

National Policy Workshop Webinar Series
On
Countermeasures for Riverine and Marine Plastic Litter in India
12 -22 May 2020

Session 2: Community Perceptions and behavioural aspects for plastic management and promotion of countermeasures to address (Riverine and Marine) plastic litter

Assessment of plastic pollution by NPC in 4 cities

**Presented by
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National Productivity Council**

Objective of pollution assessment

Page 2

- ❖ To assess and quantify the plastic leakage in the city
- ❖ Identify the pathways and sources of plastic leakage
- ❖ Identify the dominant plastic categories in the plastic waste
- ❖ Explore counter measures to combat the plastic leakage scenario

Rational for selecting the 4 cities

Prayagraj:

- Located along confluence of Holy rivers, Ganges, Yamuna and Saraswati
- Tourist attraction because of Sacred significance & Kumbh Mela

Agra:

- Located across River Yamuna
- Tourist attraction because of Taj

Haridwar:

- Located across River Ganga
- Tourist attraction because of sacred significance

Mumbai:

- Coastal city
- Densely populated



Methodology and approach

- ❖ Secondary data collection
 - ❖ Assess the trend of solid/ plastic waste generation and management
 - ❖ Primary data collection from:
 - Nagar nigams
 - Log books maintained by concessionaire for waste collection
 - Log book maintained at dry waste segregation centers, treatment plants/ dumping ground
 - Interview with rag pickers
 - Interview in sanitation workers, local residents, slum population
 - ❖ Prepare a mass balance to predict the quantity of plastic leakage
 - ❖ Dominant plastic categories identified during clean up drives as well as physical observation during field study

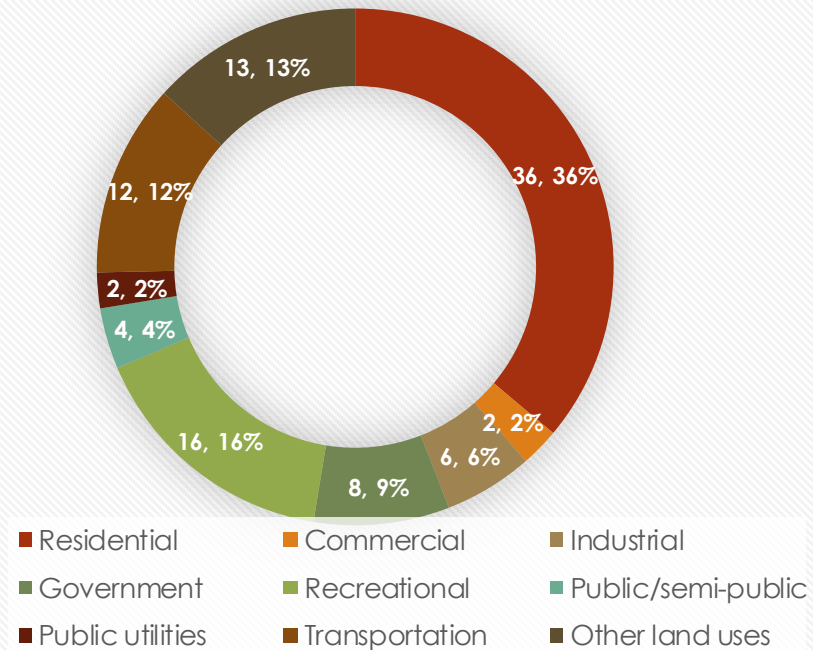
Titel of the presentation



1. Prayagraj (Allahabad)

Coordinates:	25.45°N 81.85°E
Area of ULB	82 sq Km
Municipal Wards	80
Municipal Zones	5
Growth	20.63%
Urban Population (as per 2011 Census)	11.43 Lakh
Projected Population (as per Master Plan-2021)	20.50 lakh
Average Household Density	1,087/km2 (2,820/sq mi)
Body	Allahabad Municipal Corporation

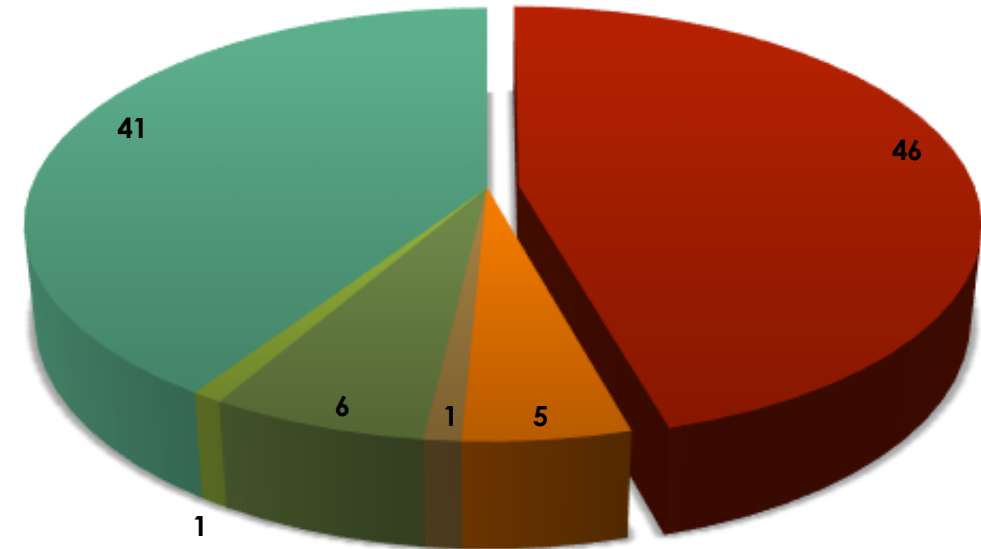
% Land use pattern Allahabad



Solid Waste generation scenario in Allahabad

Particulars	Values as per available secondary data				Values as per primary data collected by NPC
	AMC	City plan report	CPCB	Research paper(s)	
Solid waste generation (T/d)	540	680	350	1000	721
Per capita solid waste generation (kg/c/d)	0.45	0.539		0.39	0.40
Plastic waste generation (T/d)	-	-	18.86	30	56
Per capita plastic waste generation kg/c/d	-	-	-	-	0.07
% plastic waste in total solid waste	-	-	5.39%	3%	7.8%

% contribution from various sources



- Households
- Street Sweepings
- Hotels and Restaurants
- Markets (vegetable markets, mandis etc.)
- Commercial Establishments (Institutions etc.)
- Other Sources (Construction Debris, Horticulture Waste etc.)

Waste management scenario in Allahabad

- Allahabad is divided into 80 Municipal wards and Allahabad municipal corporation (AMC) is responsible for the management of solid waste generated by the city.
- The waste is collected door to door by AMC and transferred to community bins/ depots/ transfer stations.
- The high value recyclable solids are extracted by the rag pickers from the transfer stations.
- The remaining solid waste is transferred to the processing facility located at Baswar.
- Allahabad does not have any intermediate material recovery facility.
- The Baswar plant has the provision of segregation of mixed solid waste, pelletization of plastic for RDF and composting.



14, Lowther Rd, South Malaka, Prayagraj, Uttar Pradesh 211003, India

Type	Degree	DMS
Latitude	25.4379954	25°26'17" N
Longitude	81.8468544	81°50'49" E

09 Feb 2020, 10:29 AM



14, Lowther Rd, South Malaka, Prayagraj, Uttar Pradesh 211003, India

Type	Degree	DMS
Latitude	25.4379954	25°26'17" N
Longitude	81.8468544	81°50'49" E

09 Feb 2020, 10:28 AM



Unnamed Road, Prayagraj, Uttar Pradesh 211007, India

Type	Degree	DMS
Latitude	25.46118717	25°27'40" N
Longitude	81.8446312	81°50'41" E

02 Mar 2020, 09:04 AM



NH35, Gangotri Nagar, Prayagraj, Uttar Pradesh 211008, India

Type	Degree	DMS
Latitude	25.4052475	25°24'19" N
Longitude	81.8396834	81°50'23" E

09 Feb 2020, 11:44 AM



Unnamed Road, Prayagraj, Uttar Pradesh 211007, India

Type	Degree	DMS
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Longitude	81.8149692	81°48'54" E

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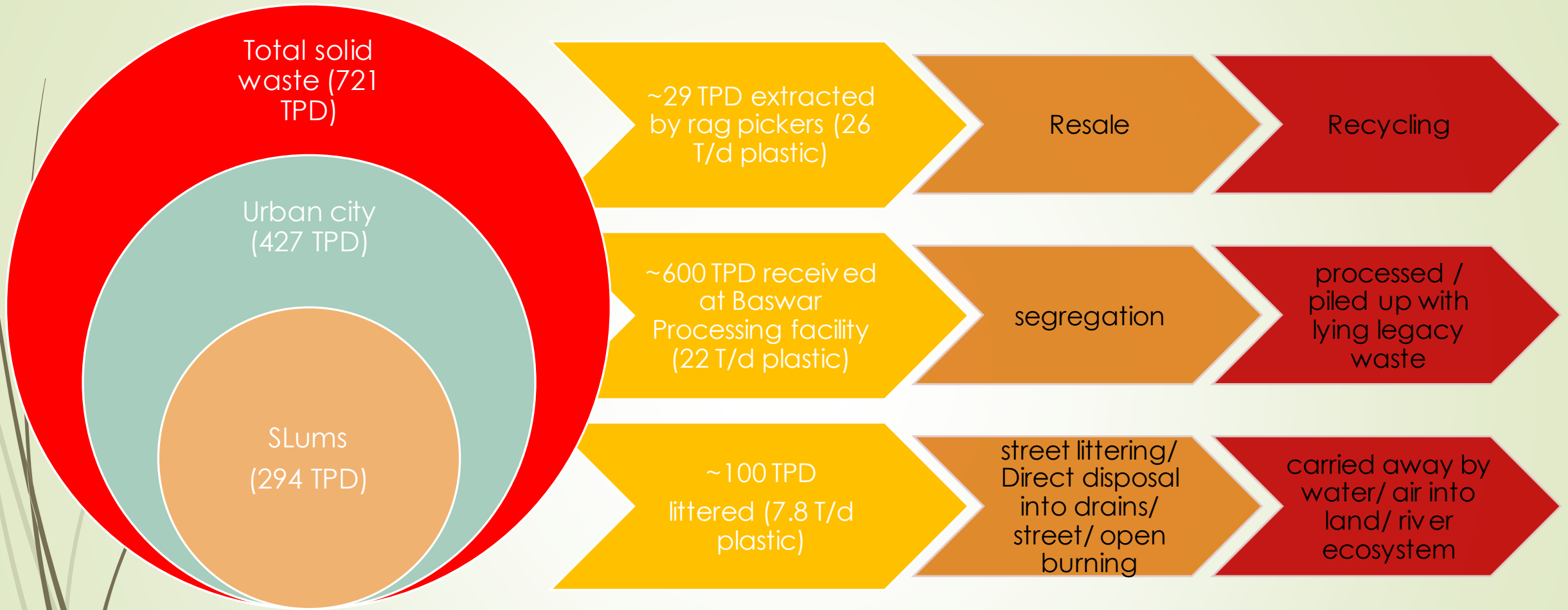


Unnamed Road, Prayagraj, Uttar Pradesh 211007, India

Type	Degree	DMS
Latitude	25.3748077	25°22'29" N
Longitude	81.8149692	81°48'54" E

09 Feb 2020, 12:00 PM

Solid waste management in Allahabad



Total solid waste (721 TPD)

Urban city (427 TPD)

Slums (294 TPD)

~29 TPD extracted by rag pickers (26 T/d plastic)

Resale

Recycling

~600 TPD received at Baswar Processing facility (22 T/d plastic)

segregation

processed / piled up with lying legacy waste

~100 TPD littered (7.8 T/d plastic)

street littering / Direct disposal into drains / street / open burning

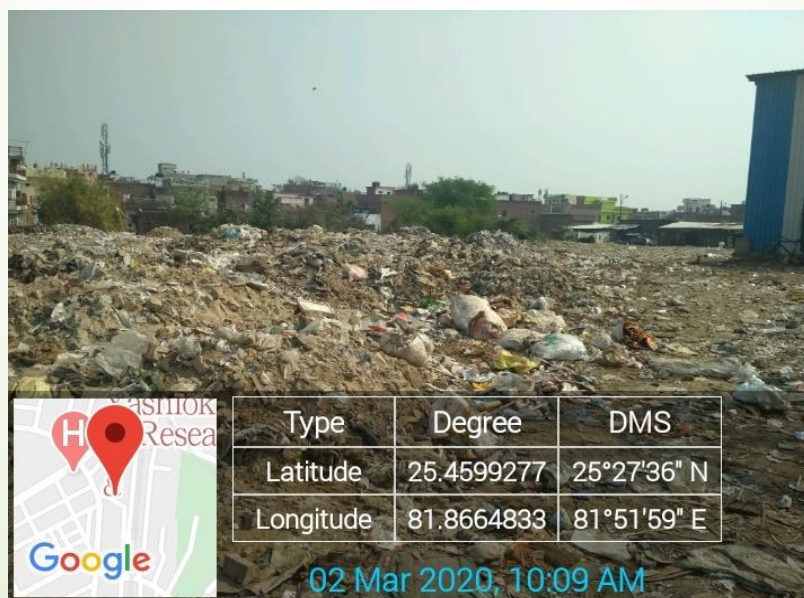
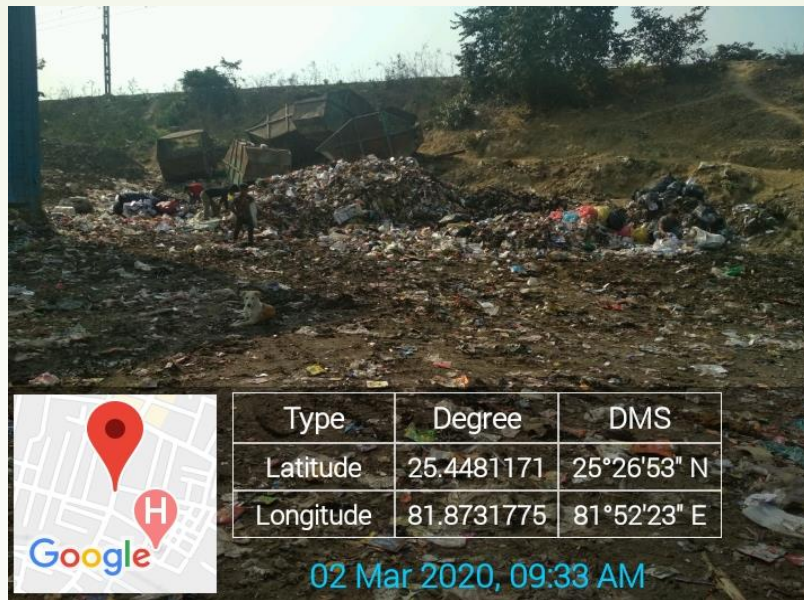
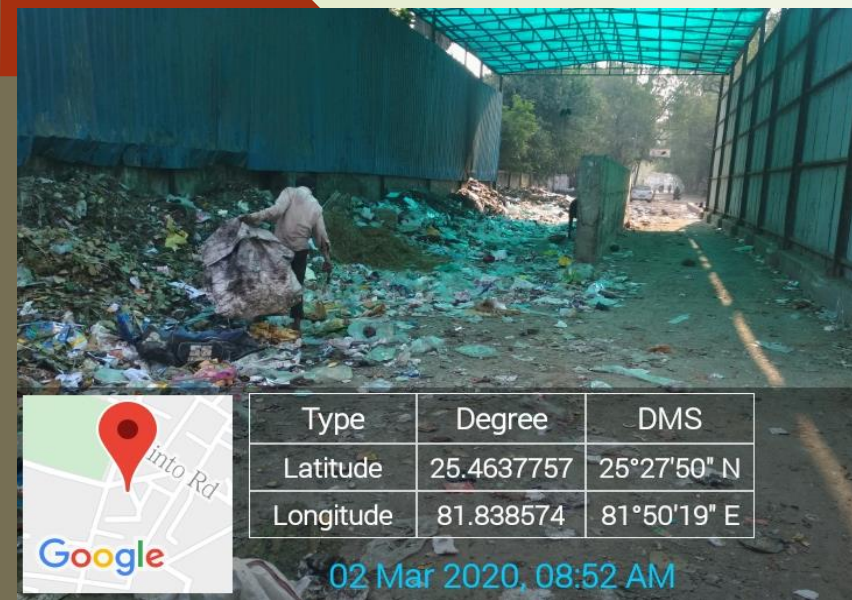
carried away by water / air into land / river ecosystem

Estimation of plastic waste

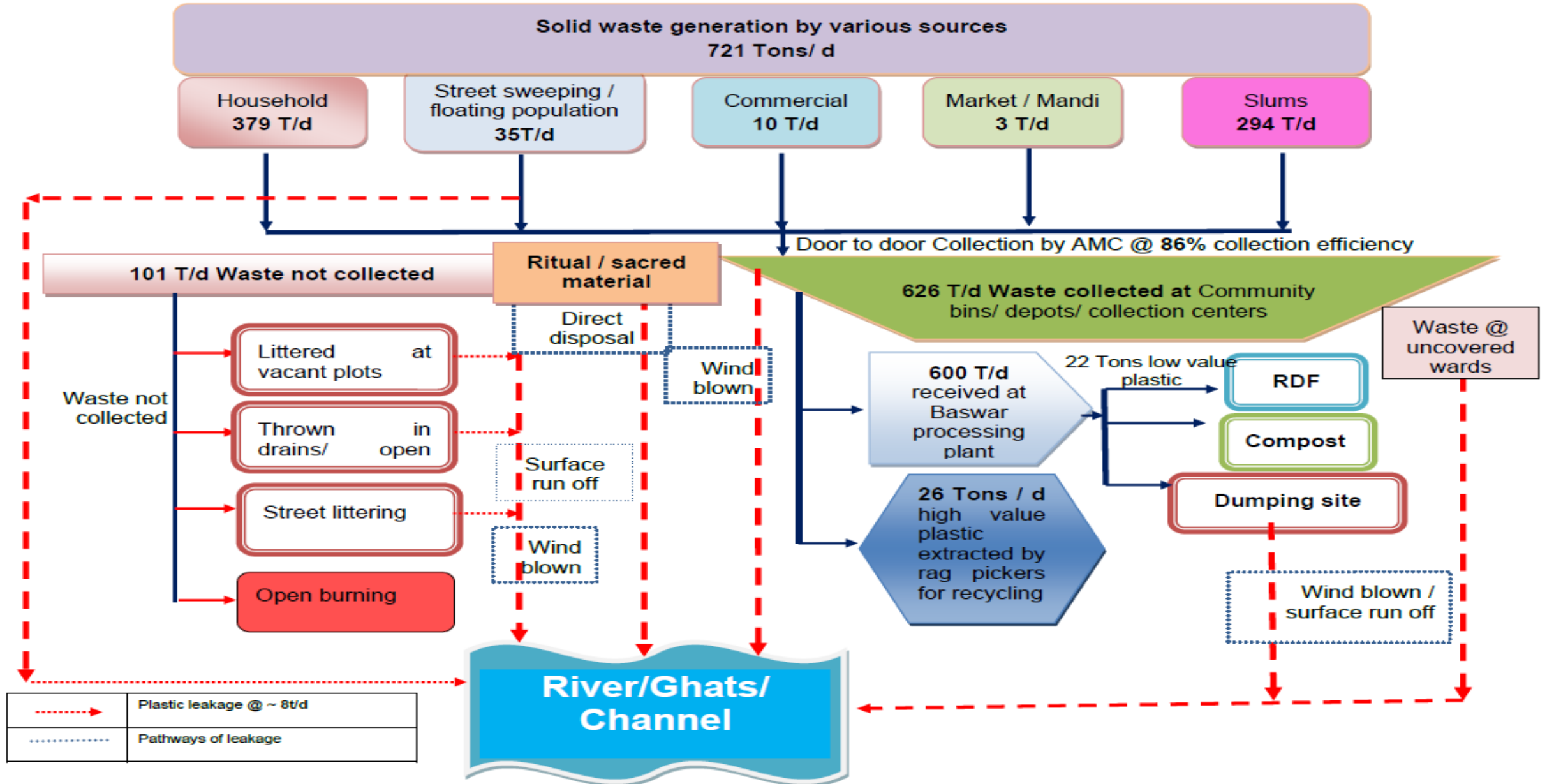
S. no.	Particulars	Value
	Plastic waste collected by Municipal corporation	
1	Solid waste collected by AMC per day , received at Baswar plant	617952 kg/d
2	% plastic in the collected waste at Baswar Plant	3.5%
3	Amount of plastic waste collected & received at Baswar plant	21628 Kg / d
	High value Plastic waste collected by Informal sector / Rag pickers	
4	Recyclable Solid waste collected by rag pickers	29755 Kg/d
5	High value Plastic waste collected by rag pickers	26390 kg / d
6	Total waste generation of city (1 +4)	647707 kg/d
7	Total plastic waste generated per day ((3 +5)	48018 kg / d

- 56 tons of plastic waste is generated by the city per day @7.8% of 721 TPD.
- Out of this, 26 T/d of high value plastic is taken away by the rag pickers and 22 tons of low value plastic reaches the Baswar processing facility.
- Thus 48 T/d of plastic is attempted to bring back into the value chain.
- Remaining 8 tons per day of plastic is directly disposed, open burned or littered into streets, drains etc. finally finding its way in to the land and riverine eco system by various means

Plastic litter observed in Allahabad

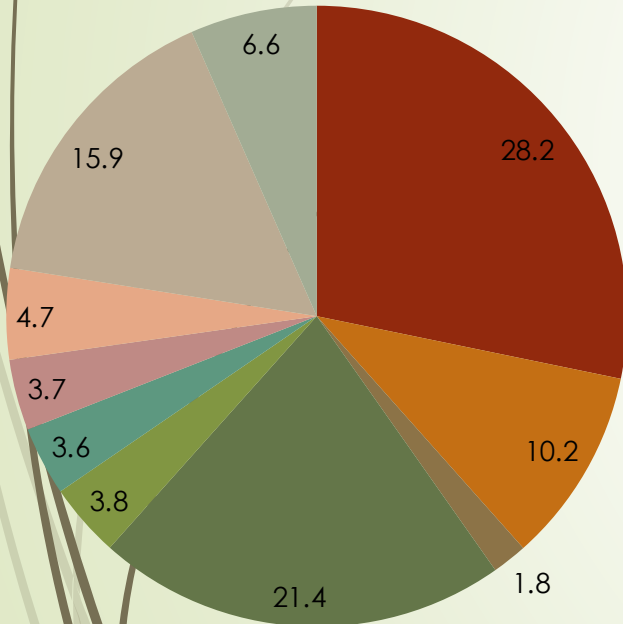


Plastic leakage scenario at Allahabad



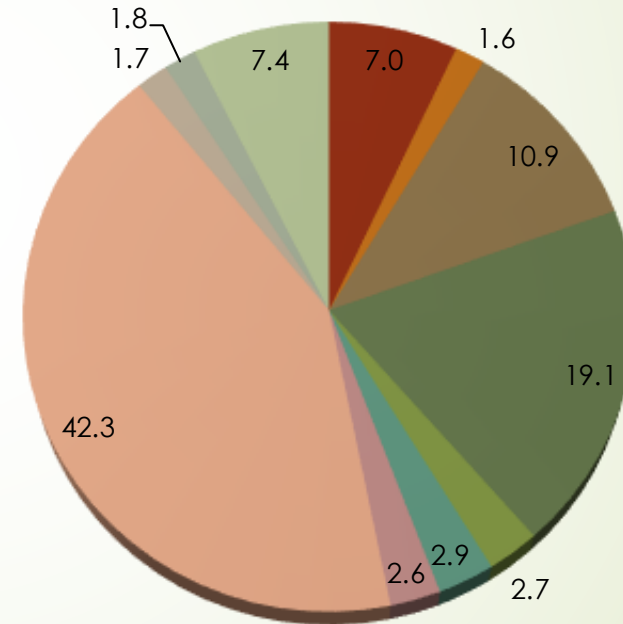
Prominent plastic categories in the waste (assessed from clean up drives)

Total plastics by count (in %) in Prayagraj



- Multilayer Large and Medium Size packets of snacks, chips, namkeen, biscuits etc.
- Monolayer Plastic Packaging used for food, detergent etc.
- Synthetic woven bags used for cement packaging etc.
- Polythene bags (colored white, black)
- Disposable plastic Cups/Glasses
- Packing used for water, milk etc.
- Ritual Material
- Plastic Sheet & other thicker plastic bags. Color-Black & White

Total plastics by weight (in %) in Prayagraj



- Multilayer Large and Medium Size for snacks, chips, namkeen, biscuits etc.
- Multilayer Sachets for Shampoo, Tobacco, tea, coffee, tomato sauce etc.
- Synthetic woven bags used for cement packaging etc.
- Polythene bags (colored white, black)
- Packing used for water, milk etc.
- Shopping Bags/ Grocery Bags
- Construction Materials with plastic component
- Synthetic Clothes/Clothes
- Ritual Material
- God Sculptures having synthetic cloth material & plastic ornaments.
- others

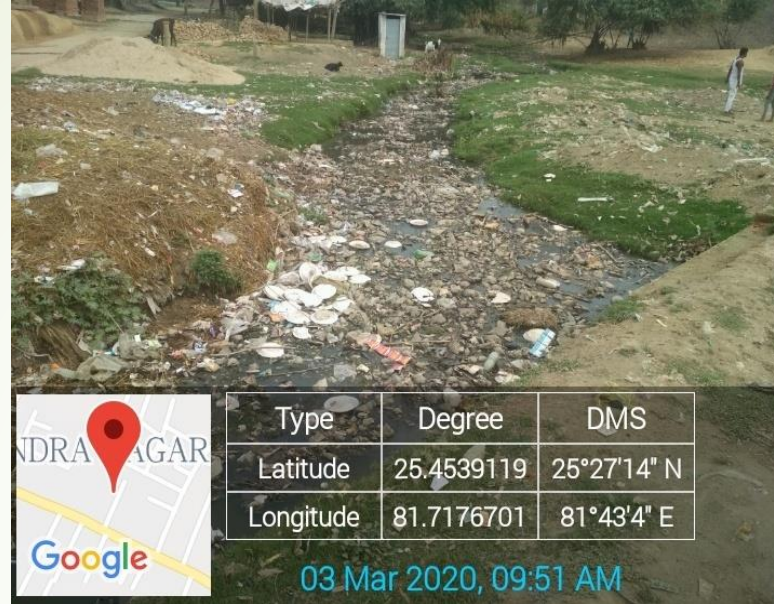
Prominent plastic categories in the waste (assessed from field study)



During physical observation at various hot spots the prominent plastic categories were:

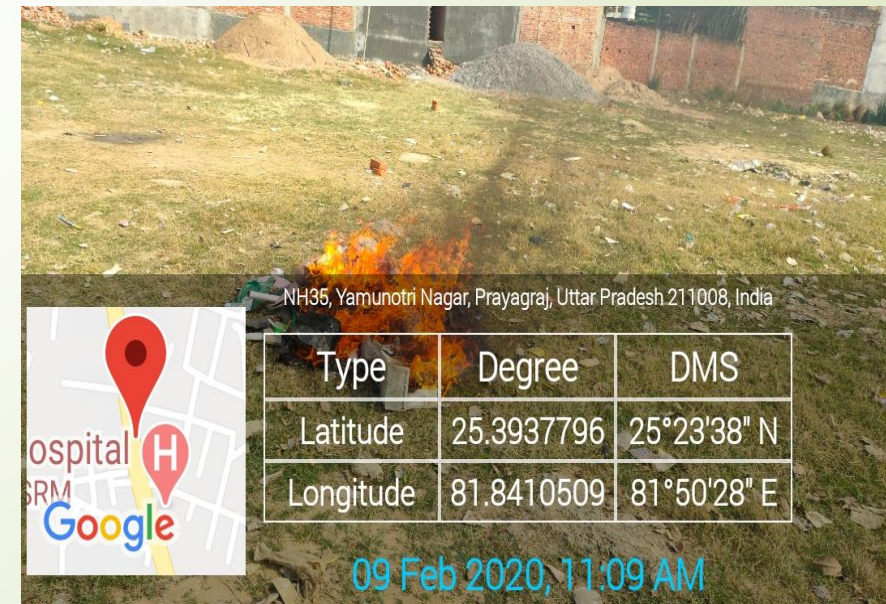
- i. Food wrappers / take away packets
- ii. Poly carry bags
- iii. Packaging material

Pathways and sources of plastic litter in Prayagraj



The identified pathways of plastic waste litter are:

1. Street littering
2. Direct disposal in to drains/ open channel
3. Surface run off
4. Wind blown from uncovered transfer stations/wards
5. Open dumping / burnig at hotspots



Summary & Findings

	Allahabad	Agra	Haridwar	Mumbai
Plastic waste generated and that leaked into the environment	About 56 TPD generation About 8 TPD leakage	<ul style="list-style-type: none"> 110-130 TPD plastic waste generation 10-30 TPD leakage 	<ul style="list-style-type: none"> 49-57 TPD plastic waste generation during peak 3.7 – 4.4 TPD plastic leakage during peak 	<ul style="list-style-type: none"> 84 to 433 TPD is the generation 50-110 TPD leaking into environment
Dominant plastic waste category	Multi layer packets for food, sachets for Tobacco and thin poly bags, plastic disposable cutlery.	Multi layer packets for food, thin poly bags, small sachets of different usage for detergents, tomato sauce, tobacco sachets, woven polypropylene bags etc.	Multi layer packets for food, thin poly bags, small plastic bottles, plastic laminated metallised paper plates, disposable cutlery	Multi layer plastic, poly bags, disposable cutleries (most likely from event, celebrations, etc), cement bags (polypropylene woven bags).
Existing waste management status	Door to door waste collection is not 100% and no segregated waste collection is practice	100% door to door collection of waste is not done. Segregated waste collection is missing. Dry waste segregated from mixed waste is sent to MRF from where it is sent to plastic recycling industry.	100% door to door collection of waste is not there only 52 wards out of 60 wards. Waste collection from slum is not done. 150TPD waste out of 433 waste collected is treated.MLP segregated from 150 TPD is sent to cement plant.	Door to door segregated waste collection is being done from 24 wards in Mumbai only. However, no waste collection is happening in Slum areas due to inaccessibility.
Plastic leakage points and pathways	Major Plastic leakage path to river is through drains/barriers leading to river. Most of the open drains are located near slum, market places.	Major Plastic leakage path to river is through open drains/barriers leading to river. Most of the open drains are located near slum, market places	Major Plastic leakage path to river is through drains/barriers leading to river.	Major Plastic leakage pathway to ocean is through drains along railway track near Slum leading to Mithi river flowing into the Arabian sea. 186 outfalls are present which leads to Arabian sea carrying plastic waste

Prominent Plastic Observed during Physical Observation at various hotspots Mumbai



Pathways and sources of plastic litter in Mumbai



- The identified pathways of plastic waste litter are:
1. Street littering
 2. Direct disposal in to drains/ open channel
 3. Surface run off
 4. Wind blown from uncovered transfer stations/ wards
 5. Open dumping at hotspots
- Open burning



Plastic littering Observed during Physical Observation at various hotspots in Agra



Pathways and sources of plastic litter in Agra



The identified pathways of plastic waste litter are:

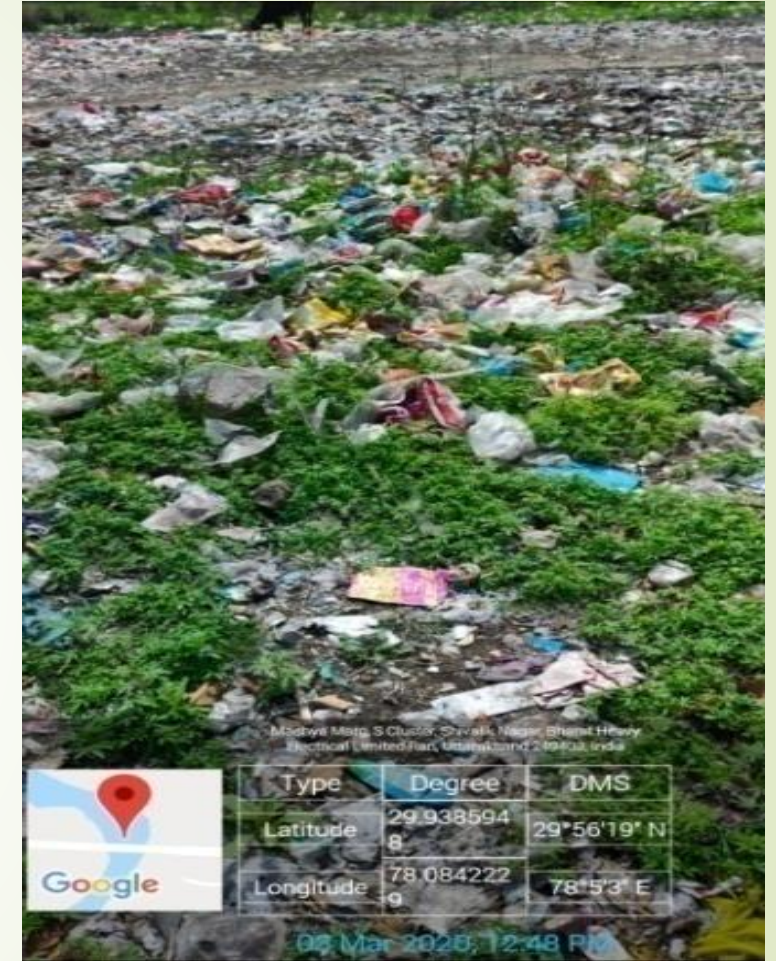
1. Street littering
2. Direct disposal in to drains/ open channel
3. Surface run off
4. Wind blown from uncovered transfer stations/ wards
5. Open dumping at hotspots
Open burning



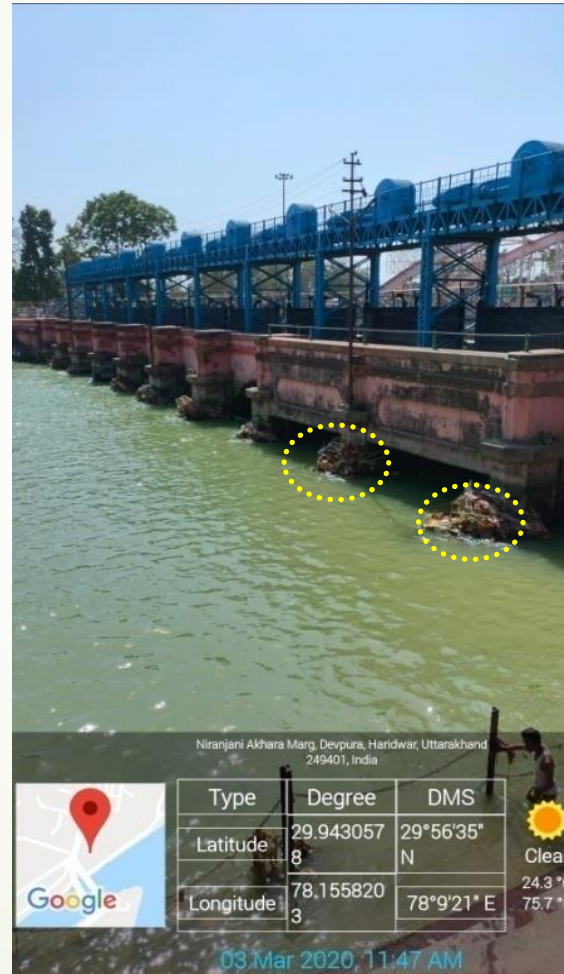
Pathways and sources of plastic litter in Agra (contd.)



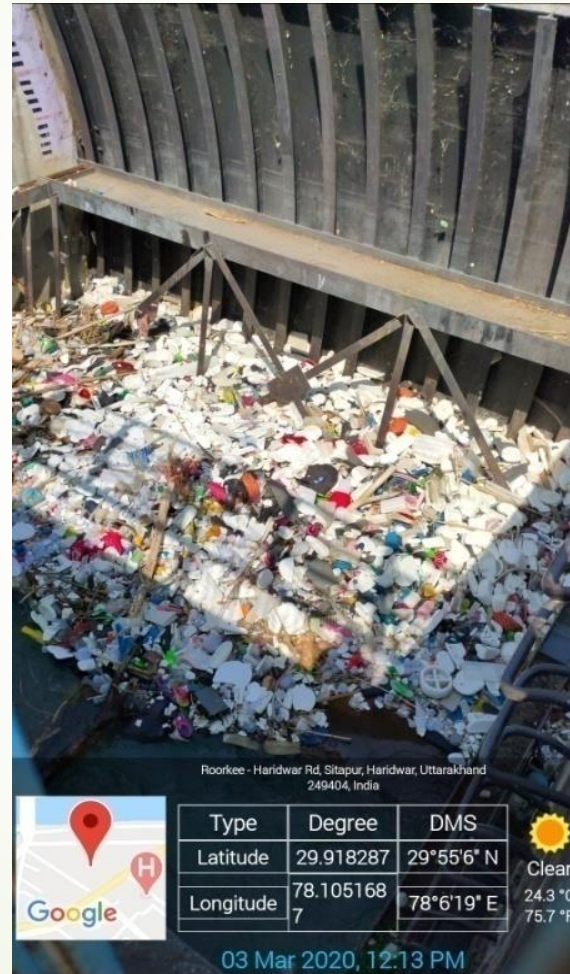
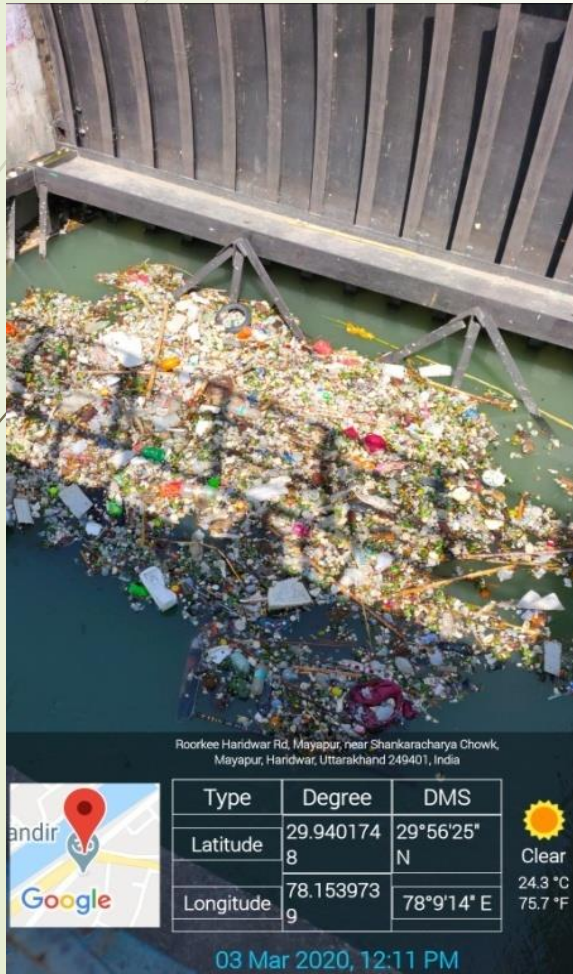
Plastic waste litter at hotspots in Haridwar



Plastic leakages through barriers in Haridwar

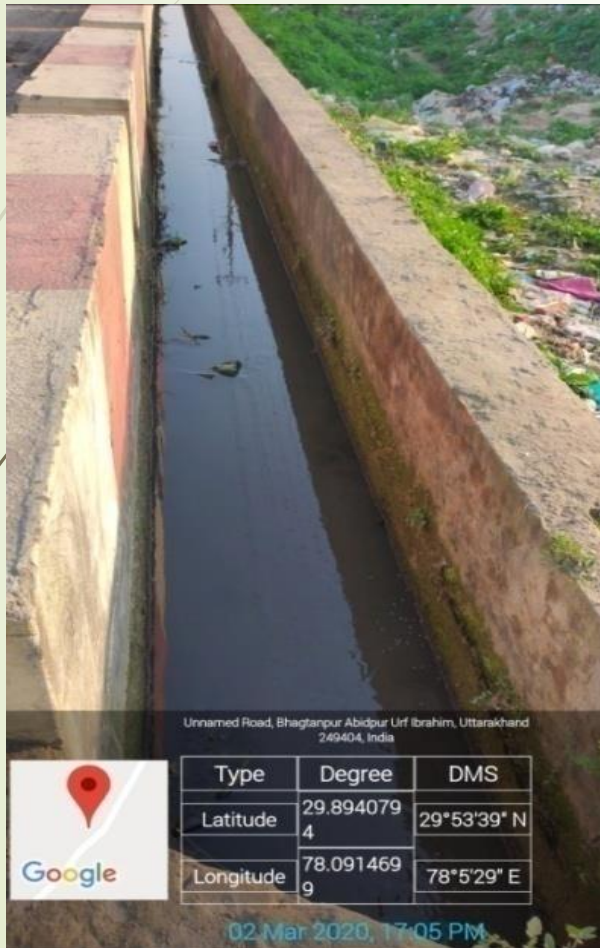


Plastic Leakages through barriers in Haridwar



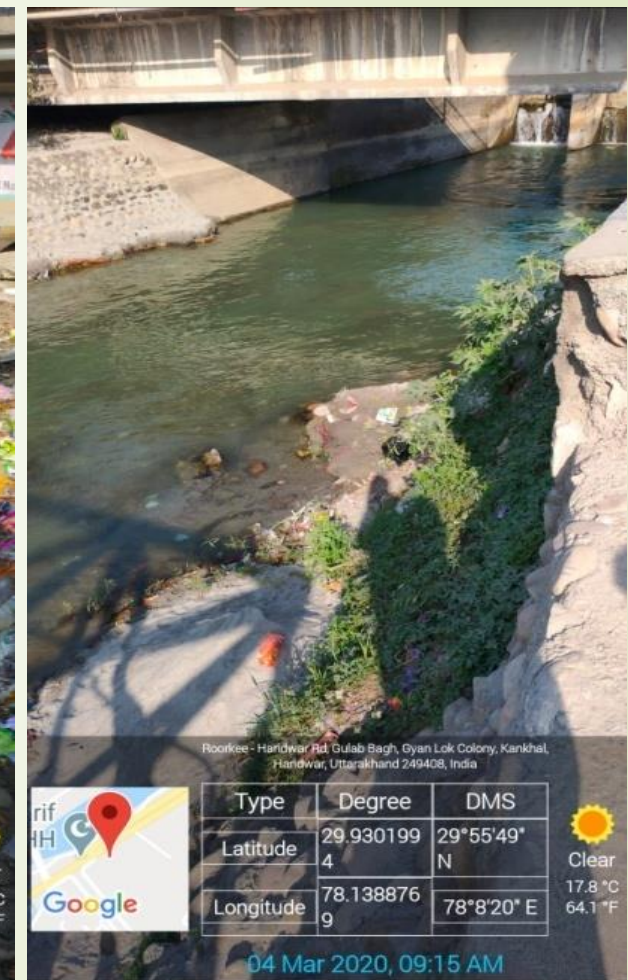
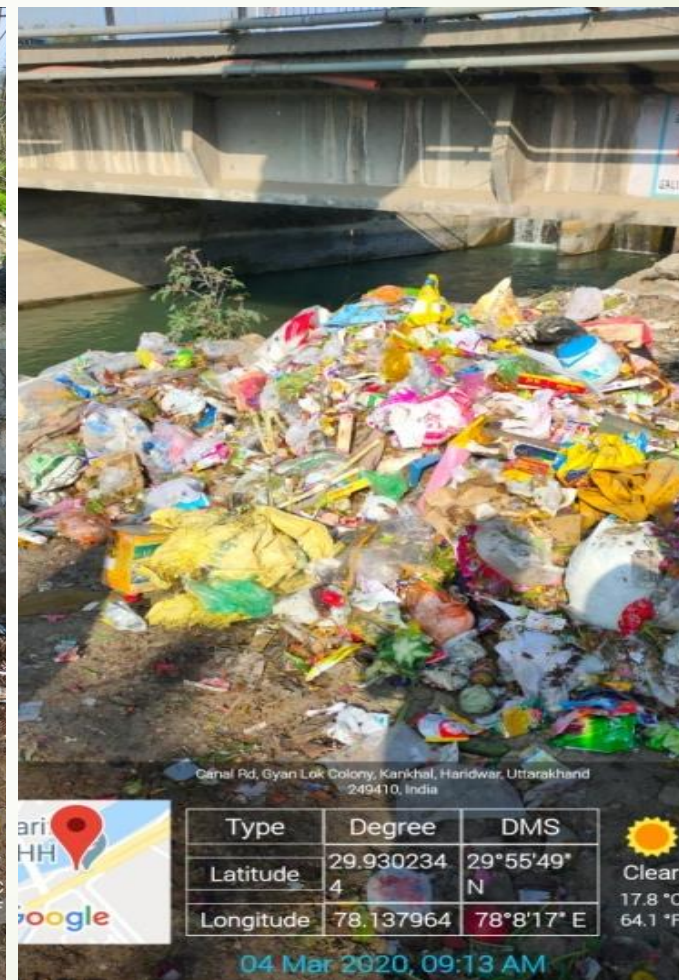
The accumulated waste comprises of thermocole, plastics, Synthetic clothes, footwear, etc.

Leakage through open dump in Haridwar



Plates affixed on the left side shows the huge quantity of legacy waste stacked in an open space near waste treatment plant at Haridwar.

Leakage through drainages in Haridwar





THANK YOU

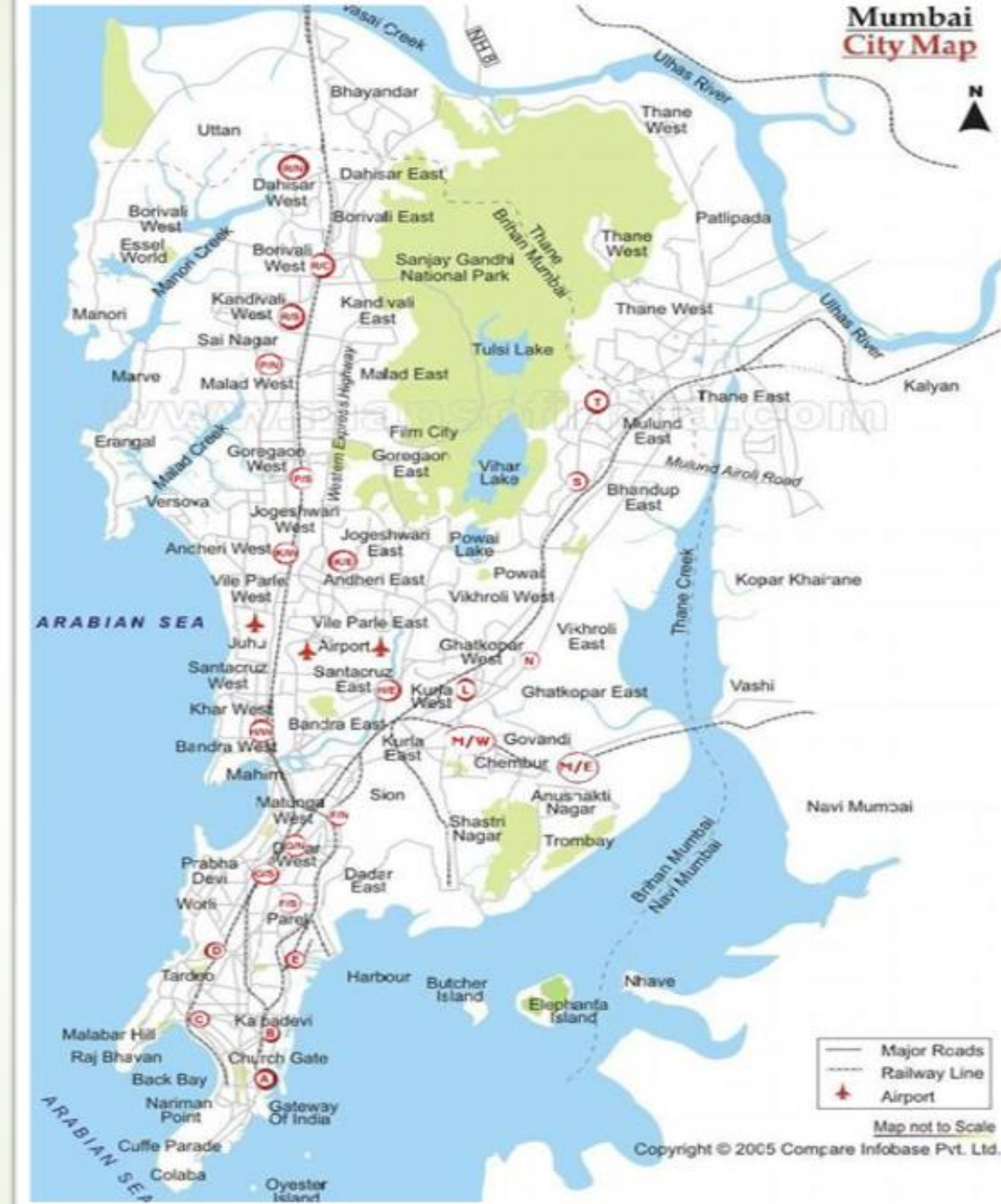
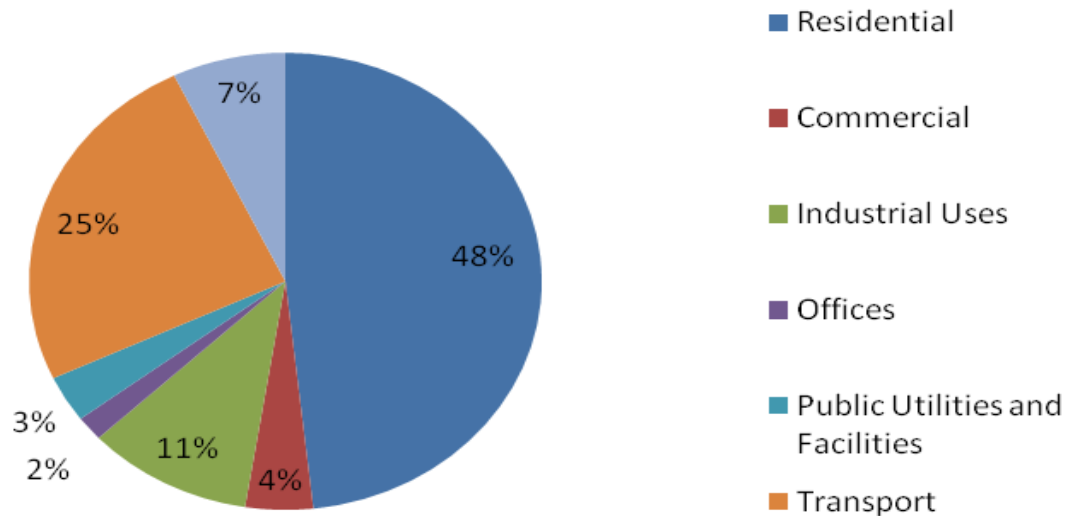


Reference slides

2. Mumbai

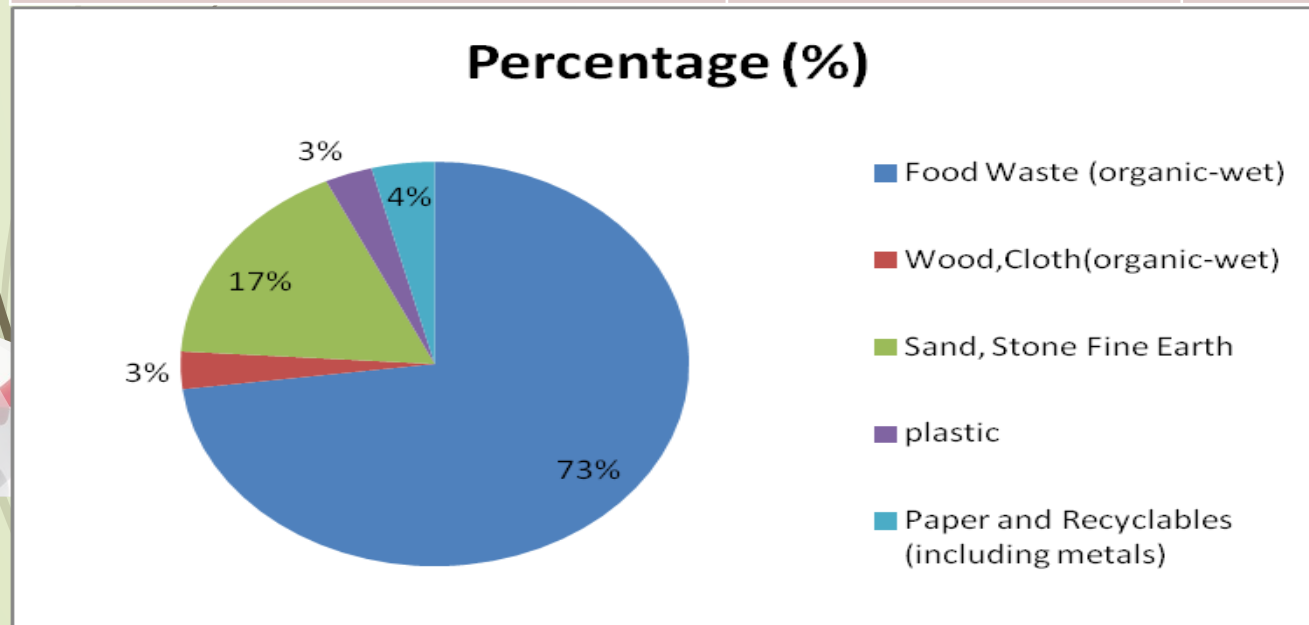
Coordinates	19.0760° N, 72.8777° E
Area of ULB	6,355 square km
Municipal Wards & Zones	24 & 7
Population density	19,652 people per sq. km.
Urban Population (as per 2011 Census)	1,24,42,372
Estimated Population (as per Master Plan-2021)	25 million
Average Households	658,359
Body	Municipal Corporation of Greater Mumbai (MCGM)

% Landuse distribution for Mumbai



Solid Waste generation scenario in Mumbai

Particulars	CPCB	Research paper(s)	BMC data report
Solid waste generation (MT/d)	6500	7000	6959
Dry waste generation from house Hold	-	-	789
Per capita solid waste generation (kg/c/d)	-	0.45	0.39
Plastic waste generation (MT/d)	433	210	84.36 (11% of Dry Waste 789MTD)
% plastic waste in total solid waste	6.28%	3%	11%



Source: Environment Status Report 2016-17

Dry Waste Segregation Centre (DWSC) Report for the month Nov-2019: For (46 Centres)

Dry Waste Generation in Mumbai (Monthly Report - November 2019) in - MT

Plastic Bottles	Other Plastic Recyclables	News Paper	Mixed Paper	Boxes/Card Board	e-waste	Thermocol	Glass Bottles	Tins	Metals	Cloths	Other Recyclables dry waste	Reject sent to Dumping Ground	Total Dry Waste
321	657	666	592	532	64	71	3410	94	188	181	636	861	8274

From the above monthly report, it can be inferred that the amount of plastic that gets collected and attempted to bring back into the value chain is approx. 32.6 MT per day out of 275.76 MT per day which is 11.82% of the Total dry waste generated in Mumbai City

Images of Segregation Centre at Ward Level with Prominent type of Plastic and Paper Waste



Picture depicts segregation of dry waste which contain 2-3 % plastic with various types of plastic waste



Waste Paper and Used Tissue papers which have economic value

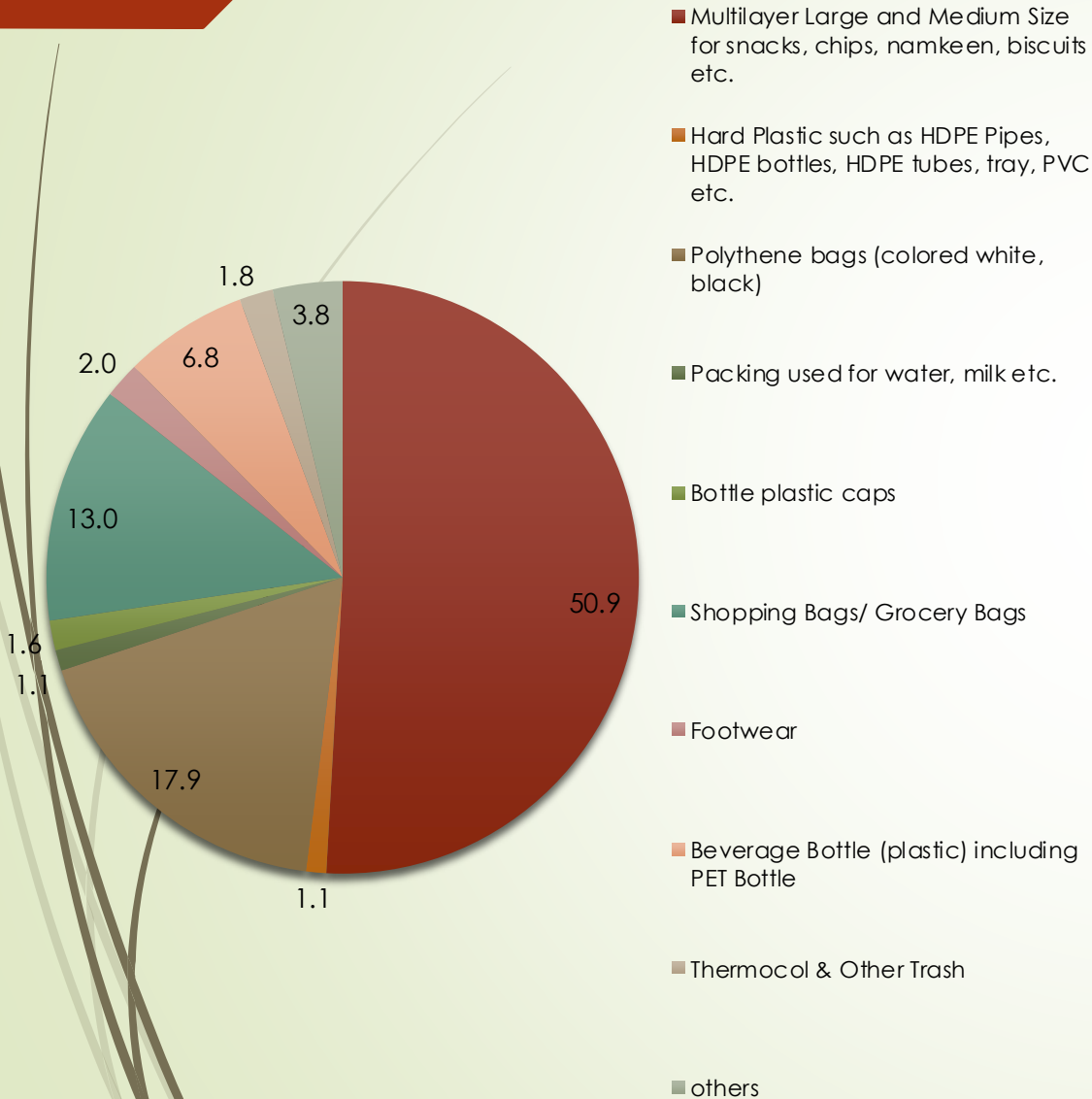
Quantification of plastic leakage in Mumbai

Plastic Waste Details			Remarks	
	Minimum (As Per BMC Dry Waste Collection Report)	Maximum		
Plastic waste generation	86.79	433.32	Min generation value assuming 100% collection of waste	Max value based on an estimate using plastic content indicated in CPCB, 2015 report
Plastic leakage	50.616	110	Estimation as per PCRA Energy report Oct 2019	

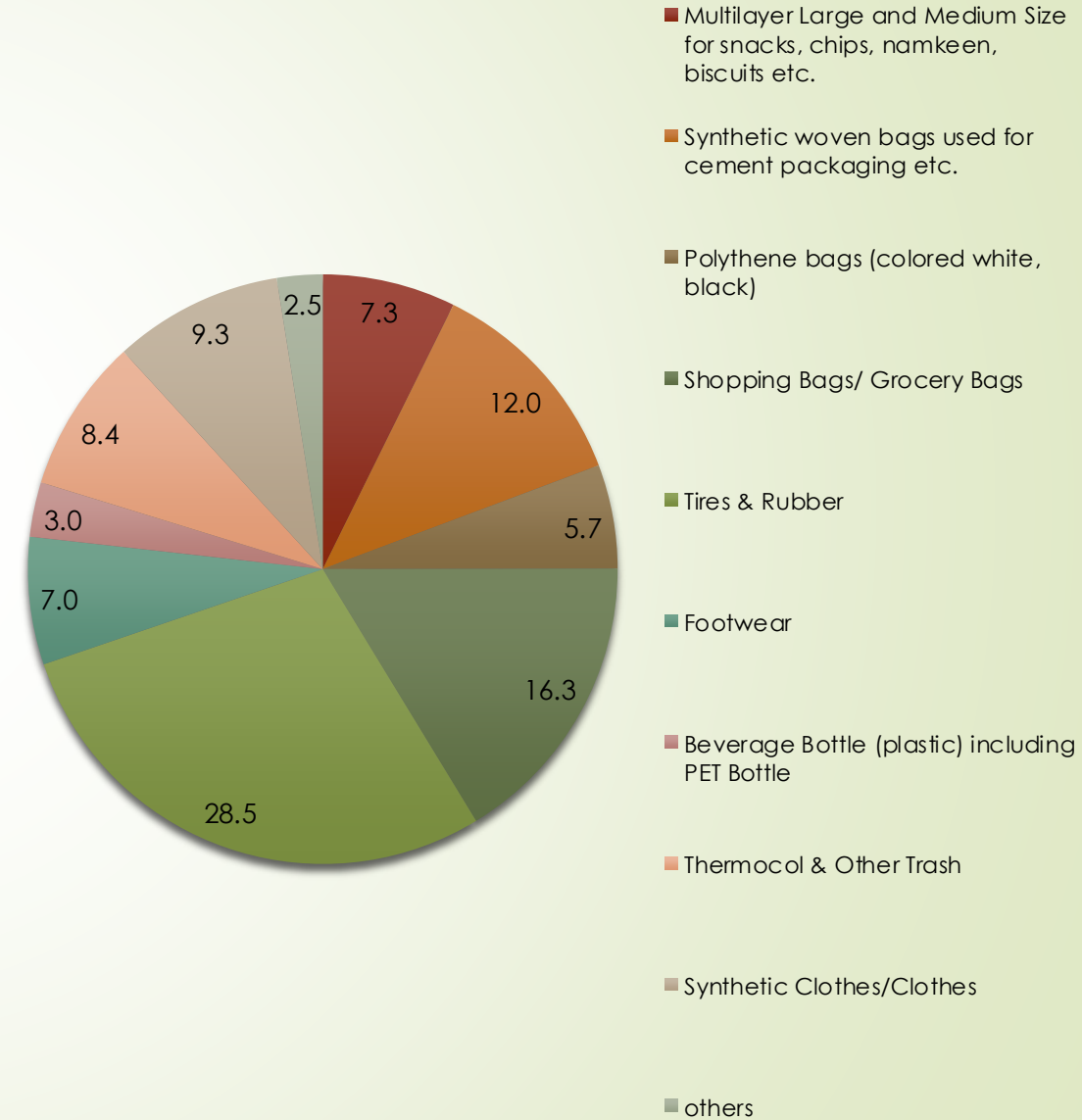
So, approximately plastic waste generation in Mumbai city is in the Range of 84 TPD to 433 TPD.

Prominent categories of plastic in the total plastic waste (assessed from clean up drives)

Total plastics by count (in %) at Mumbai



Total plastics by weight (in %) at Mumbai



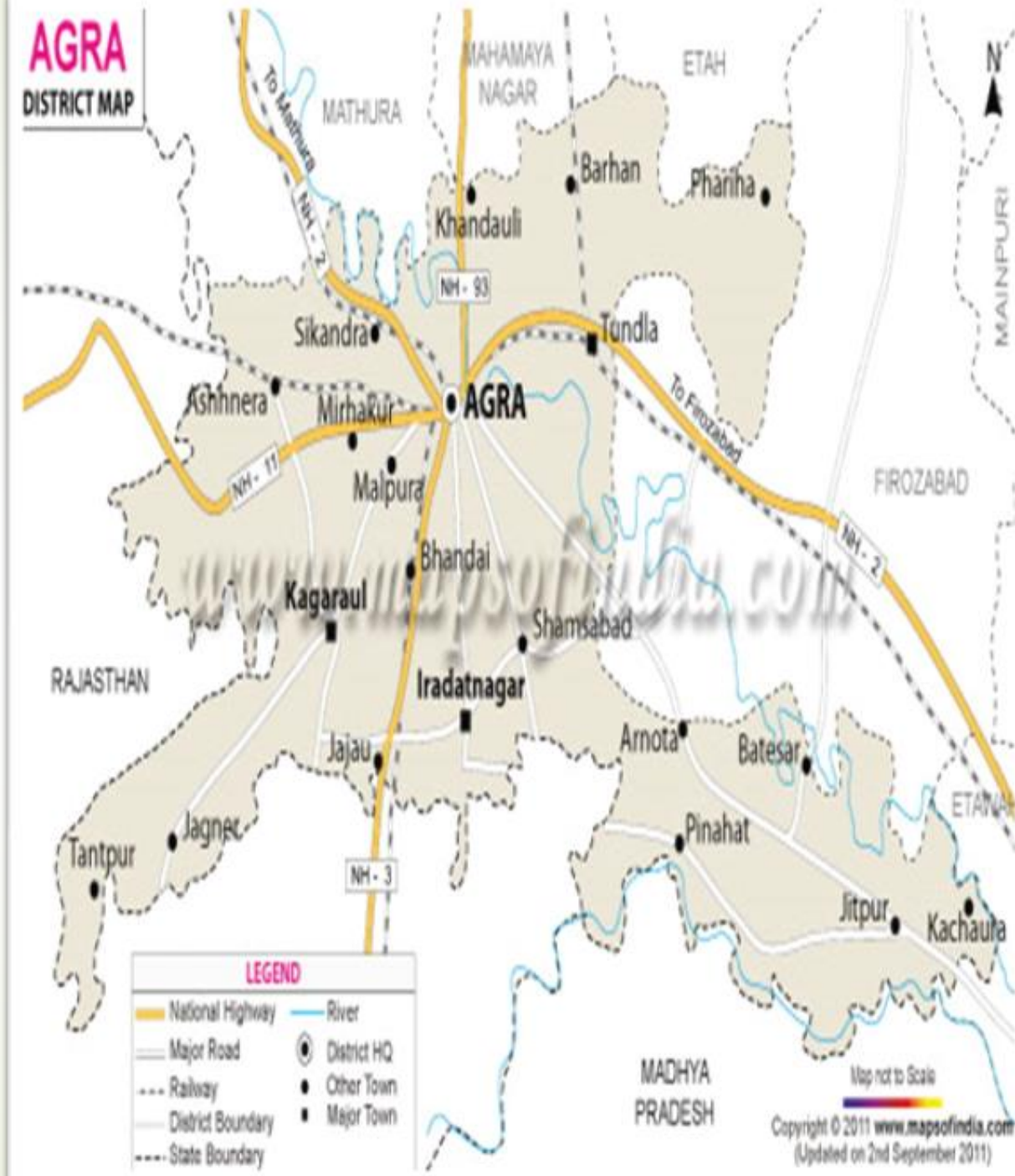
Prominent categories of plastic in the total plastic waste (assessed from clean up drives)

The values of category wise total plastic waste collected during each of the three clean ups carried out in Mumbai have been collated on count basis as well as on weight basis. The prominent plastic categories found in Mumbai are:

- i. Multilayer packaging packets
- ii. Polythene carry bags,
- iii. Shopping / grocery bags.
- iv. Synthetic woven bags, and
Plastic sheets

3. Agra

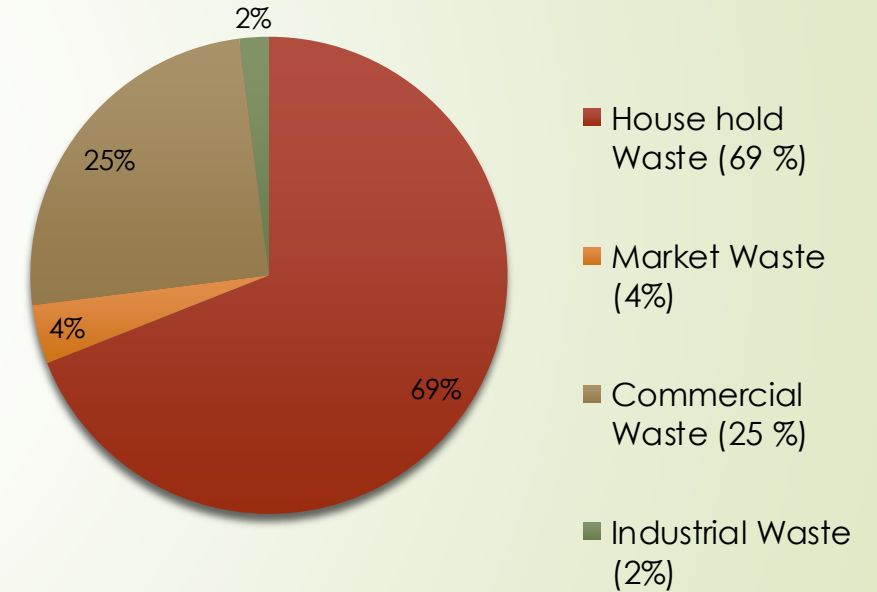
Particulars	Quantities
Total Area	126.15 sq.km
Population	1773408
Floating Population	391037
Population Density	12580 person/ sq km
No. of household	264053
Number of Ward	100
Number of Zones	4



Estimates of solid waste generation in Agra

Particulars	Values as per available secondary data			Values as per primary data collected by NPC
	Action Plan Agra (2017)	City Sanitation Plan (projected valued in 2020)	CPCB	
Solid waste generation (T/d)	712 TPD	1350 TPD	520	866
Per capita solid waste generation (kg/c/d)	0.45	0.559		0.40
Plastic waste generation (T/d)	-	-	40.89	110-130
% plastic waste in total solid waste	-	-	7.8	13-16%

Sources of solid waste in Agra



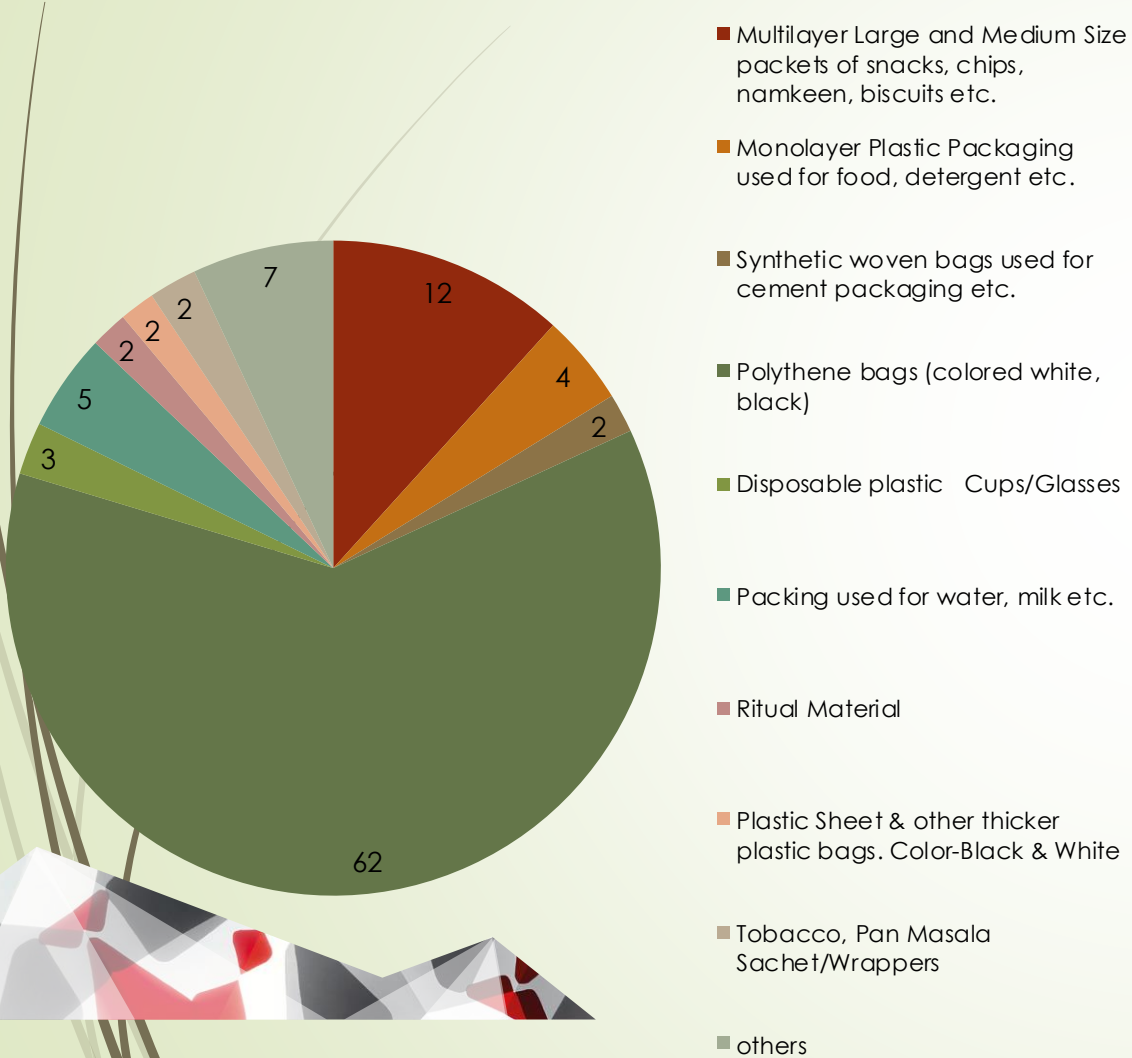
Estimation of plastic waste generation in Agra

Particulars	Plastic Generation (TPD)	Remarks
Estimated Plastic in total Domestic Waste	55-60	10% plastic waste present in total household waste 597.54 TPD as per DPR, Agra Nagar Nigam, 2017.
Estimated Plastic in total Commercial Waste	50-55	24 % plastic waste present in total commercial waste 216.5 as DPR, Agra Nagar Nigam, 2017.
Estimated Plastic in total Market Waste	2-4	6% present plastic waste in total market waste 34.64 TPD as per DPR, Agra Nagar Nigam, 2017.
Estimated total plastic waste generation	110-130	
Estimated plastic generation in slum	9-13	Estimated from the slum population as mention in DPR ANN, 2017 and taking 9 % plastic waste as per CEPHEEO guidelines
Estimated total plastic waste recycled in dry waste	80-85 *Only from formal collection	Out of 113 TPD total plastic waste, 40 % plastic is recycled from the dry waste as informed by the MRF facility (210 TPD).
Estimated high value plastic collected by rag pickers	4- 5	Only 4 to 5 % of plastic collected by rag pickers
Estimated Plastic littered	10-30 TPD	Most of the contribution of plastic littering comes from mismanagement of waste from slums , secondary storage, uncollected waste, and dumping site of Agra city.

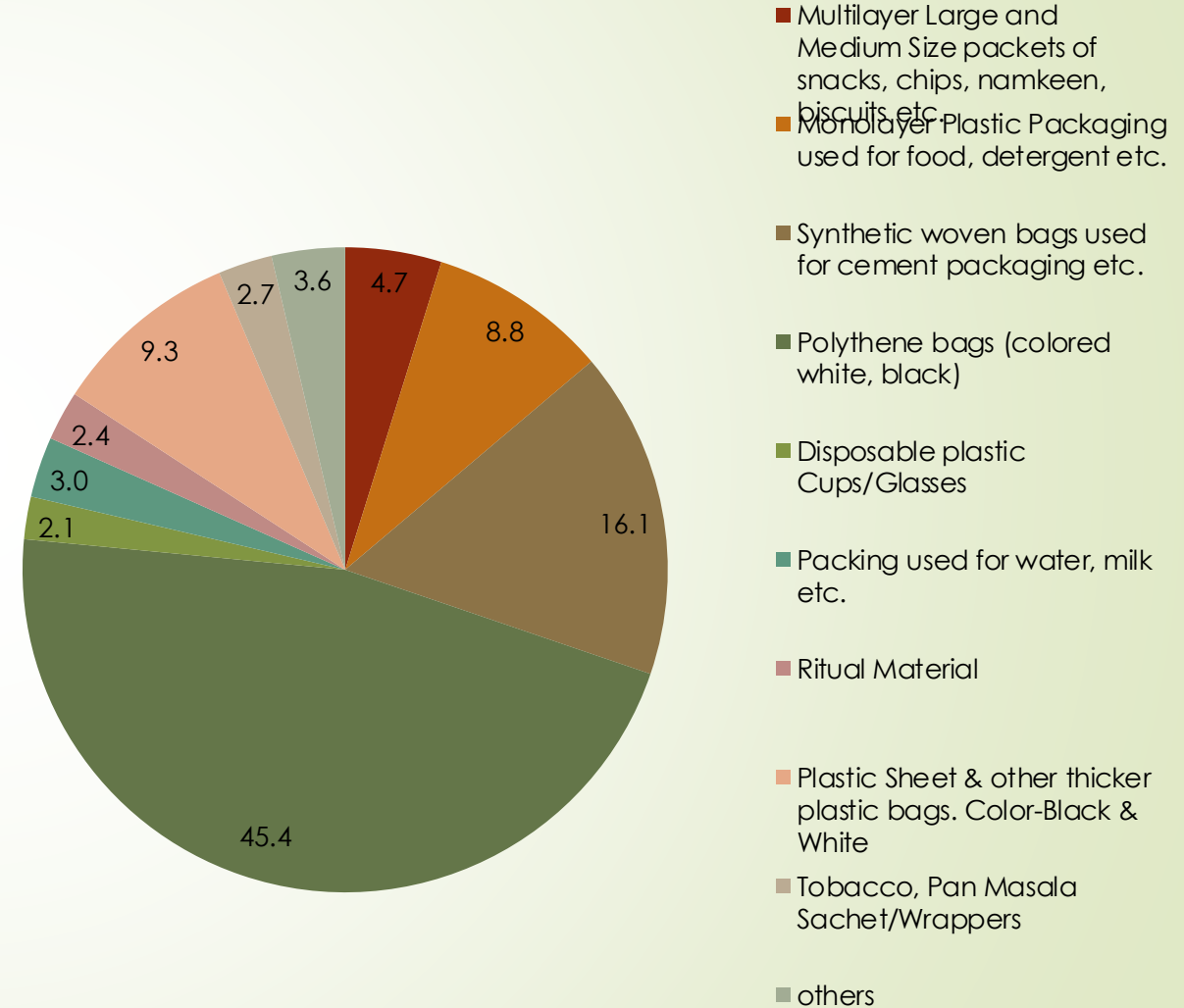
- The MRF plant at Agra is 210 TPD, where 40 % of plastic waste is received in Dry waste.
- This waste comes after the rag pickers have already extracted the high value and recyclable plastic from the mixed solid waste at various collection points/ dhalaos and community garbage bins.
- Only 4 to 5 % of high value plastic waste is collected by rag pickers during field study.

Prominent plastic categories found in Agra (assessed during clean up drives)

Total plastics by count (in %) in Agra



Total plastics by weight (in %) in Agra



Prominent plastic categories found in Agra

The prominent plastic categories found in Agra are:

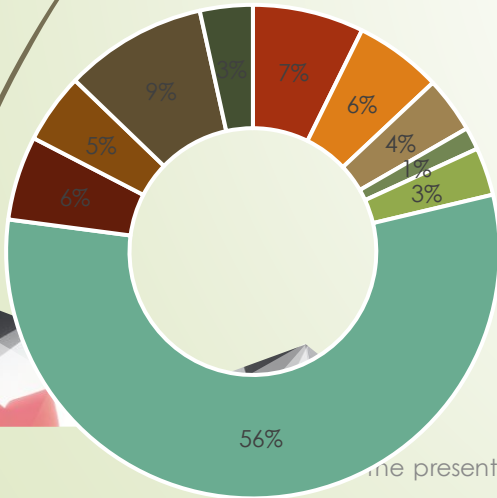
- Polythene carry bags,
- Multilayer packaging packets
- Monomer plastic packing used for food, detergents etc.
- Synthetic woven bags, and
- Plastic sheets



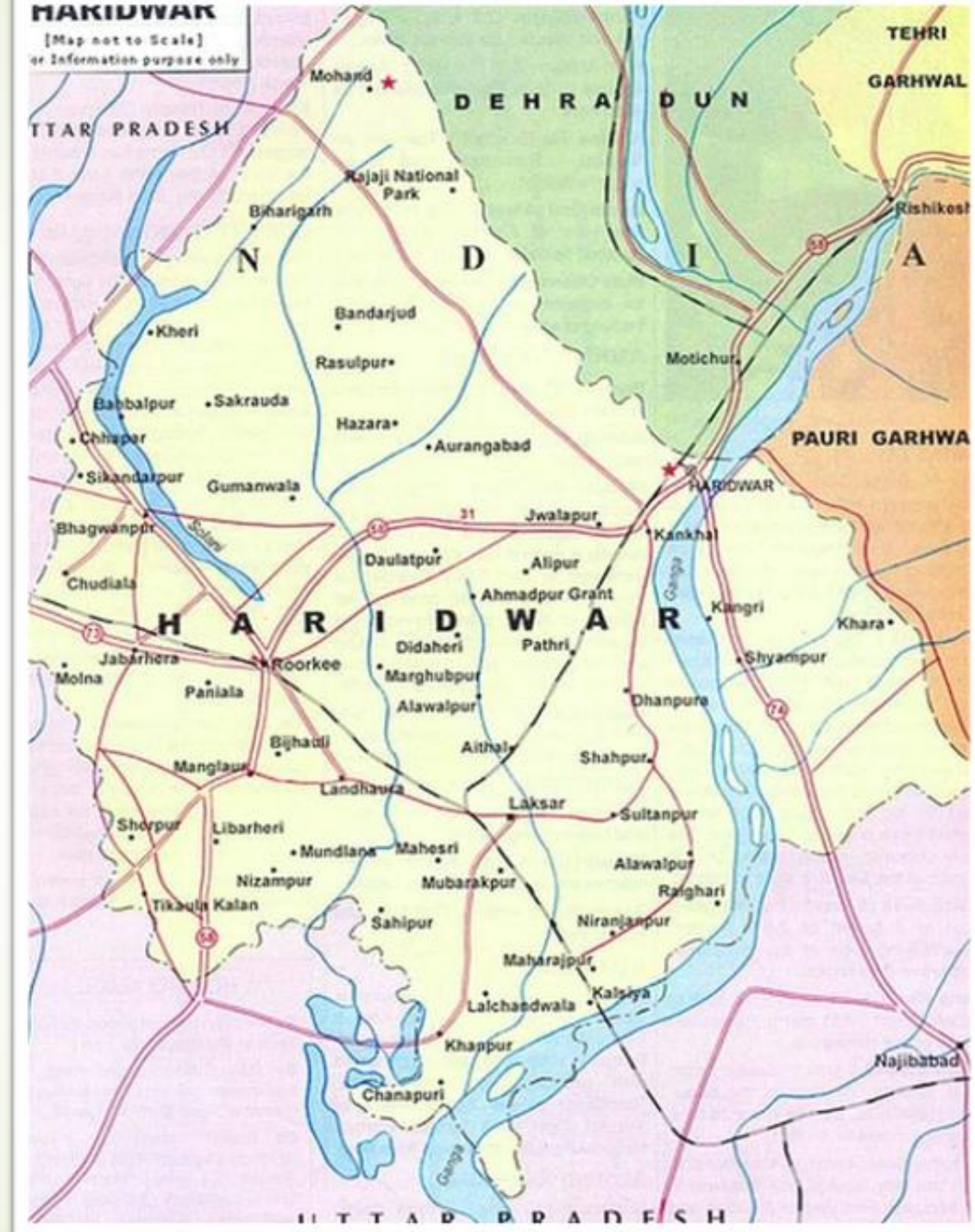
4. Haridwar

Coordinates	29.9457°N, 78.1642°E
Area of city	12.17 Sq. Kms
Municipal Wards	60
Urban Population (as per 2011 Census)	228,832
Body	Haridwar Nagar Nigam

Land usage in Haridwar



- Residential
- Industrial Area
- Tourism
- Public Amenities
- Transportation
- Agriculture
- Infertile
- Open area
- River/Sewer/Canal
- Forest area



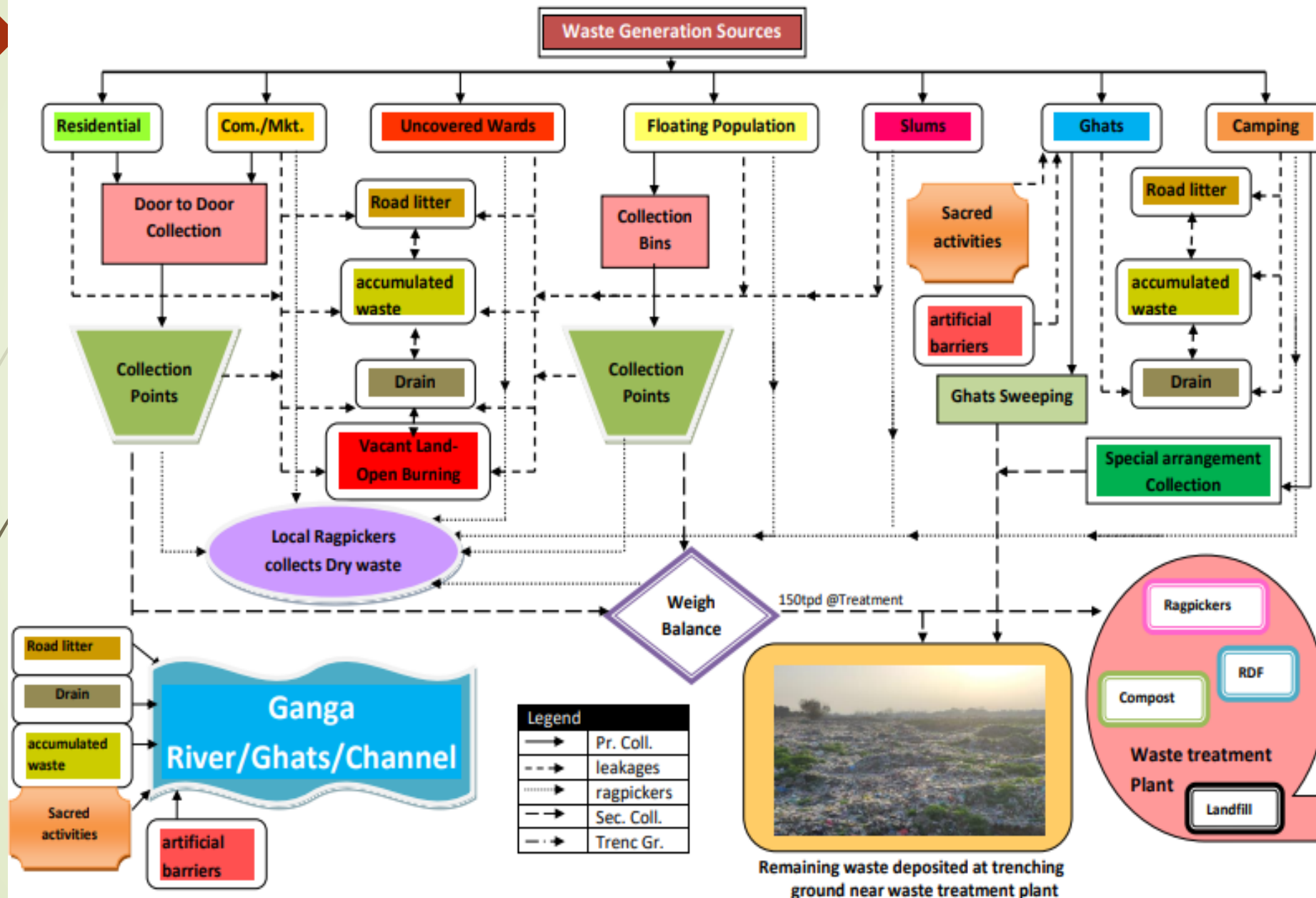
Shahi Snan at Har Ki Podi, Haridwar



Solid waste management scenario in Haridwar

- ▶ M/s KRL Waste Management Pvt. Ltd, Sarai agency has been engaged by them for waste management in the city
- ▶ M/s KRL is responsible of waste collection, transport, storage, treatment & disposal.
- ▶ Collection efficiency is 86% of door to door collection from commercial & household
- ▶ Waste generation in the city is average 312 Tonne per day which may vary depending upon the floating population.
- ▶ Most of the waste generated is comprises of food and other discarded waste such as paper, plastic, glass, metal, packaging material etc.
- ▶ -The existing treatment plant has a capacity of treating 150 tons of mixed waste per day. The plant consists of trommel screens of 45mm, 25mm and 4mm mesh sizes.
- ▶ The ragpicker collect recyclable waste from trenching ground
- ▶ About 162 tonne per day waste remain stacked in trenching ground
- ▶ M/s Akansha Enterprises under Namami Gange for maintain cleanliness of Ghats at Haridwar
- ▶ All the waste collected from ghats is finally transfer to trenching ground. The waste collected from ghats mainly comprises of waste cloths, silt, poly bags, packaging waste, flowers, fruits, vegetables etc.

Plastic leakages in Haridwar City within Municipal boundary



Estimated projections of soild/plastic waste generation

Estimated Waste per day collected by M/s KRL (excluding commercial establishments) (1)	Estimated Waste per day generated by the commercial establishments (2)	Estimated Waste per day generated by the remaining wards of Haridwar which are not cover by M/s KRL (3)	Estimated Waste per day generated by the slums populations (4)	Estimated Waste per day collected by the M/s Akansha Enterprises Pvt Ltd (5)	Estimated Waste collected by the Raggpickers (6)	Estimated Waste per day generated at dumping ground (7)	Total waste generated per day (8)
103.5 (in tons)	46.5 (in tons)	13 (in tons)	30.41 (in tons)	12 (in tons)	6 (in tons)	174 (in tons)	367.41 (in tons)
Source: DPR ISWM, 2009		Source: M/s KRL	Source: ISWM, 2009	Source: M/s Akansha	Source: local ragpickers	Source: M/s KRL	

As informed, about 8 tons of plastic waste extracting out of 150 tons of mixed waste reaching at the waste treatment plant, therefore, considering 5.3% (8 plastic waste /150 mixed waste) of plastic waste untreated generated from the total mixed waste untreated (367.41 - 150= 217.41 tons per day) is 11.52 tpd.

Estimated projections of solid/plastic waste generation for Haridwar city from Tourist load/ daily Visitors/ Floating population in addition to the previous table

Total waste generated per day (8)	Estimated Waste per day generated by the Tourist load (9)	Estimated Waste per day generated by the daily visitors (10)	Estimated Waste per day generated by District Hq. floating population (11)	Gross waste generated per day (12)
367.41 (in tons)	65.6 (in tons)	2.5 (in tons)	1.2 (in tons)	436.71 (in tons)
Calculated in above table	Source: ISWM, 2009	Source: ISWM, 2009	Source: ISWM, 2009	Gross waste generated in Haridwar city is comprises of waste stemming from (8) + (9) + (10) + (11) = 436.71 tpd
	considering the tourist load of 6,56,000 and 0.1 kg waste generation per capita per day as mentioned in ISWM, 2009. Therefore the total waste generation of tourist load is 65.6 tons considering daily visitors	considering daily visitors of 25,000 as mentioned in ISWM, 2009 and 0.1 kg waste generation per capita per day. Therefore total waste generation by daily visitors 2.5 tons	considering District Hq. floating population of 12,000 and 0.1 kg waste generation per capita per day as mentioned in ISWM, 2009. Therefore total waste generation by District Hq. floating population is 1.2 tons	

As informed, about 8 tons of plastic waste extracting out of 150 tons of mixed waste reaching at the waste treatment plant, therefore, considering 5.3% (8 plastic waste /150 mixed waste) of plastic waste untreated generated from the total mixed waste untreated (436.41 - 150= 286.71 tons per day) is 15.19 tpd.

Plastic Waste generation analysis: During lean period

Matrix for estimation of plastic waste (MTPD) generation in lean period in Haridwar city in the range of Minimum and Maximum

Particulars	Estimated waste generation considering waste generated from 86% DTDC collection (312 TPD)+ floating population (69.3 TPD) + Ghats sweepings (12 TPD) (TPD in tons per day)	Estimated waste generation considering 100% DTDC collection (325 TPD)+ floating population (69.3 TPD) + ghats (12 TPD) including slums waste generation (30.41TPD) (TPD in tons per day)
excluding estimated quantity of plastic waste collected by the local ragpickers (2.4 tons out of total 6 tons dry waste)	<p style="text-align: right;">393.3</p>	<p style="text-align: right;">436.71</p>
Estmate quantity of plastic waste generation	<p style="text-align: right;">~21</p>	<p style="text-align: right;">~23</p>
Estimated plastic waste collected by ragpickers (@40% of total dry wate collected i.e. 6 TPD)	<p style="text-align: right;">2.4</p>	<p style="text-align: right;">2.4</p>
Estimated Total plastic waste generation during lean period	<p style="text-align: right;">~23</p>	<p style="text-align: right;">~25</p>

Plastic waste generation analysis: During peak season of one month (July) as mentioned in DPR

Matrix for estimation of plastic waste (MTPD) generation during the peak season in July in Haridwar city considering the minimum and maximum range of 500-600 MT of additional waste generated during this period as mentioned in DPR, ISWM, 2009


Particulars	Estimated quantity of waste generation (in TPD) during peak season considering population of minimum 50,00,000 as mentioned in ISWM, 2009	Estimated quantity of waste generation (in TPD) during peak season considering population of maximum 60,00,000 as mentioned in ISWM, 2009
considering a factor of 100gm/day /capita waste generation by floating population during camping as mentioned in ISWM, 2009	500	600
Considering 5.3% of plastic from the mixed waste as per the information received by the waste treatment agency.	~26	~31
Estimate Minimum and maximum range of plastic waste untreated/at trenching ground/leakages	Minimum	Maximum

Plastic waste leakage analysis

Season	Quantity	Remarks
Lean Period		
Total plastic waste generation	23.2- 25.4 TPD	<ol style="list-style-type: none">1. Min value : 1) Min value : 312 TPD mixed waste collected by KRL (from 52 wards out of total 60 wards) + from Ghat sweeping + floating population during lean season + plastic waste collected by rag pickers @40% of the total waste collected by them i.e 6TPD (2.4 tpd plastic waste)2. Max value: waste collected by KRL + waste collected from Ghat sweepings + Waste generated from slums + waste generated in non covered wards + waste generated by floating population amounting to 436 TPD plastic waste collected by rag pickers @40% of the total waste collected by them i.e 6TPD (2.4 tpd plastic waste)3. Plastic in mixed waste is 5.3%

Plastic waste leakage analysis

Plastic leakage	2.24 - 2.939 TPD	<ol style="list-style-type: none"> 1. Min value : untreated plastic waste in trenching (12.8TPD) may be leaking to environment @5% i.e 0.5 TPD + plastic waste from slum i.e 1.6 TPD is also leaking into environment 2. Max : In addition to Min value , waste not collected from 8 wards at present @ 13 TPD having 5.3% plastic i.e 0.689 tpd
Peak season	Month of July	
Total plastic waste generation	49.5 – 57.2	<ol style="list-style-type: none"> 1. Min value of additional plastic waste generation during peak season: 50 lakh population generating mixed waste @100gmper capita per day which has 5.3% plastic. 2. Max value: 60 lakh population generating mixed waste @100gmper capita per day which has 5.3% plastic 3. Total plastic waste = plastic waste during lean period+ Peak season
Plastic leakage	3.56- 4.25	<ol style="list-style-type: none"> 1. Min value: 5.3% of untreated waste amounting to 500 +243 during normal which is leaked @ 5% + estimated waste generated from slums i.e. 1.6tpd. 2. Max value: Additional leakage from non covered wards i.e. 0.689 tpd



❖ 393 ton per day (minimum) comprises of waste generated from Ghat sweeping + floating population during lean season + 312 TPD mixed waste collected by KRL (from 52 wards out of total 60 wards) (excluded waste collected by rag pickers @40% of the total waste collected by them i.e 6TPD (2.4 tpd plastic waste))

❖ 436 tons per day (maximum) comprises of waste generated from slums + waste generated in non covered ward + waste collected from Ghat sweepings + waste generated by floating population + waste collected by KRL amounting to 436 TPD.

(excluded plastic waste collected by rag pickers @40% of the total waste collected by them i.e 6TPD (2.4 tpd plastic waste)).



❖ Total plastic waste generation in the lean period is in the range of 23.2 ton per day (minimum) and 25.4 tons per day (maximum).

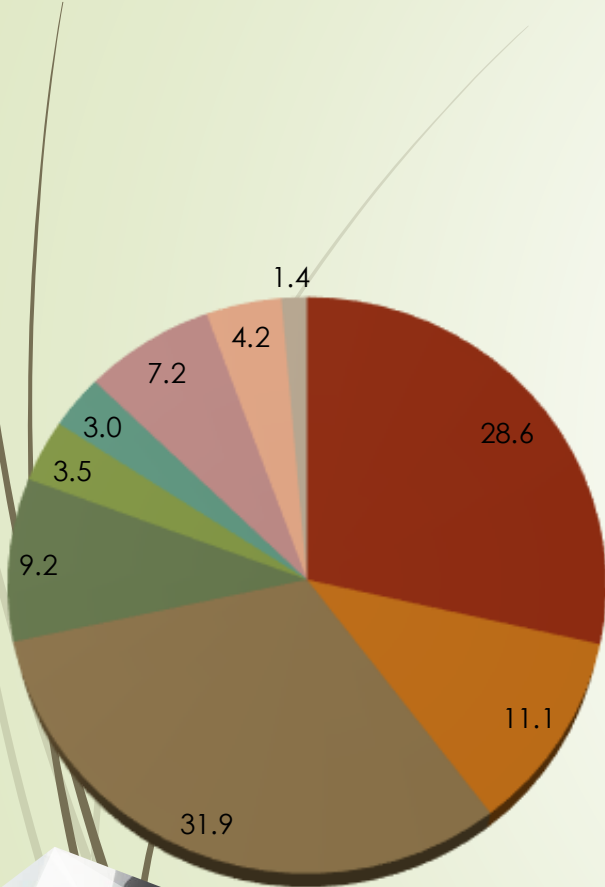
❖ Total plastic waste leakage in the lean period is in the range of 2.24 ton per day (minimum) and 2.939 tons per day (maximum).

❖ Total plastic waste generation in peak season is in the range of 49.5 ton per day (minimum) and 57.2 tons per day (maximum).

❖ Total plastic waste leakage in peak season is in the range of 3.56 ton per day (minimum) and 4.25 tons per day (maximum).

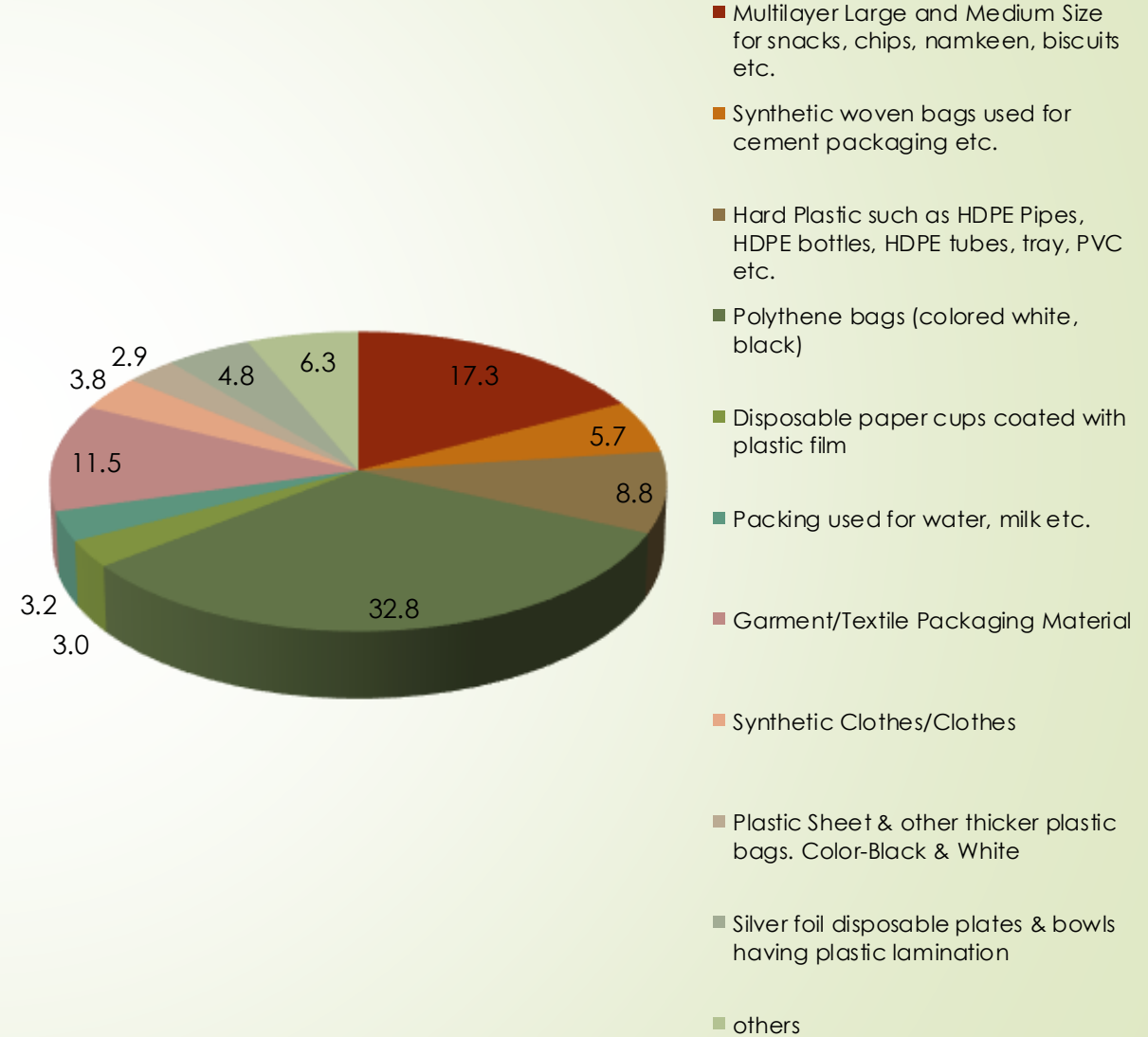
Prominent plastic categories found in Haridwar (assessed during clean up drives)

Total plastics by count (in %) at Haridwar



- Multilayer Large and Medium Size for snacks, chips, namkeen, biscuits etc.
- Hard Plastic such as HDPE Pipes, HDPE bottles, HDPE tubes, tray, PVC etc.
- Polythene bags (colored white, black)
- Disposable paper cups coated with plastic film
- Packing used for water, milk etc.
- Bottle plastic caps
- Garment/Textile Packaging Material
- Silver foil disposable plates & bowls having plastic lamination
- others

Total plastics by weight (in %) at Haridwar



- Multilayer Large and Medium Size for snacks, chips, namkeen, biscuits etc.
- Synthetic woven bags used for cement packaging etc.
- Hard Plastic such as HDPE Pipes, HDPE bottles, HDPE tubes, tray, PVC etc.
- Polythene bags (colored white, black)
- Disposable paper cups coated with plastic film
- Packing used for water, milk etc.
- Garment/Textile Packaging Material
- Synthetic Clothes/Clothes
- Plastic Sheet & other thicker plastic bags. Color-Black & White
- Silver foil disposable plates & bowls having plastic lamination
- others

Prominent plastic categories found in Haridwar (assessed during clean up drives)

- ▶ The values of category wise total plastic waste collected during each of the two clean ups carried out in Haridwar have been collated on count basis as well as on weight basis. The prominent plastic categories found in Haridwar are:
- ▶ Multilayer packaging packets
- ▶ Polythene carry bags,
- ▶ HDPE pipes, tubes, trays etc.
- ▶ Disposable plastic cutlery, and
- ▶ Garment packing material

