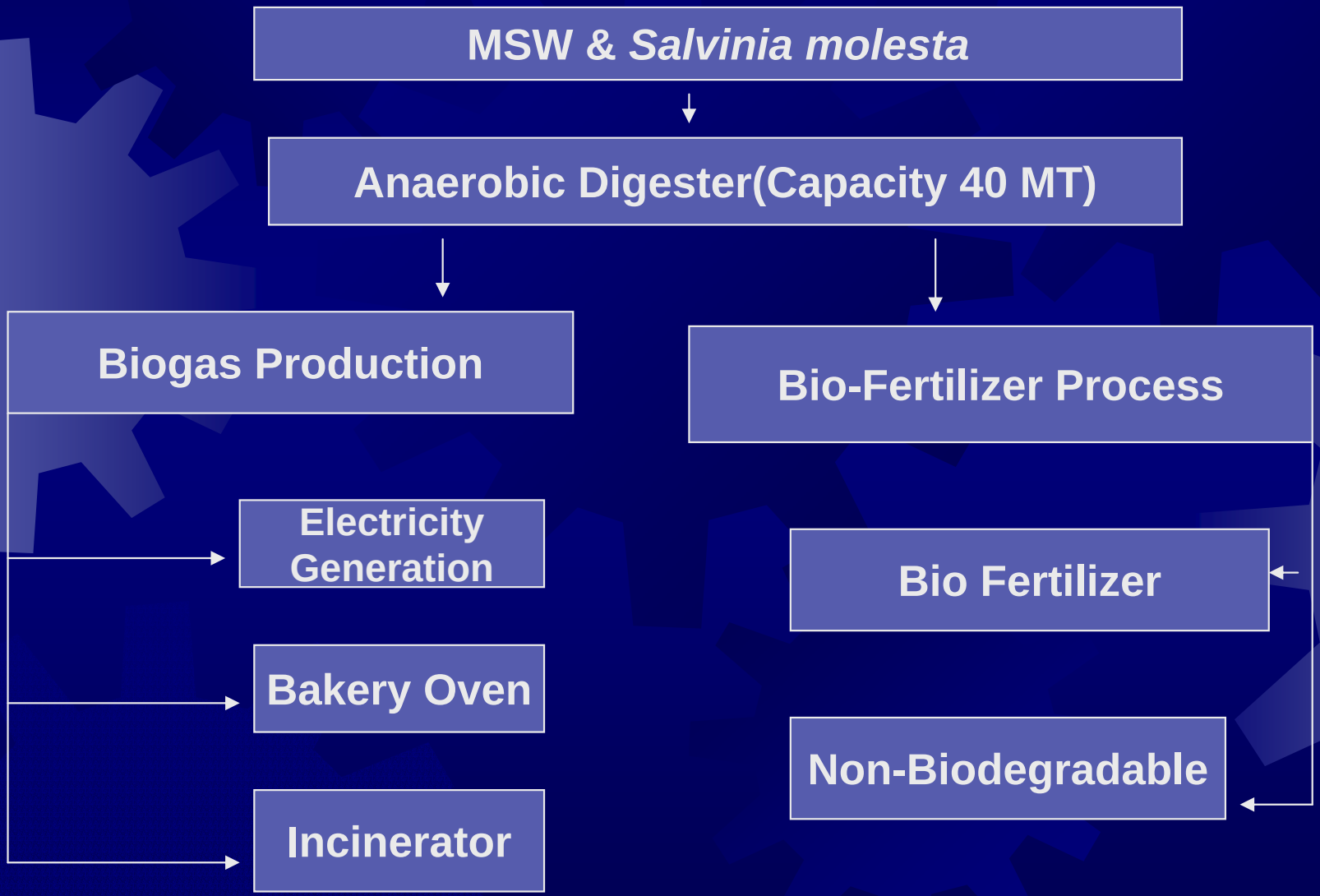
Shortcomings;

- Designed to treat vegetable waste but fed with mixed MSW. No expected outcome achieved
- No supply of vegetable waste as expected
- Baking of bread envisaged but the community did not patronize it

Future Plans;

- Negotiation with local authorities to obtain enough market wastes

The Process


MSW & *Salvinia molesta*
Anaerobic Digester(Capacity 40 MT)
Biogas Production
Bio-Fertilizer Process
Electricity Generation
Bakery Oven
Incinerator
Bio Fertilizer
Non-Biodegradable

The Plant

Thamankaduwa –Biogas Plant

Recycling of Non-degradable wastes

Major recycling plants;

- Arthacharya Foundation at GALLE
- Daulagala
- Mawanella

Waste Item	***Number of Recycling Enterprises***
Polythene/Plastics	20
Paper	03
Glass	01
Coconut Shells	02
PET Bottles	02

Plastic Recycling Plant-Arthacharya Foundation, Galle

- An NGO
- Plant established in 1992
- Operates through community based organizations; 45 CBOs, 1500 families
- Provide loans and job opportunities to the community
- Capacity-10 tones/month

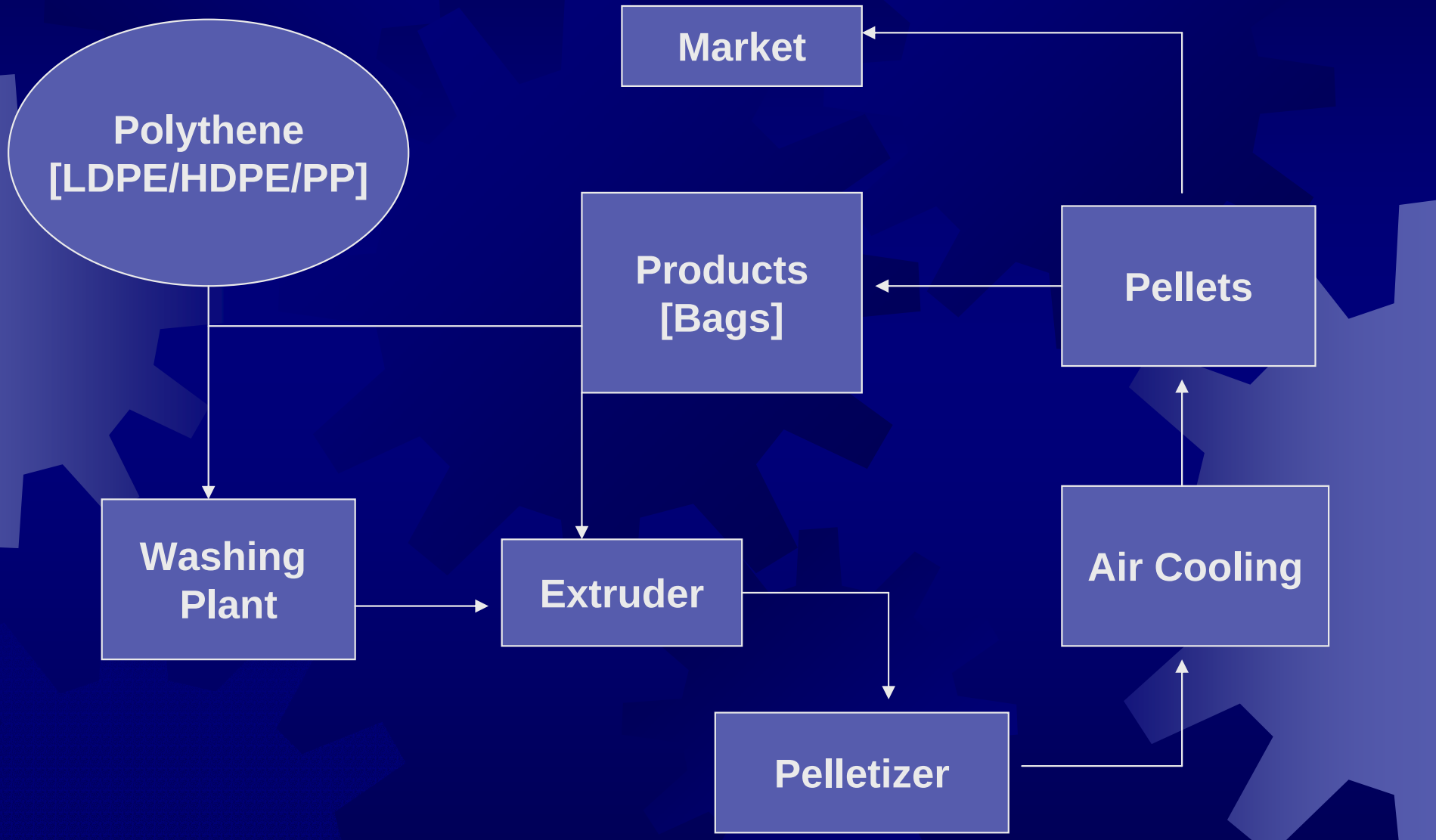
Future Plans;

- 10 more CBOs
- Washing plant and the stores

Shortcomings;

- Hardly any involvement of high income families
- Washing of polythene not done
- No technical staff, glass and paper not processed
- No enough space, capacity of machines is insufficient

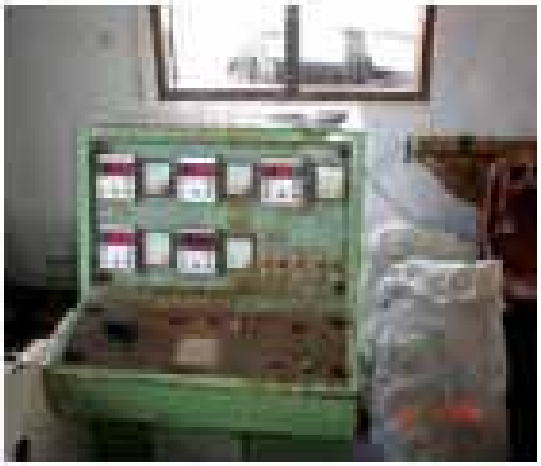
The Process


Market
Polythene [LDPE/HDPE/PP]
Products [Bags]
Pellets
Washing Plant
Extruder
Air Cooling
Pelletizer

The Plant

Raw Materials

Extruder & cooler



Controller

Feeding

Preparation

Products

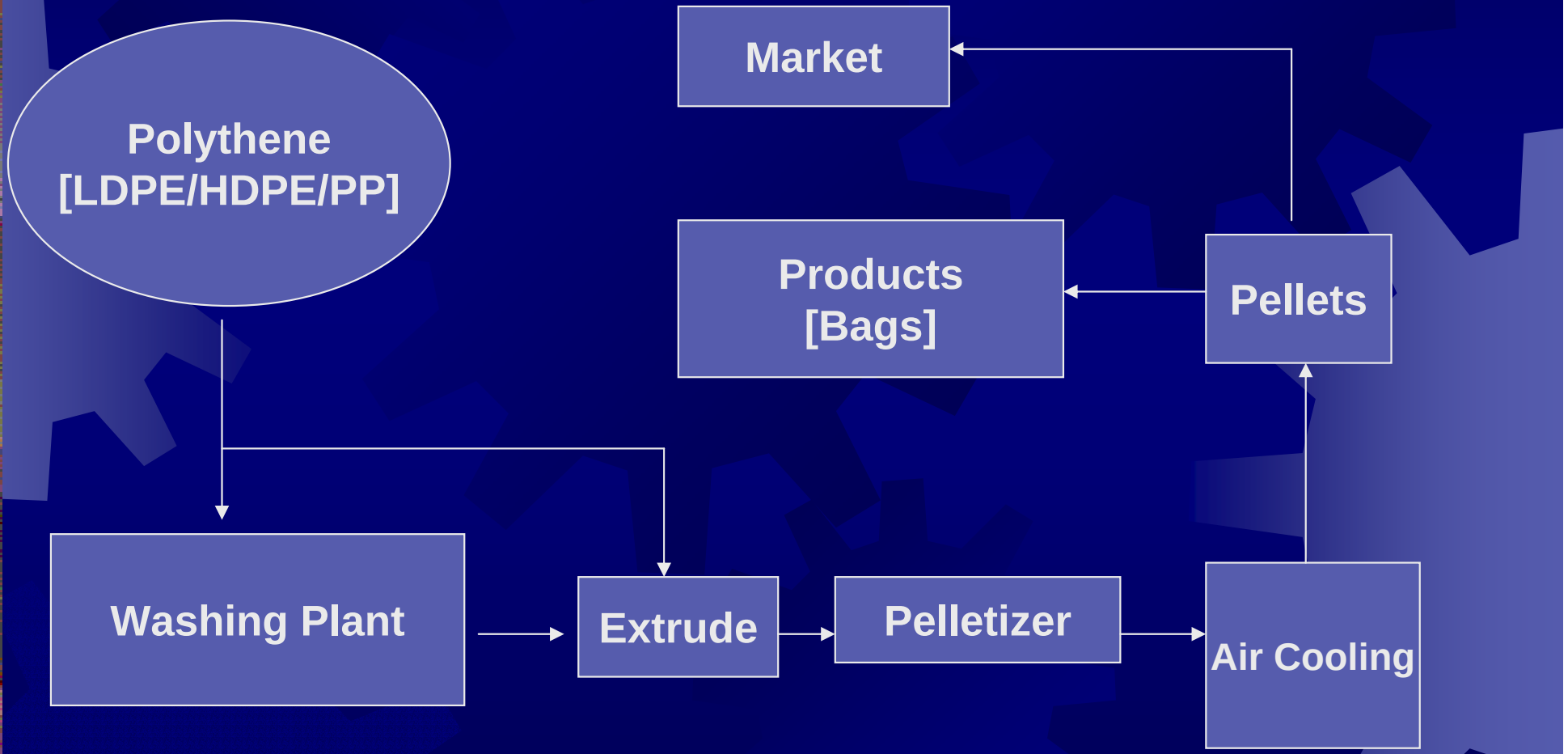
Plastic Recycling Plant at Daulagala

- By a private entrepreneur
- Launched in 1988
- 10 machines, 40 workers
- Technology mainly imported
- Capacity- 2 tones/day

Future Plans;

- New machines to produce grocery bags
- Improve the washing plant

The Process


Market
Polythene
[LDPE/HDPE/PP]
Products
[Bags]
Pellets
Washing Plant
Extrude
Pelletizer
Air Cooling

The Plant

STEPS IN MANUFACTURING PROCESS.

Extruder

Cooling System

Pellets

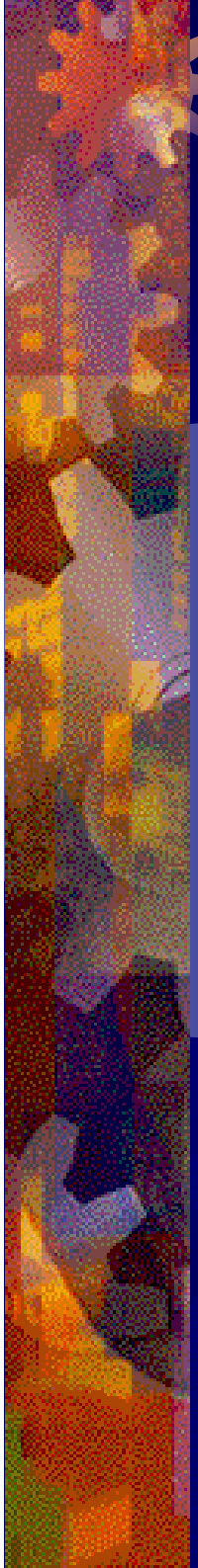
Air Bubbling

RAW MATERIAL

END PRODUCT

Common Problems in Managing MSW in Sri Lanka

- Lack of awareness and education
- Difficult in finding suitable lands for viable and sustainable MSW management
- Lack of accountability in service delivery
- Lack of resources for capital investment and O&M
- Lack of technical know how of most of local authorities
- Weak and slow financial resources mobilization, poorly defined budgets
- Reluctant in creation and implementation of by laws
- Lack of political commitment at all levels of government
- No proper disposal facilities-Only one sanitary landfill so far in operation
- No proper separation of wastes at source except few pilot scale projects



THANK YOU