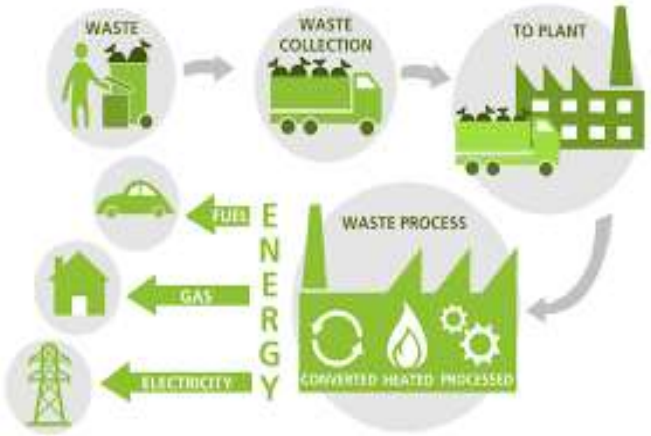
SEM 2-FYBCOM-EVS (ENVIRONMENTAL STUDIES)

UNIT 1-SOLID WASTE MANAGEMENT FOR SUSTAINABLE SOCIETY

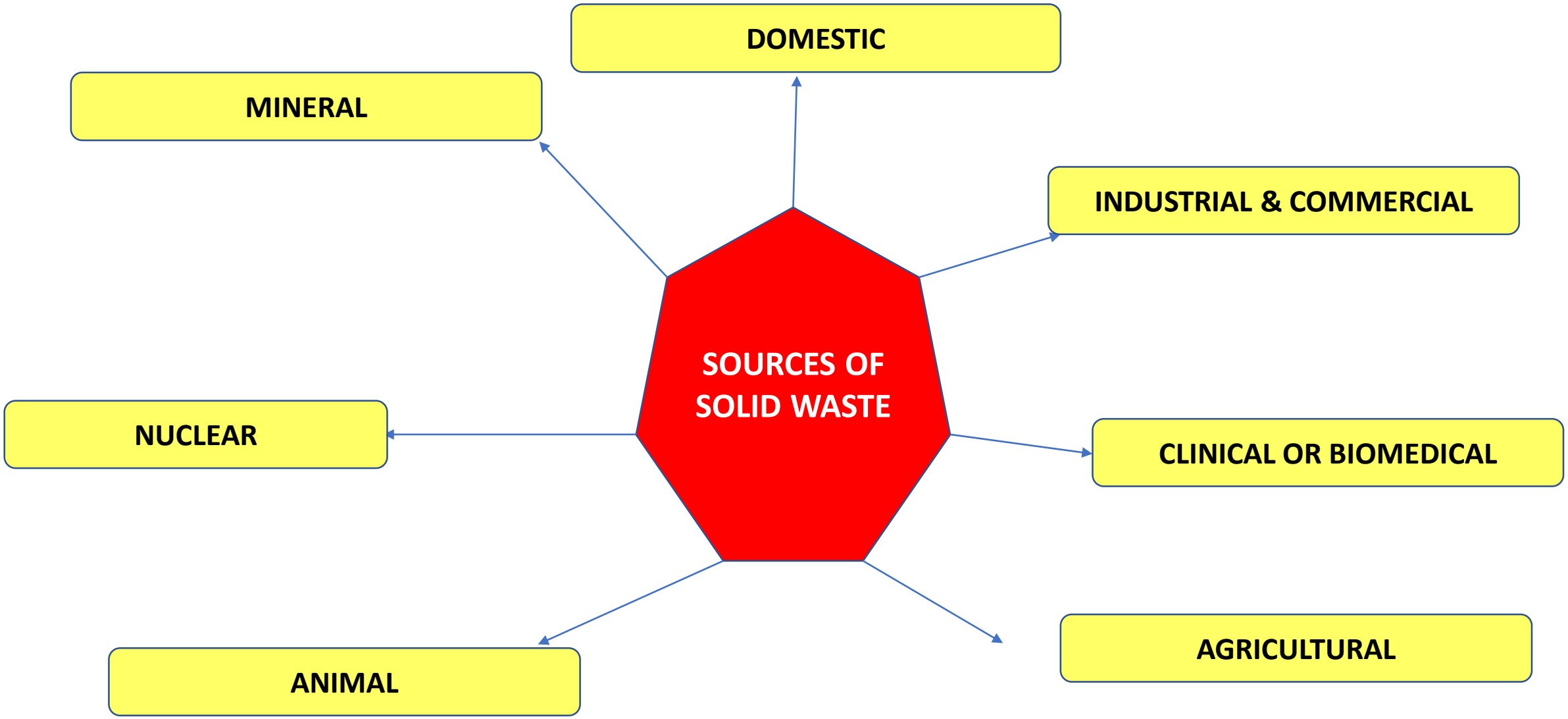


❖ **SYLLABUS AT A GLANCE** :-

- ❑ Classification of Solid Wastes-Types & Sources of Solid Waste
- ❑ Effects of Solid Waste Pollution-Health Hazards,Environmental Impacts
- ❑ Solid Waste Management-In Mumbai
- ❑ Solid Waste Management-Schemes & Initiatives run by MCGM
- ❑ Role of Citizens in Waste Management in- Urban & Rural Areas

INTRODUCTION TO WASTE

- Waste is- “Useful Resource, at wrong time & wrong place.”
- It is anything,which is-Rejected,Abandoned or out of use.
- It is any substance,solid,liquid or gaseous,for which no use can be found by the organism or system which produces it & for which, a method of disposal must be devised,is called as- ‘Waste’.
- Thus,it is ‘Left Over’ from some human activity,having no use in particular as such
- As compared to earlier era,modern era is generating huge amount of waste due to-Increase in Population,further advancement in Science & Technology & changes in Standard of Living.
- Amount of waste generated,depends upon following factors :-
  - Level of Economic Development
  - Standard of living of people
  - Industrialisation & Urbanisation
  - Size of Population


DOMESTIC
MINERAL
INDUSTRIAL & COMMERCIAL
SOURCES OF SOLID WASTE
NUCLEAR
CLINICAL OR BIOMEDICAL
ANIMAL
AGRICULTURAL

SOURCES OF SOLID WASTE

DOMESTIC WASTE

- **Household/Domestic Garbage** includes waste like-Spoiled food,old newspapers,waste papers,plastic bags,cardboard wrappings,tins,broken glass,stationary,bulbs & tubes,unused medicines,cloth pieces,rags,kitchen smoke,vegetable waste,old or leftover insecticides,pesticides,cleaning chemicals like-Phenyl etc.

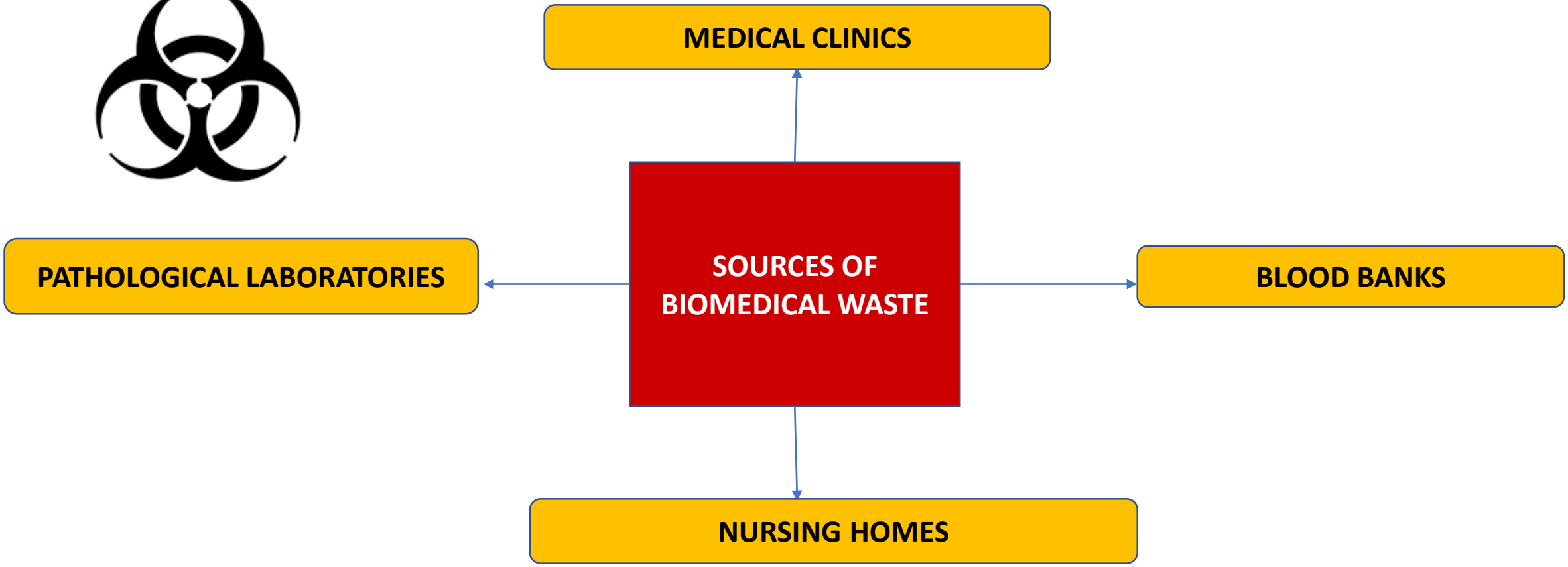
INDUSTRIAL WASTE

- **Industrial & Commercial** :- It includes-Residual metals or solid wastes from industries,ash,packaging containers.Liquid residues or liquid wastes like-Oil,paints,waste-water & chemicals.Gaseous wastes are generated as a result of burning & combustion of coal & other fuels.Industries release fumes of chemicals & particulate waste in air.

BIOMEDICAL WASTE

- **Clinical or Biomedical** :- It includes-Metallic Waste ,Glass,rubber,plastic items,needles,equipments,bottles,sharps,syringes,tubes,gloves,cotton soiled with blood& other body fluids,Mercury spilled out from broken thermometers,old & expired medicines,disinfectant like-Phenyl,other chemicals & their containers.Anatomical waste like-Surgically removed body parts/Amputed Organs are also part of-Biomedical Waste.

  It is highly infectious waste.



- **Agricultural Waste** :- This waste residues include- a variety of plant products like-Stalks,dried- grass,leaves&husk.Biomass is not considered as waste by farmers but it is reused by them in many different ways.Some of it is used in making farm manure or compost & some is just buried or left in the field to decompose & mix with soil.Some of the waste is used as a fodder for domestic animals.Only a small portion of this biomass,which is burnt,is considered as a waste.Chemical fertilizers are utilized by farmers to provide instant nutrient supply & chemical pesticides are sprayed to protect crops from pests & insects.Their residues are present in soil in small quantities,which are not visible,but form most harmful agricultural waste.

Animal Waste

- **Animal Waste** :- Products associated with it are from the field of Agriculture,mostly include-Animal Dung,excreta of other animals & bodies of dead animals.They are not considered as a waste by farmers but reused in making manure & compost.

Nuclear Waste

- **Nuclear Waste** products of nuclear power plant include-Radioactive Minerals & metals.A lot of care is essential for it's disposal.Few countries are dumping large quantities of radioactive wastes generated while testing nuclear weapons in Pacific Ocean.It has caused irreparable damage to marine life.Atomic Energy accident had occurred in past,Chernobyll (Russia-1986) & Fukushima-Daichi-Nuclear Power Plant (March 2011).

Mineral Waste

- **Mineral Waste** :- Heavy metal residues which are found around mines & quarries contain toxic metals like-Lead,Arsenic,Cadmium etc.Fine particles of Carbon generated from coal mines,heavy metal particles & radiation from Coal mines mix with dust & pollute surrounding air & pollute water bodies as well by mixing in water sources like-Streams,Ponds & Aquifers.The pollution caused by oil spill from oil containers in sea along with metals & chemicals leads to vast damage of marine life.

CLASSIFICATION OF WASTES

CLASSIFICATION OF WASTE BASED ON NATURE (PHYSICAL STATE)

SOLID

- It is generated from variety of sources like- Construction,Industries,mining, commercial areas,offices,factories & domestic use.
- Examples-Ash from fuel combustion,Garbage etc.

LIQUID

- Domestic & Industrial sewage (Wastewater) Discharge,Effluent (Treated Sewage),Affluent (Untreated Sewage)

GASEOUS

- Poisonous gases,fumes & smoke from industries & automobiles

CLASSIFICATION OF WASTE (BASED ON MOISUTRE)

WET WASTE

It includes-Fruit Peels,Vegetable Peels,Leftover & stale food,Tea & coffee powder etc.

DRY WASTE

It includes-Paper,Metal,Glass,Plastic,Cardboard etc.

CLASSIFICATION OF WASTE (BASED ON HARMFUL NATURE)

HAZARDOUS

- They are highly toxic & harmful to all living beings.They are highly inflammable,corrosive ,explosive & react when exposed to certain things such as gases.Some of these wastes can cause irreparable ,harmful genetic disorders.
- Industrial wastes in this category is considered as very harmful due to presence of toxic substances.
- Biomedical Waste in this category is very infectious & requires careful handling.
- Certain types of Household Waste are hazardous, such as-Old Batteries,Shoe-Polish,tint of paint,old medicinal bottles,bandages & discarded soiled clothes of sick,infected people, Pesticides etc.

NON HAZARDOUS

- It includes-Municipal & Household wastes,obtained from street sweeping, construction work & Demolition of buildings etc.

CLASSIFICATION OF HAZARDOUS WASTE

BIODEGRADABLE WASTE

- It is also known as- 'Organic Waste'.It consists of- Vegetable peels,fruit & vegetable remains,bones meat,left-over & rotten food,garden waste such as-Leaves & Twigs,which are decomposed by ants & insects,earthworms,beetles, millipeds,fungi & microbes.
- These degradable substances once again enter Bio-Geochemical cycles.A large quantity of household & agricultural wastes are biodegradable & also known as- 'Wet Waste'.

NON-DEGRADABLE WASTE

- It includes- Plastic,Thermocole,Nylon & Rayon like Synthetic Fibres,other Synthetic Polymers & E-Waste (Electronic Waste)

NON-BIODEGRADABLE WASTE

- It includes-Synthetic Material like-Plastic,Thermocole,Fibres like-Nylon & Rayon & other synthetic polymers.
- It also includes- Electronic Waste consisting large volume of inert material like-Plastic & Polymers.These wastes consist of Communication Equipments like-Computers,Mobiles,Telephones & Television sets etc.
- Non-Biodegradable waste ,is that waste,which cannot be decomposed by micro-organisms & therefore,this waste will continue to remain on earth,causing debries problem,unless some solution is found for it's proper management.

ELECTRONIC WASTE

- E-Waste is a type of waste consisting of-Any broken or unwanted electronic appliance.Many of the components of Electronic Equipment are considered toxic & non-biodegradable.That's why many European countries banned E-Waste from landfills in the 1990's.An advanced E-Waste Policy in Europe by implementing the **Waste Electrical and Electronic Equipment** in 2002,which holds manufacturers responsible for E-Waste Disposal at end-of-Life.

- Electronic Waste consists of- All computers,Entertainment devices,mobile phones etc.,whether they have been sold,donated or discarded by their original owner.
- 65 cities in India,generate more than 60% of total E-Waste that generates in India.10 states generate 70% of total E-Waste generated in India.

- Maharashtra ranks First in E-Waste generation followed by Tamilnadu,Andhra Pradesh,Uttar Pradesh, West Bengal, Delhi, Gujarat,
  Karnataka, Madhya Pradesh & Punjab in the list of E-waste generating states in India.

- Amongst the 10 cities,generating E-waste,Mumbai ranks First,followed by-Delhi,Bengalooru,Chennai,Kolkata,Ahmedabad,Hyderabad,Pune,Surat & Nagpur.

- There are two small E-Waste dismantling facilities functioning in Chennai & Bengalooru.
- There is no large scale organised E-Waste recycling facility in India & the entire recycling exists in unorganised sector.

EFFECTS OF E-WASTE

Lead (Pb)

- It is found in solder in printed circuit boards,glass panels & gaskets in Computer monitors.
- It causes damage to-Central & Peripheral Nervous Systems,Blood Systems & kidney damage.
- It affects brain development in children.

Cadmium (Cd)

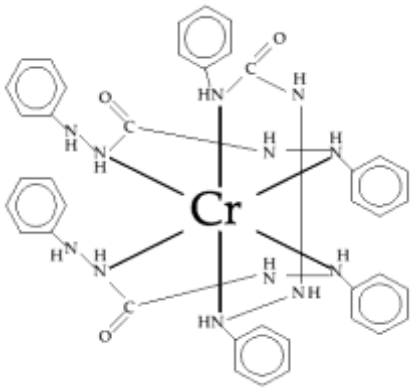
- It is found in chip resistors & semi-conductors
- It causes toxic,irreversible effects on human health by being Tetratogenic (Cancer Causing)
- It accumulates in Kidney,Liver & causes neural damage

Mercury (Hg)

- It is found in Relays & switches,Printed Circuit boards
- It causes Chronic damage to brain.
- Due to bioaccumulation in fishes,it causes respiratory & skin disorders
- Corrosion protection of untreated & galvanised steel plates,decorator or hardner for steel housings

EFFECTS OF E-WASTE

HEXAVALENT CHROMIUM



- It is used for the protection against corrosion of-Untreated & Galvanised steel plates, as a Decorator or hardner for steel housings.
- It causes-Asthmatic Bronchitis
- It causes damage to DNA

BARIUM

- It is found in front panel of CRT's (Cathod Ray Tube)
- It's short term exposure causes-Muscle Weakness,Damage to-Heart,Liver & Spleen

PLASTICS INCLUDING PVC (Polyvinyl Chloride)

- It is found in cabling & computer housing.
- Burning of PVC produces Dioxin that causes reproductive & developmental problems,damage to immune system & interference with regulatory hormones

PLASTIC WASTE

- Plastic is one of the few chemical materials which is responsible for causing environmental problem.Polyethylene,Polyvinyl Chloride,Polystyrene are largely used in plastic manufacturing.It can be formed into fibres or thin transparent films.These properties has made Plastic popular in many durable & disposable goods & also for packing material.

- Plastics have wide application as they are easy & cheap to manufacture & last for longer duration.But at the same time,unluckily, these useful properties of plastics make plastic cause a huge pollution problem.As Plastic is cheap, it gets discarded easily & it's persistence in environment can do a great harm.

- Urbanisation has added to the plastic pollution in a concentrated form in cities.Plastic waste thrown on garbage, enters drainage lines & chokes them,leading to floods like that of experienced in Mumbai,1998 & 26th July,2005.Eating of plastic bags from garbage results in death of cattles.

- Plastic is responsible for causing Marine Pollution.It affects marine wildlife in 2 important ways:- By entangling Creatures & by being eaten.Turtles get badly affected by plastic pollution.A a result,Turtles are threatened & endangered species in today's era.Plastic bags are being eaten by marine creatures,due to getting mistaken as Jellyfish.

SOURCES OF PLASTIC WASTE

- Important sources of Plastic Waste are from Packaging, carry bags,bottles, containers,trash bags, from health & medicare,from hotels & catering industry,plastic from air,rail,road travelers.
- Plastic is problematic to environment via it's all stages of Life Cycle :- Manufacture,Use & Disposal.
- Problem gets worsened when plastic is sent for recycling for repeated use.
- As far as use of Plastic is concerned, for consumer acceptance purpose, recycled material of first grade should be used.
- In other cases,Second Grade material will have greater acceptance,if blended virgin & recycled plastic in 50:50 ratio.
- Carry bags, which are manufactured ,using third & low grade materials, are unacceptable & are main environmental culprits.

JUDICIOUS USE OF PLASTIC WASTE

PLASTIC ROAD

HOT BITUMEN

- Recent studies, in the direction of judicious use of plastic have shown some hope in terms of using plastic waste for road construction.
- Bengalooru based firm,K.K.Polyflex & a team of engineers from R.V.College of Engineering have developed a way of using plastic waste for construction of roads.
- Plastic Roads are mainly made up of- Plastic Carry Bags,Disposable cups,Pet Bottles collected from garbage dumps, which form important ingredient of construction material.
- When mixed with Hot Bitumen, plastic melts to form only a coat, over the aggregate & the mixture is laid on the road surface like a normal tar road.

Ministry of Environment, Forest and Climate Change
Government of India

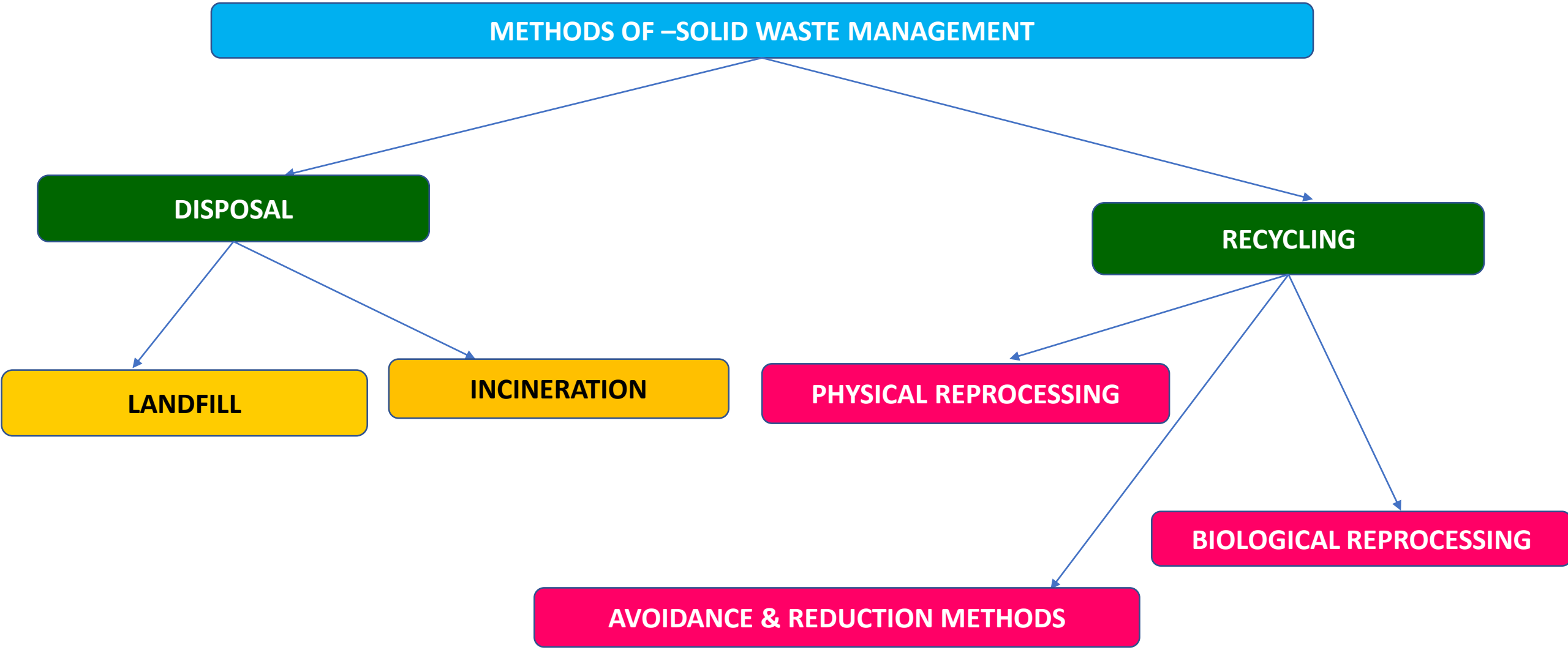
- The Union Ministry of Environment and Forests (MoEF) has recently notified **“The Recycled Plastic Manufacture and Usage Rules 1991”.**

- These rules require that-Carry bags or containers used for the purpose of storing shall be made up of virgin plastic & be in a natural shed or white.

- The thickness of carry bags shall not be less than 20 microns.

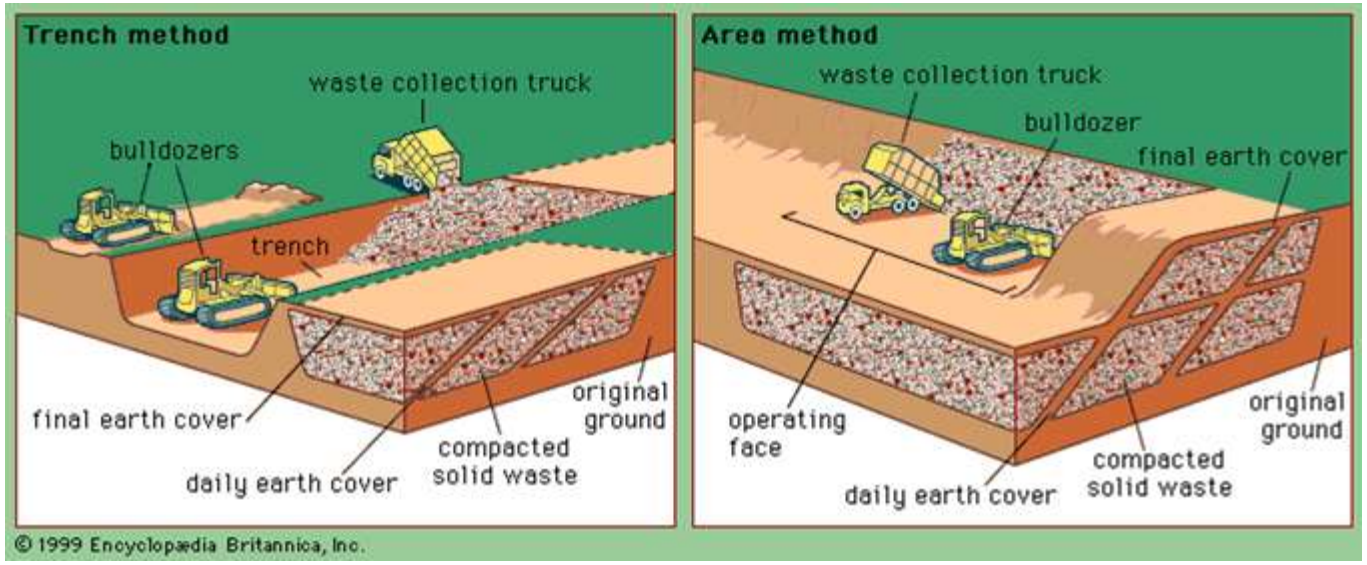
SOLID WASTE MANAGEMENT

- Waste Management is-Collection,Transport,Processing,Recycling or Disposal of Waste Material.
- It is generally undertaken to reduce effect of wastes on environment & to recover resources from them.
- Management of Hazardous & Institutional waste in metropolitan areas is usually the responsibility of Local Government authorities,while management for Non-Hazardous commercial & industrial waste is usually the responsibility of generator.


METHODS OF –SOLID WASTE MANAGEMENT
DISPOSAL
RECYCLING
LANDFILL
INCINERATION
PHYSICAL REPROCESSING
BIOLOGICAL REPROCESSING
AVOIDANCE & REDUCTION METHODS

DISPOSAL METHODS OF SOLID WASTE MANAGEMENT

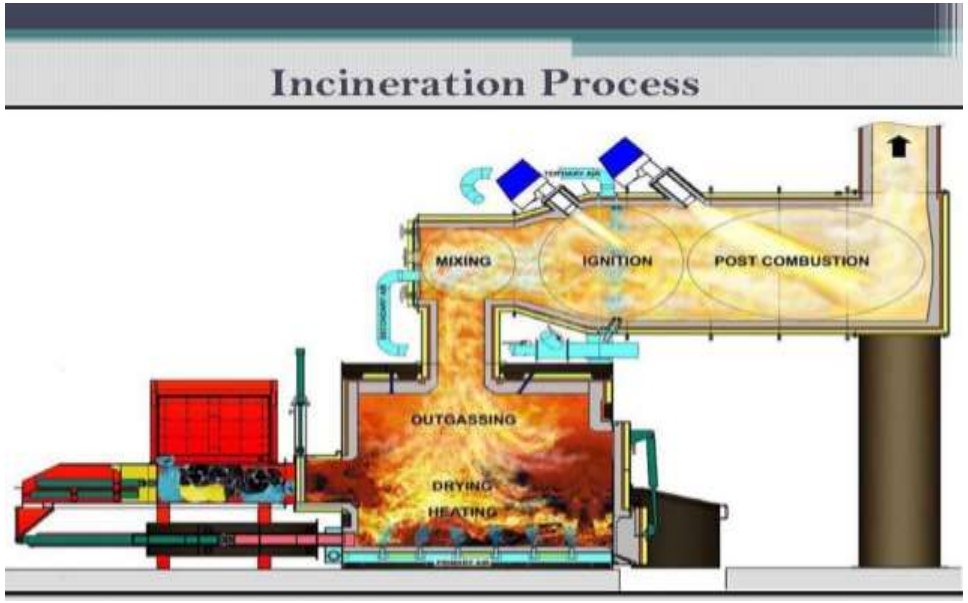
LANDFILL



- Disposing of waste in a landfill involves burying waste to dispose of it & this remains a common practice in most countries.Historically,landfills were often established in disused quarries,mines,voids or borrow pits.

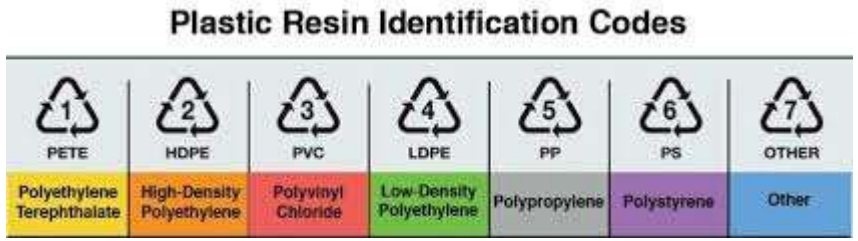
- A properly designed & well managed landfill can be a hygienic & relatively inexpensive method of disposing off waste materials.

INCINERATION



INCINERATION PLANT

- It’s a disposal method which involves combustion of waste material at quite higher temperature.
- This waste treatment system is also described as- “Thermal Treatment”
- Incinerators convert waste materials into-Heat,Gas,Steam & Ash.
- It is used to dispose off-Solid Waste.
- It’s a practical method of disposing of certain hazardous waste materials.



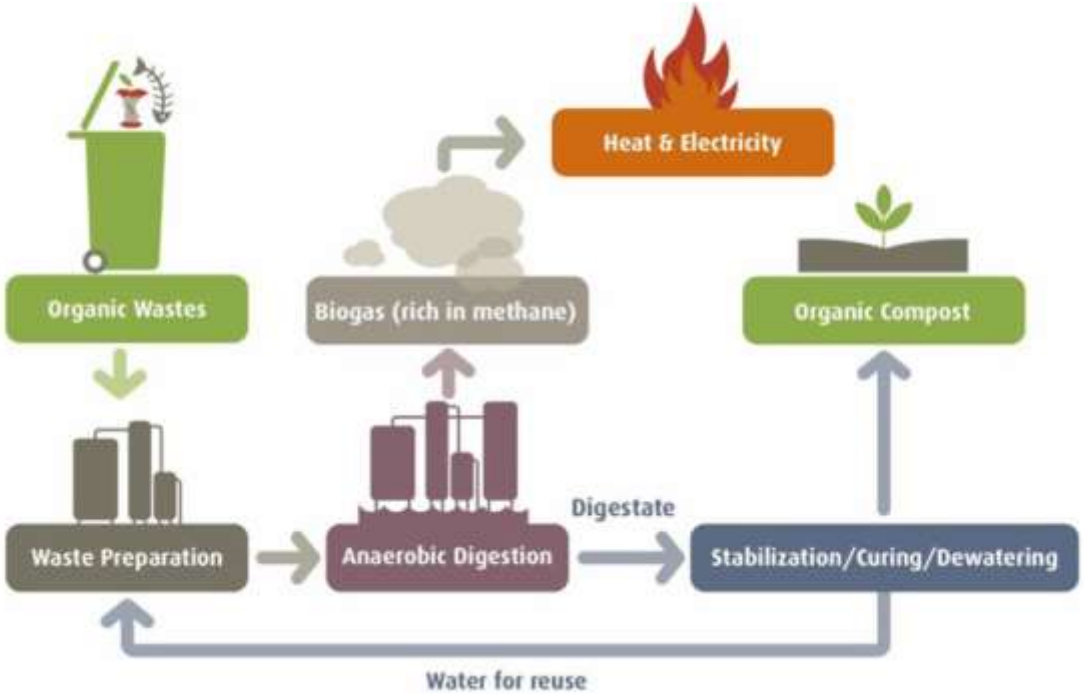
RECYCLING METHODS

- The process of extracting resources or value from waste is generally referred to as-Recycling,meaning to recover or reuse the material.There are a number of different methods by which waste material is recycled:- The raw material maybe extracted & reprocessed,or the calorific content of the waste maybe converted to electricity.

PHYSICAL REPROCESSING

- The popular meaning of recycling is-Widespread collection & reuse of everyday waste materials, such as- Empty Beverage container or commonly used-Plastic Water Bottle used for drinking water.
- The most commonly used consumer products recycled,include-Aluminium Beverage Cans,Aerosol & food cans,made up of Steel,HDPE & PET Bottles,Glass Bottles & Jars,Paperboard Cartons,Newspapers,Magazines & Cardboards.Other type of Plastic (PVC,LDPE,PP & PS) are also recyclable, although they are not collected so commonly.
- These objects are usually composed of a single type of material,making it relatively easy to recycle into a new product.

BIOLOGICAL REPROCESSING

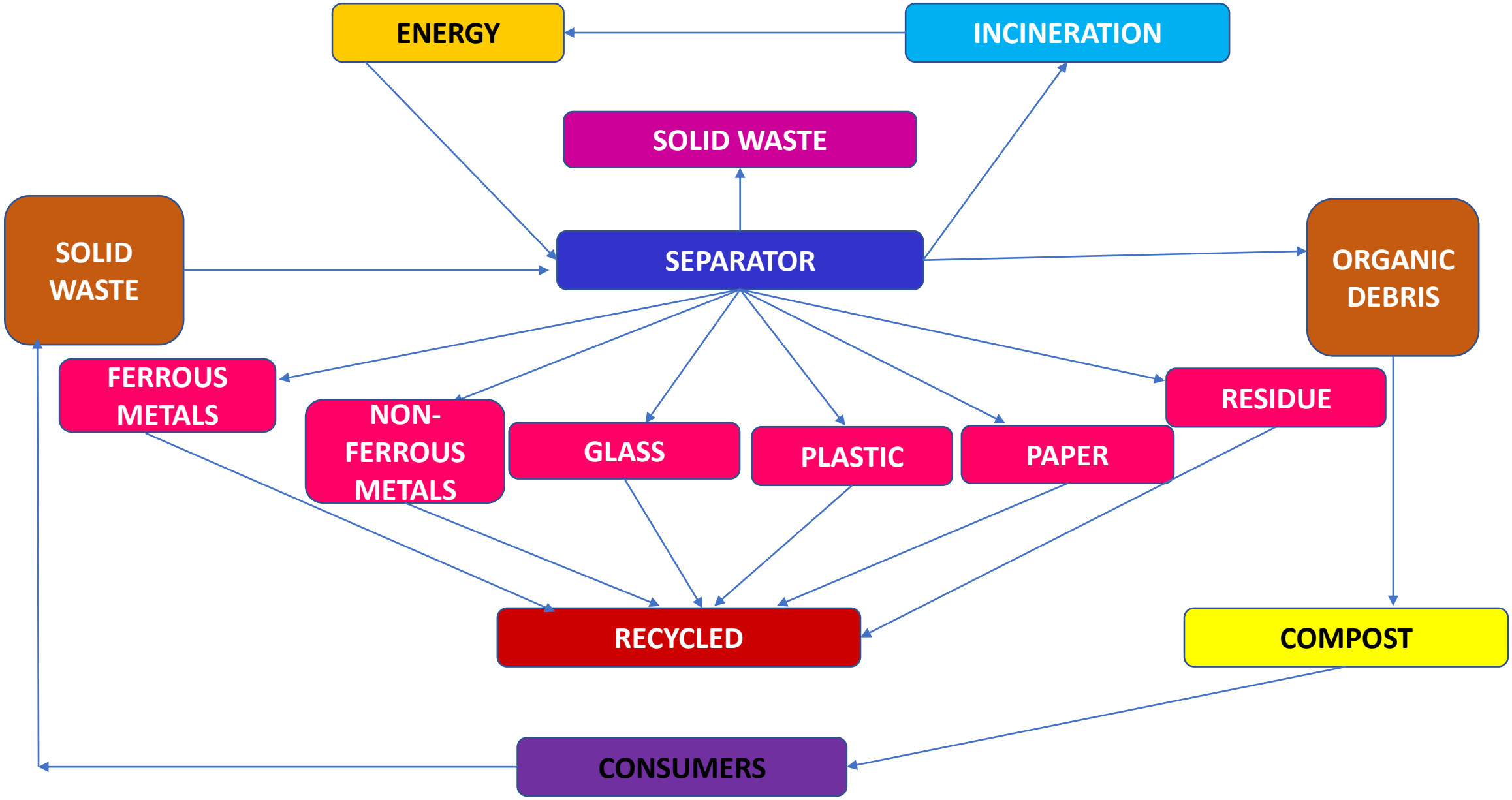


- Waste Materials,which are organic in nature, for e.g.- Plant Material,Food Scraps,Agricultural Waste,Kitchen Waste,Food & Vegetable Waste ,Paper Waste can be recycled using biological composting method & digestion processes to decompose the organic matter.Thus,resulting organic material is then recycled as- ‘Compost’ for agricultural or landscaping purpose.

- Even, a biogas digestor can be utilised for the same process.

- Vermicomposting can be also carried out in order to process the waste- ‘Biologically’.

FLOW CHART-SOLID WASTE MANAGEMENT IN URBAN AREAS



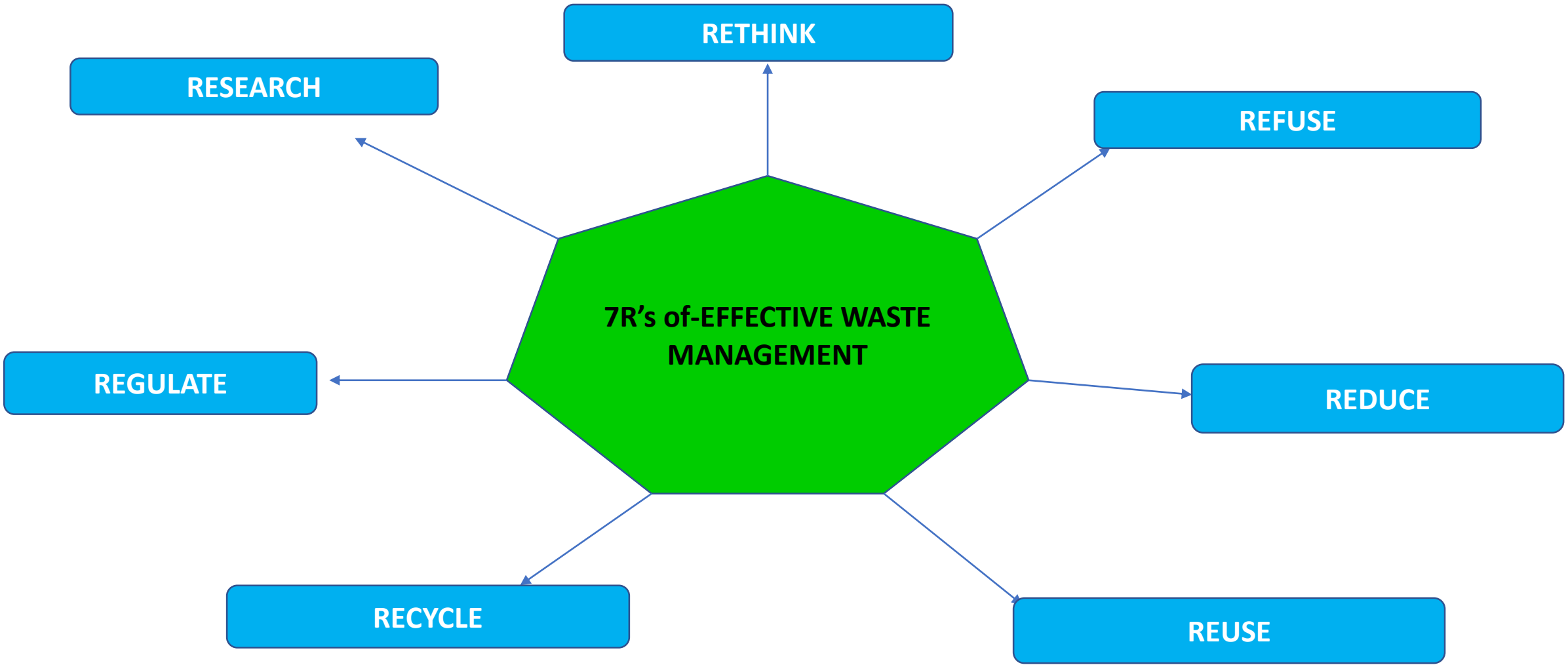
AVOIDANCE & REDUCTION METHODS

- An important method of Waste Management is-Prevention of waste material creation.

- **Method of Avoidance include** :-

- ❑ Reuse of-Second Hand Products.
- ❑ Repairing broken items instead of buying new.
- ❑ Designing products to be repairing refillable or reusable. (Such as-Cotton or Paper bags,instead of-Plastic Shopping Bags)
- ❑ Encouraging consumers to avoid using disposable products. (Such as disposable cutlery)
- ❑ Designing products that use less material to achieve purpose of reduction.(For e.g.-Use of Light-Weight Beverage Cans

EFFECTIVE WASTE MANAGEMENT CONCEPTS



RETHINK :- We need to rethink about our-Habits,Actions,their effects in matters of waste disposal.We all have basic needs.We all need a number of things in order to-Study,work,hobby or entertainment.Next time,before buying anything new,each one of us must rethink- “Do I really need this thing now”?

REFUSE :- Refuse anything which will harm the environment.For e.g. People in Ladakh have refused use of plastic carry bags & thus,the region is free from-Plastic Waste.

REDUCE :- It is important to reduce generation of waste as well as wastage of resources.Repairing,reusing & sharing of things help to reduce waste.

REUSE :- Using waste material in it’s present form again & again,is known as-Reuse of that material.It has a number of ways.For example, a shirt or top which was earlier used for wearing purpose can be cut into 2 equal halves.One half can be used for cleaning dusts from dining,dressing table & rest of furniture.And another half can be used for floor cleaning.Or an old shirt can be donated to needy people after washing & ironing it neatly.

RECYCLE :-Recycling is the reprocessing of unwanted materials into new,useful products.A recycled product is made in whole or part from materials recovered from waste.If reduction or reuse of waste is not possible, then it should be recycled.For e.g.-Paper,Metal,Glass & Plastic can be recycled.

REGULATE :-People throw their untreated waste anywhere they wish.In a similar manner, the untreated waste material produced by industries is dumped by them into resources of water,or on open grounds.Such kind of practice pollutes environment & spreads diseases.Thus such practices need to be avided.

RESEARCH :- Constant research on the ways to reuse waste materials will definitely help us to reduce waste generation.

POLLUTION FROM SOLID WASTE & HEALTH HAZARDS

Accumulated waste is responsible for causing Pollution.The types of Pollution caused by accumulated wastes depend upon the quality & quantity of waste materials accumulated.
Problems due to accumulation of waste are as follows :-

- **Unavailability of Land** :- The piece of land where waste is thrown,cannot be utilized for any other purposes.In residential areas, walking & other kind of movements like-Driving,Jogging etc. become impossible, when garbage is thrown on streets & pavements.Areas where garbage is dumped cannot be used for activities such as-Sports,Recreation & Commercialisation.Secondly, it is expensive & difficult to treat water body or land area to make it useable.

- **Land Pollution** :- Accumulation of chemical residues in agricultural Land causes soil pollution & thus the soil loses it's fertility & is no more useful for the growth of crops.Polluted water is not fit for any kind of consumption. Contamination of water bodies results in generation of less quantity of fish & other seafood.

- **Loss of Biodiversity** :- Toxic wastes cause destruction of natural habitats.Release of acidic waste results into degradation of Coral reefs.Hot water released via industries into water bodies like-Oceans & Rivers,results in Marine Pollution-Kills sensitive aquatic plants & animal species.

- **Dumping of Solid Wastes** :-Solid wastes consist of-Immersed idols,dead bodies,decayed organic waste of-Leaves & flowers used for worship,which are thrown in water,can disturb wetland ecosystem.Sewage (Wastewater from industries & domestic areas) adds high levels of Nitrates & Phosphates in wetlands.It results in tremendous growth of-Algae & Water Hyacinth,which crowd out other plants(Eutrophication)

- **Social Impact** :- In cities, poor people move around garbage bins to look for recyclable waste material like-Paper,Glass,Metal & plastic items,which they can sell & earn some money.In this process of searching for recyclable material,they can get injured due to presence of sharp objects in present in garbage bins.Municipalty should carry out disposal of waste in safe,careful manner.

- **Bioaccumulation :**- Pesticides sprayed on crops get carried away through run-off water that enters ponds & rivers.Pesticides,Heavy Metals like-Mercury,Lead & some other chemicals can get absorbed by small plants & microbes & thus continue to remain in their bodies.This phenomena is called as-"Bioaccumulation"Bioaccumulation takes place,as these waste compounds are neither excreted nor metabolised but instead get stored in the tissues of these organisms.

- **Bio-Magnification :-** Several of the compounds accumulated inside the body of an organism,get concentrated as they move from one organism to another,via food chain.For e.g.-Mercury present in Mercury containing waste,which are dumped into rivers,enters aquatic food chain,building upto higher levels in larger organisms.The small fish,large fish or birds who eat the small fish,as well as Humans, all can get affected & suffer from Mercury Poisoning.Top level consumers will have highest level of toxin concentration.This phenomenon is termed as-"Biomagnification".

SOLID WASTE MANAGEMENT IN MUMBAI

Solid waste Management comprises of-

- Planning
- Engineering
- Organisation
- Administration
- Finance
- Legal Aspects

of activities, associated with-

- Generation
- Storage
- Collection
- Tranfer
- Transport
- Processing
- Disposal

of Municipal Solid Wastes (Household Garbage,Rubbish,Street Litter,Construction Debris,Sanitation Residues etc.) in an environmentally compatible manner,adopting principles of-

- Economy
- Aesthetics
- Energy
- Conservation

FUNCTIONAL ELEMENTS OF SOLID WASTE MANAGEMENT

GENERATION

:- Generation rates are used to evaluate reuse & recycling feasibility & processing,disposal requirements.

ON SITE HANDLING,STORAGE & PROCESSING

:- It is necessary to make on-site preparation of the waste for-reuse,recycle or disposal.Reuse is usable in it's current form or with only minor modifications,as raw material for other production.Recycle applies to converting waste on alternative use in different form.For e.g.- Plastic Bottles & Newspapers.

COLLECTION

:- It is Physical gathering of waste & may vary from the garbage collection from homes to collection of toxic chemical waste from industries.

TRANFER & TRANSPORT

:- Consolidation of collected waste from bulk transport to the processing & disposal facilities.

PROCESSING & RECOVERY

:- It includes activities employed to allow recovery of waste as raw materials or as energy,or Preparation of waste for disposal.

DISPOSAL

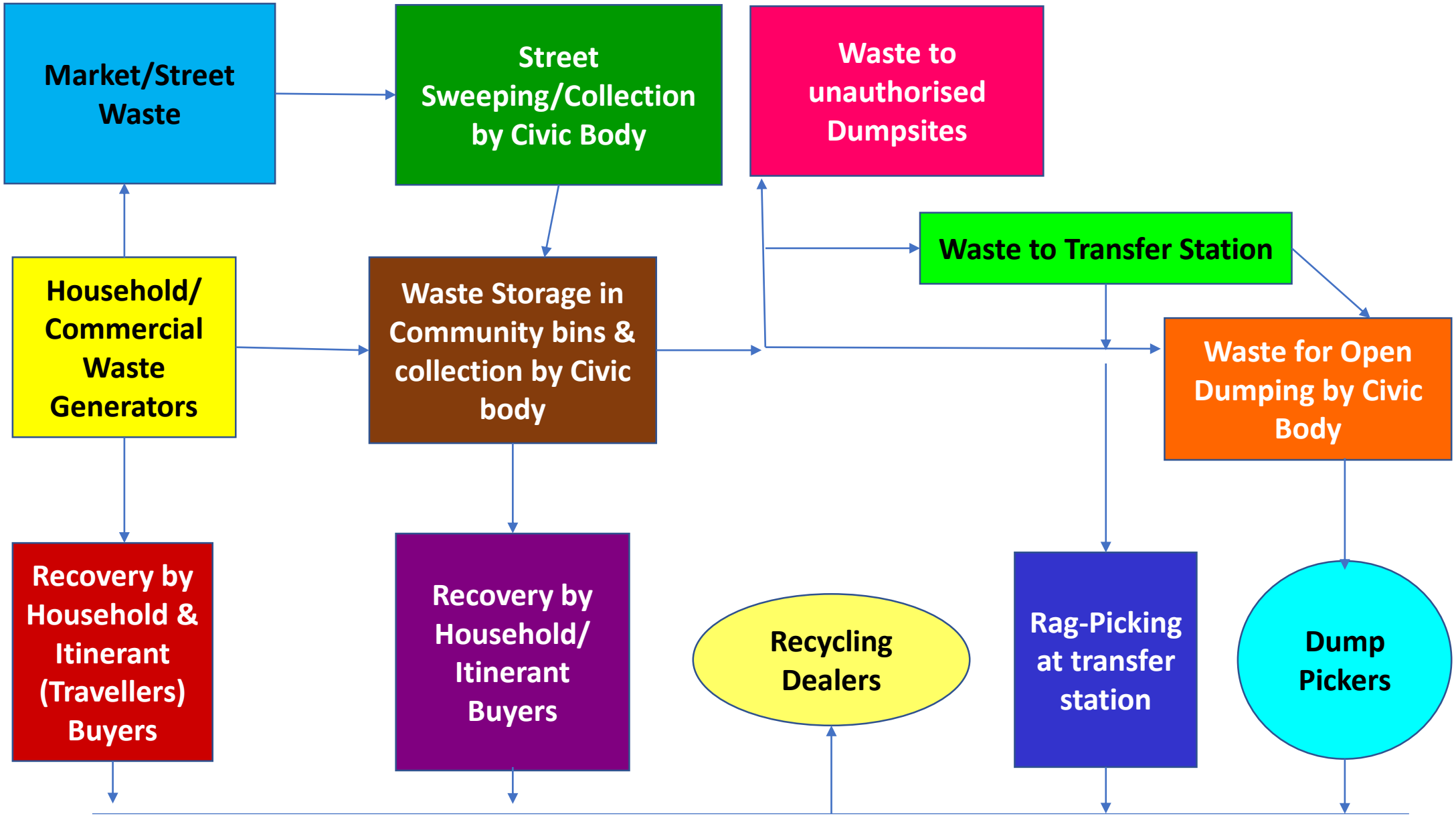
:- Incineration & Landfilling are the two common disposal alternatives for non-reuseable & non-recyclable waste.

SOLID WASTE GENERATION IN METRO CITIES

Management of Municipal Solid Wastes is one of the most neglected areas of urban development in India.23 Metro cities in India,generate about 30,000 tonnes of waste per day & about 50,000 tonnes of waste is generated daily from class I cities.

- **Solid Waste Generation in Mumbai** :- As per recent survey,the quantity of municipal solid waste generated in Mumbai was 5,355 tonnes per day; and per capita waste generated was 0.436 kg per day.
  - The estimated annual increase in per capita waste quantity is about 1.33 % per year. The biodegradable waste fraction of solid waste in Mumbai is quite high due to habit of using fresh vegetables.
  - The ash & fine earth contentin Solid Waste of Mumbai is high due to practice of inclusion of waste from-Street Sweepings, drain silt & debris from-Construction,Demolition.
  - But quantity of waste paper is much less, as it is picked up by people who use it for fuel purpose & for packing of food & other material by street hawkers.Thus as reuse & recycling of paper takes place in Mumbai on large scale on priority basis,amount of paper waste in Mumbai is very low.But,in comparison with paper, plastic & glass waste is recycled to lesser extent in Mumbai.

CURRENT PRACTICE OF SOLID WASTE MANAGEMENT IN MUMBAI



HOUSEHOLD WASTE

- Waste generated at households is generally collected in small containers (Generally Plastic Buckets) for disposal into community bins.The community storage system is usually practiced in Mumbai, where individuals deposit their waste in bins,located at street corners. Garbage is taken away,at specific intervals.Such kind of practice,helps in reduction of cost for waste collection & minimizes problems problems associated with lack of on site storage space.

- But if, community storage arrangements are not located at convenient locations,then householders tend to throw their waste into roadside gutters.

- Although,storage arrangements are located conveniently at most of the places,waste tends to scatter around the storage area,partly due to indiscipline & partly due to scavenging of waste by rag pickers & stray animals.

TRANSPORTATION OF WASTE

- For transportation of Domestic Solid Waste in Mumbai,open body trucks of 5-9 tonnes capacity are commonly used.
- Commercial Sectors,like-Shops,offices,hotels use-Community Waste bins & their wastes are also collected along with household wastes.

ROLE OF RAG-PICKERS

- Thousands of people in Mumbai make their living from waste like plastic products, tin,cans,bottles,bones,hair, leather, glass,metal etc. recovered from Municipal Solid Waste.

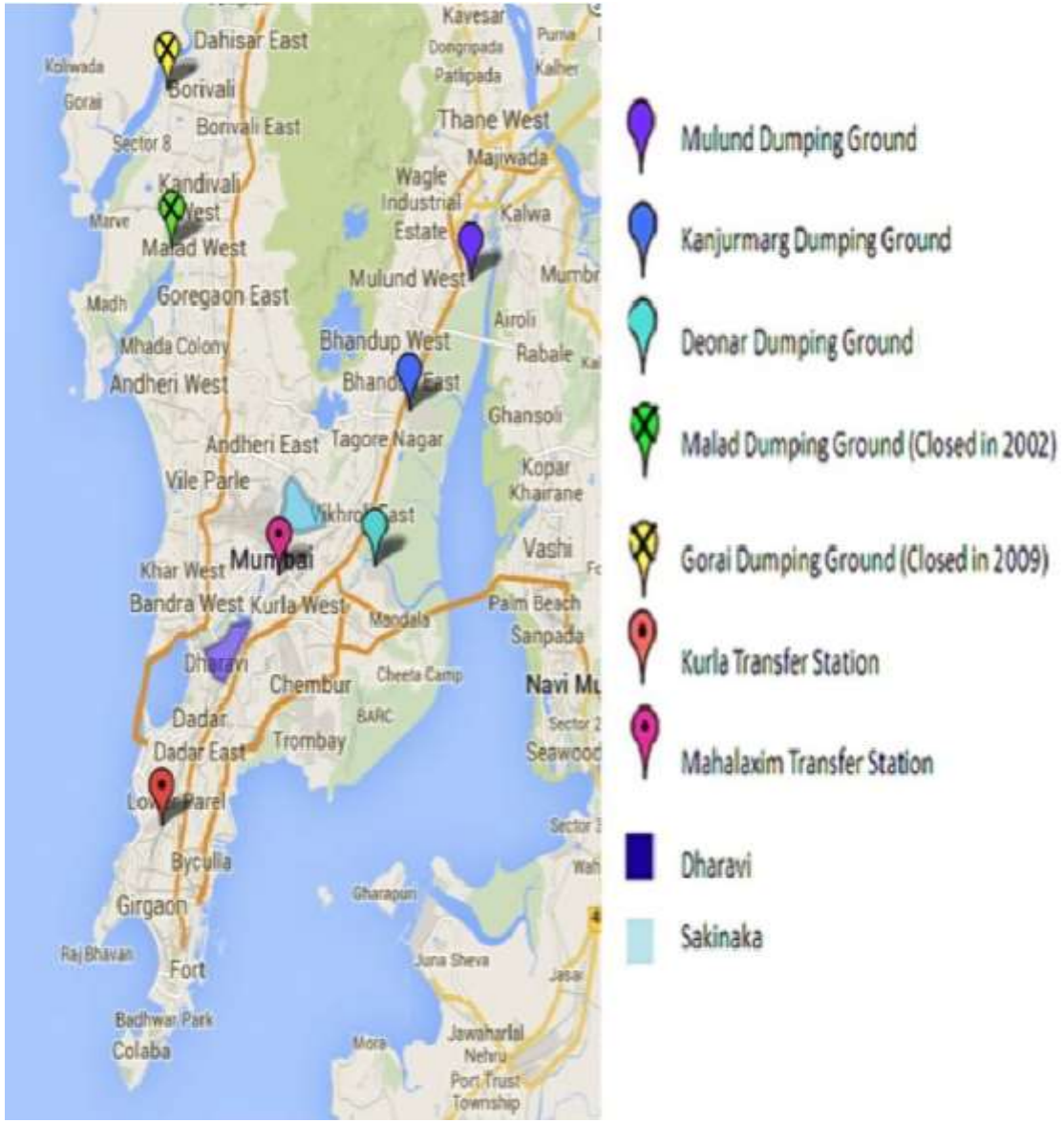
- All metals,paper,plastics,glass,cardboard etc. are readily marketable & hence recycled by householders themselves or by rag-pickers.

DUMPING GROUNDS

DISPOSAL SITES

- In Mumbai, waste is disposed of by depositing in low lying areas.Disposal sites are selected on the basis of their closeness to collection areas.
- New Disposal sites are normally identified only when existing ones are full.
- At present,dumping grounds are present at locations like-Kanjurmarg,Deonar & Mulund.
- In most of the cases, waste is simply dumped at such sites & bulldozers are rarely used for waste compaction at disposal sites.
- Incoming Solid Waste vehicles are not weighed & there occurs lack of specific planning while filling dumpsites.
- Unfortunately,provisions for leachate(Sticky,Semi-Solid nature-Solid Waste,which is likely to contaminate groundwater) & gas control do not exist.

Map of Mumbai Dumping Grounds

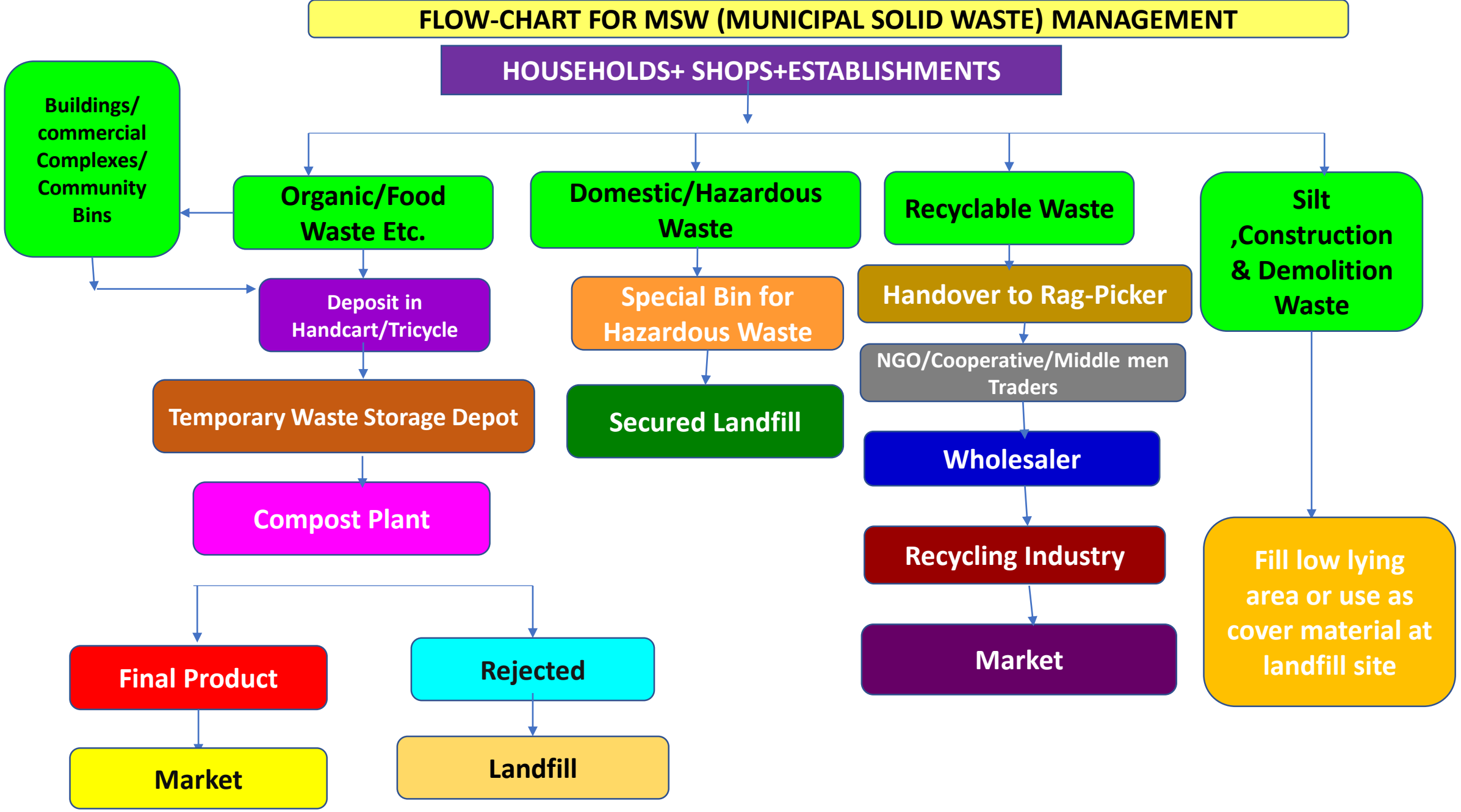


- A soil cover is hardly provided except at the time of closure of the site.
- Most of the disposal sites are not fenced & waste picking is carried out in careless manner,posing problem in the operation of site.
- In order to reduce total volume of wastes & for easy rag-picking, harmful practice of open burning of garbage is carried out,which results in severe air pollution & health problems in surrounding areas.

ACTION PLAN FOR SOLID WASTE MANAGEMENT

- National Environmental Engineering Research Institution (NERI),on behalf of the Ministry of Urban Affairs,published manual on municipal solid waste management rules under the **Environment Protection Act** by the coordinated efforts of municipal agencies,The Ministry of Environment & Forests,Government of India,Central Pollution Control Board(CPCB) & State Pollution Control Board (SPCB).

- The Recommendation of the Expert Committee constituted by the Supreme Court of India,issued the direction in which country is moving towards the improvement of- **Municipal Solid Waste Management**.


FLOW-CHART FOR MSW (MUNICIPAL SOLID WASTE) MANAGEMENT
HOUSEHOLDS+ SHOPS+ESTABLISHMENTS
Buildings/ commercial Complexes/ Community Bins
Organic/Food Waste Etc.
Domestic/Hazardous Waste
Recyclable Waste
Silt ,Construction & Demolition Waste
Deposit in Handcart/Tricycle
Special Bin for Hazardous Waste
Handover to Rag-Picker
NGO/Cooperative/Middle men Traders
Temporary Waste Storage Depot
Secured Landfill
Wholesaler
Compost Plant
Recycling Industry
Fill low lying area or use as cover material at landfill site
Final Product
Rejected
Market
Landfill
Market

DIRECTIVES GIVEN BY NERI FOR SOLID WASTE MANAGEMENT OF MUMBAI

- Ban on throwing of waste on streets & impose administrative charges (fine) from those who litter on streets.
- Segregation of wastes at source.
- Doorstep collection of wastes.
- Sweeping streets on all days of the year.
- Working norms for sweeping of streets.
- Provision of litter bins at public places.
- Abolition of open waste storage sites & manual collection.
- Conversion of organic waste into compost.
- Upgradation of existing dumpsites.
- Siting,construction & operation of sanitary landfills.

- NGO participation in SWIM (Solid Waste management In Mumbai) practices.
- Public Awareness Strategy.

SOLID WASTE MANAGEMENT IN MUMBAI

In order to reduce pressure on civic bodies & to reduce cost of disposal of solid waste & pollution,every citizen in urban as well as rural areas should shoulder his/her responsibility in managing solid waste disposal.

Role of citizens in waste management is as follows :-

- Avoid littering at public places to keep your city/village clean.

- Collect biological degradable & non-degradable waste in separate dustbins using colour coded bins using colour coded bins.

- In big co-operative housing societies,kitchen waste,leftover food,leaf litter etc.Biodegradable waste could be recycled as compost in compost pit.If there is problem of space,then composting can be done in large flower pots. In rural areas,same waste can be used as raw material in biogas plant.

- Waste paper from old notebooks,used,unwanted office stationary,old newspapers etc. could be used to prepare recycled paper.

- It is recommended that citizens re-use the collected plastics.Different kinds of plastic could be segregated & sold to the Ragman as well.Thus plastic waste from solid waste collected in urban/rural areas can be reduced.

- Citizens can work to protect their house, society building, neighbourhood etc. from becoming a huge dustbin. They should take up **‘Clean-Up’** campaigns, which involve not only themselves, but also others in locality.