

23/9/22

Thursday

ES-200 - Lecture-1

53

Module-2 :- Water Quality

↓
Ta Na wa 2 \Rightarrow Proof.

Evaluation: 33% weightage

Final \Rightarrow 25 marks

Assignments \Rightarrow 8 marks

+ class discussion

Asking & Answering Questions
in class

(Qn Given at the
end of each class.)

To be submitted at the
→ End sem exam time. (All
qns together)

Overall minimum - 80% Attendance reqd
Individually also - At least 80% reqd

Module-3

→ About air quality

→ Manoranjan Sahu

→ 10,800 litres of Air/day per human

→ 3-4 litres of water per day per human

Compare the scale.. Air quality is much more imp

→ 65-70% of Indian population live in rural areas.

→ Human population has done more damage to the envmt in 20th century than in all of human history.

→ 23 Quiz → 10th Quiz/Assignment

Module-1

— Solid Waste Management

— One of the most neglected Areas

→ Anusag Garg

→ Landfills mostly — to dump Solid waste ..

→ Asia's largest landfill site — Devnar

(near Mumbai)

(146 acres) around.

→ Highcourt now ordered to stop dumping here as it has reached its limits. Now 2000 tonnes Devnar, then Konjumangal waste processing & dumping centre
One more in Mulund, closed now.

———— Electrical & Computer people need to think of how to make things that are more reusable, recyclable.. etc..

→ Evaln → 25 Marks - Final Exam

→ 9 Marks - Assignment/Quiz

If Assignment - open book
If Quiz - closed book. {

Just 2nd week
Monday

→ Everything won't be there inside. Listen & make notes. Ans will be based on them. Make class interactive.

Solid waste

Thu 22/09 : class 1

Fri 23/09 : class 2

Tue 27/09 : class 3

Thu 29/09 : class 4

} nice! only 4 classes...

CPHEEO, 2016 :

central public health &
environmental engineering
organisation.

CPHEEO manual 2016!

26. Sept. 2022.

Monday.

Solid Waste Management :-

- MSW - municipal solid waste

10K metric tonnes/day → Mumbai Solid waste
now 7.5K m.ton

- * CPhEEQ 2016 manual on solid waste management.

→ What is MSW?

i) Non-hazardous waste!

MSW inclu

{ treated biohazard waste
domestic waste
sanitary waste, institutional

excludes

{ industrial waste
bio-medical waste
e-waste
radio-active waste

Per capita waste is higher in
higher income countries

- * Global waste composition

{ 60% compostable + paper + wood
12% plastic
8% Rubber/textiles

↳ bio-degradable waste

waste collection services
improved with
economic status
of a country.

- * carbon-neutral materials in MSW composition

- Compostables (Yard trimmings, food scraps)
- Paper
- wood ↗ not biodegradable, due to lignin.

- * not carbon-neutral :-

- metals
- plastic
- Rubber, leather; textiles
Soj. carbon-neutral
- Glass, Ash content.

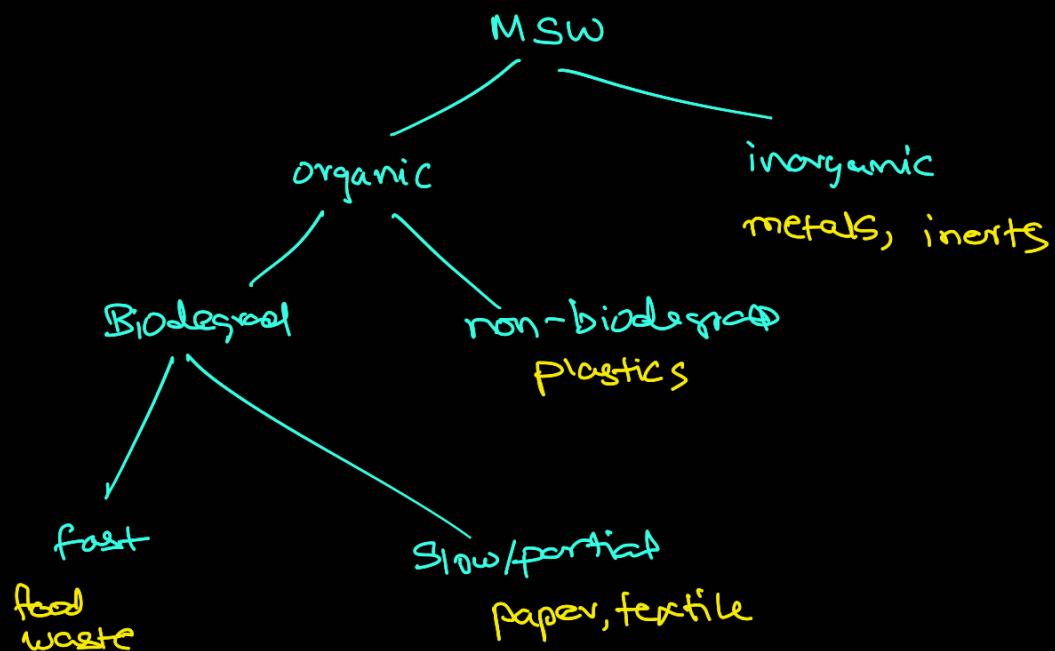
the carbon
content
was once CO_2

So neutral!

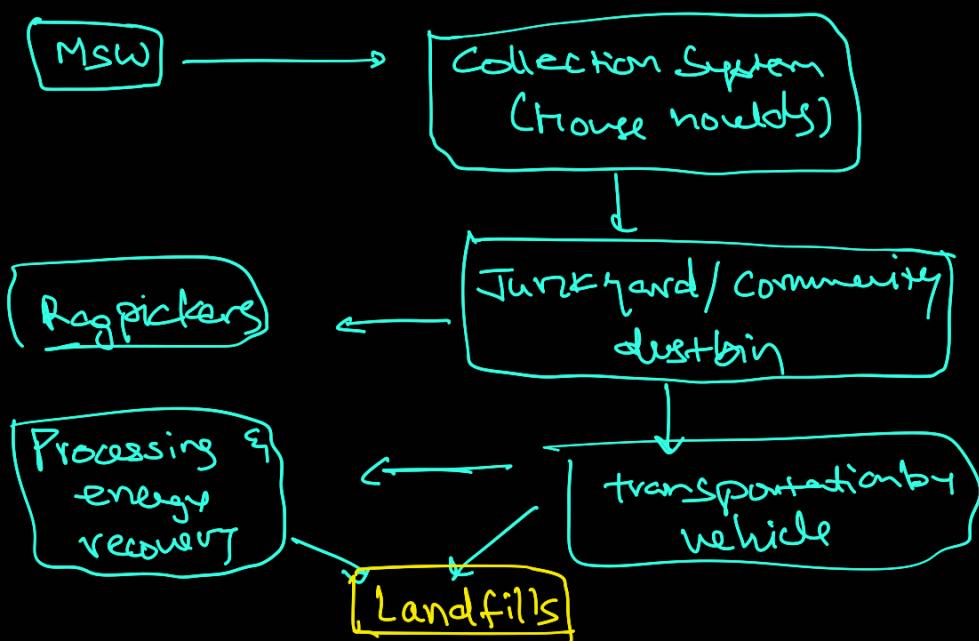
* Office paper → Bright white
 less lignin; more cellulose; easily degradable.

lignin → hard protein
 cellulose → degradable protein.

→ Classification:



→ existing generalizes MSW mgmt. in india.



→ Terminology :-

- 1) Bulk Waste Generator :- buildings; hospitals; schools, hotels
avg. waste gen $\geq 160\text{kg per day.}$ Bulk waste generator.
- 2) Biodegradable waste :-
org. material, that is decomposable by microbes. into stable compounds.
- 3) Combustible waste :-
 - * non-biodegradable
 - * non-reusable
 - non-hazardous

no other way to process this.

solid waste with minimum Cal Val.
 $\text{Calorific value} \geq 1500\text{kcal/kg}$

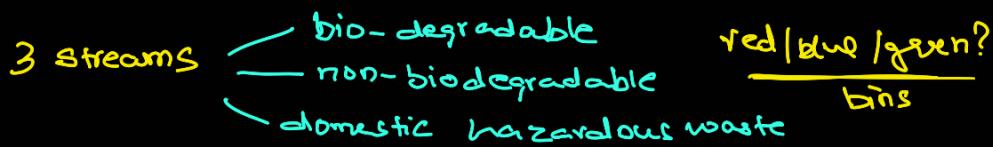
combustible waste

excluding chlorinated materials
- * co-processing : use of combustible waste as a raw material source of energy.
- * decentralized processing : using dispersed facilities for waste processing - minimize transportation costs.
- * refuse derived fuel :
fuel derived from combustible waste fraction of solid waste in form of pellets produced by
1) drying
2) shredding
3) dehydrating
4) Compacting

→ Duties of waste generators :- (solid waste management, 2016)

CIPHEO guidelines

1) Segregate & store:-



2) Should not burn or bury:-

on the streets, open public spaces or in the drain.

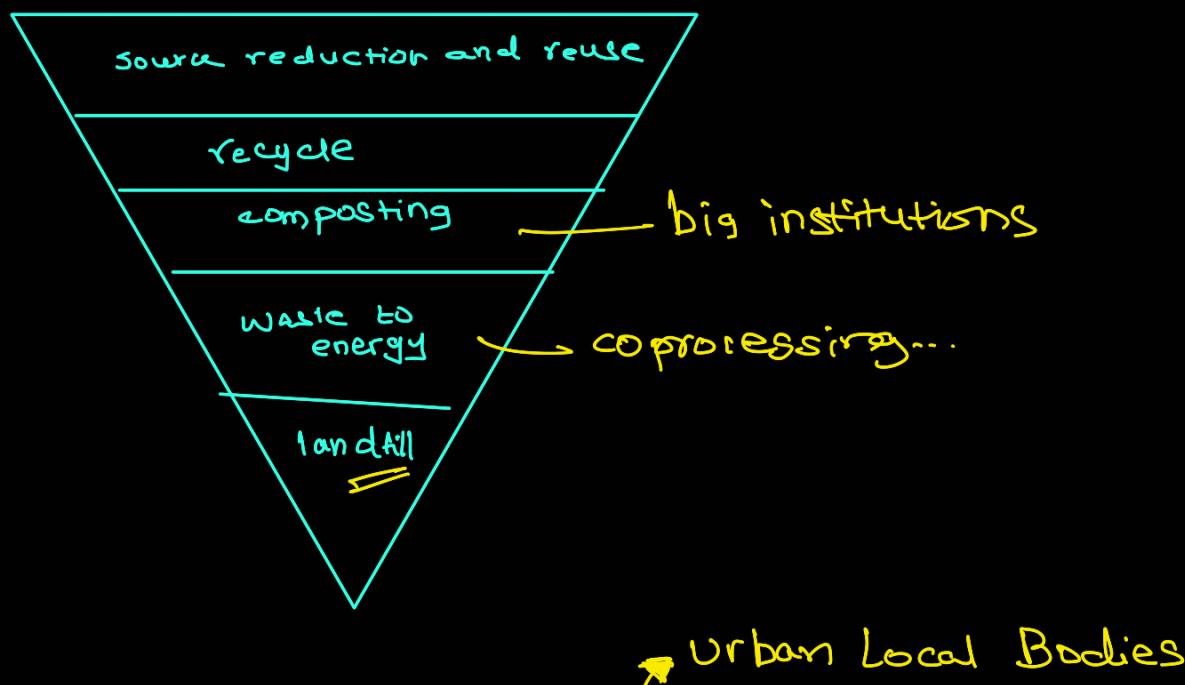
3) pay user fee : for waste management

4) gathering of more than 100 people: permit needed.

5) Street vendors : responsible with waste segregation.

6) Big Institutions: Biodegradable waste processed by composting/
biomethanation

→ Waste hierarchy :- (CPHEO 2016)



Urban Local Bodies

→ waste minimization requiring ULBs support:-

1) awareness for increased participation.

2) At Source reduction programs E.g: domestic composting At-source reduⁿ prgm.

3) reduce use of non-degradable/non-recyclable/toxic materials.

4) Banning Plastic

5) Rewards for users returning recyclable products - Batteries .

EPR is needed by producers here. prerequisite

↳ Extended Producer Responsibility.

→ Functional elements of an integrated waste management system!-

- waste generation (home)
 - waste handling & separation, storage & processing at source
(domestic composts)
 - collection (CARTICO)
 - separation, processing, transformation of solid waste (processing at industry level)
 - Transfer and transport (landfills)
 - Disposal (....)
- eazy!

→ Full cost Assessment:- (CPHEED, 2016)

↙
★ FCA → framework to evaluate all costs associated with integrated waste management for ULBs (Urban Local bodies)

- 1) front-end costs
- 2) capital costs
- 3) operating costs
- 4) back-end costs
- 5) contingent costs Dictionary: contingent = "subject to change"
- 6) environmental costs
- 7) social costs

→ Sources of financing:- CPHEED, 2016

- 1) local tax; property tax
- 2) User pays charges
 - polluter's principle
 - capacity to pay
- 3) Govt. grants
- 4) Loans from financial institutes
- 5) Loans from internationals
- 6) PPPs public-private partnerships
- 7) Municipal bonds
- 8) Revenue from waste sale.

→ Properties of MSW: (municipal solid wastes)

Physical :-

1) Specific weight :-

180 - 415 kg/m³ &
average : 300 kg/m³

* *
Very
low

water → 1000 kg/m³...

2) moisture content

3) particle size.

4) field capacity

total amount of moisture
retained in sample waste

5) permeability of compacted waste pellets

Chemical :-

rough?

1) Proximate analysis yields

- moisture
- ash content
- volatile combustible matter
(methane?)
- Fixed carbon

2) Ultimate Analysis:

- C, H, N, D, S & ash
- Halogens also vary

3) Heating Value:

- * Dulong formula:

Heating value (kJ/kg)

$$= 337C + 1419\left(H - \frac{1}{8}O\right) + 93S + 23N$$

Here; > Compositions...

DONE:-

More material on slides - last page:-

- 1) SWM rules 2016: 96 pages
- 2) CPHEEO 2016 : 96 Pages

→ Videos on MSW processing in Chq

& plastic waste utilization in road construction.

* . →