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

Webinar - 1 : Science & Technology of Plastics and techniques/best practices of plastic pollution assessment and investigation

Macroplastic assessment Methodology for 4 cities in India

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About Macro-plastics



- Macro - plastics are large fragments of plastics, typically over 5 mm size, found on land or marine ecosystem
- These are clearly visible to the eye and are made of various types of polymers & additives (and the plastics have a range of features / characteristics making them widely used material in a spectrum of products of the current plastic age)
- They degrade into micro-plastics due to various natural processes, including photo degradation, physical / mechanical forces, hydrolysis activity etc.
- Land based macro-plastics are considered one of the major sources of riverine and marine litter. The efforts are ongoing to explore the leakage scenarios of plastics into riverine and marine eco-systems and towards assessing their impacts

Macro-Plastics Assessment in Four Cities in India

Partner Agencies :-

TERI at Mumbai

Chintan at Agra

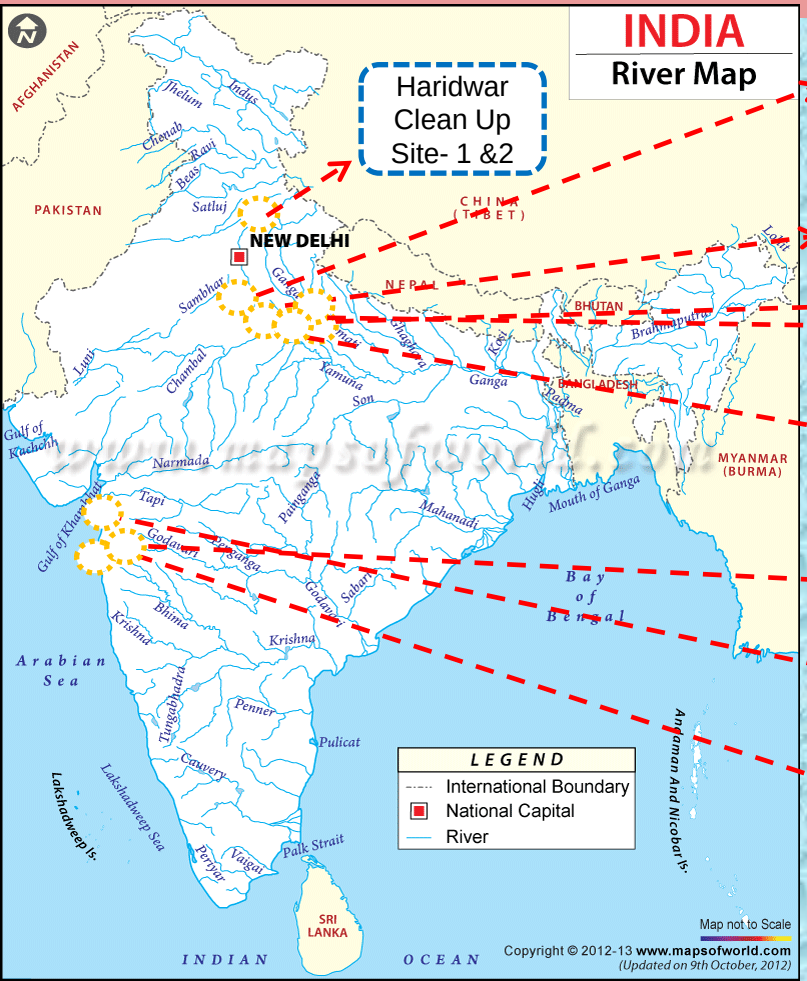
Development Alternatives- at Allahabad and Haridwar

19 Macro-plastics assessments/Clean Up activities in 4 cities (November, 2019 to March, 2020).

Includes 4 pilot studies undertaken in Mumbai, Agra, Allahabad that were enabling to develop SOP and quality parameters.

NPC along with partner agencies and local volunteers had carried out these 19 clean up drives.

Some Clean Up locations along Indian Ganges and Mumbai Coast



Haridwar Clean Up Site- 1 &2

Agra Clean Up Site- 1

Agra Clean Up Site- 1

Allahabad Clean Up Site- 3

Allahabad Clean Up Site- 1 &11

Allahabad Clean Up Site- 2,4&5

Mumbai Clean Up Site- 1

Mumbai Clean Up Site- 2

Mumbai Clean Up Site- 3

Banner used during Clean Ups

SOP for Macro plastic assessment/Clean Up activity

Standard operating procedures were developed

- To structure the over all clean up drive
- To define the step wise activities to be performed within a specific time frame.

The SOP helped in enabling the participants of clean up group to acquaint with the proceedings and accomplish the tasks.
The procedure reflected on aspects of

- demarcation of boundary for clean-up area,
- wearing of personal protective equipment,
- labeling of gunny bags
- collection of mixed waste,
- filling in gunny bags,
- segregation of plastic waste(in 2 stages)
- Weighing of segregated plastic waste after suitable categorization etc.

SOP for Clean Up Activities

SOP For Macro-Plastic Assessment / Clean-up Activity

Steps	Description	Sample Photos	Duration	Tools Required
1.	Demarcate cleanup area along the boundary		30 minutes	strips of fluorescent colour , chalk powder.
2.	Label Bags 1. Place 2. Date 3. Bag No.		20 minutes	Permanent marker pens
3.	Divide Team into 2 groups 1. Collection of Litter (Group 1) 2. Segregation of Waste (Group 2)		20 minutes	Datasheet for recording names
4.	Wear Personal Protective gear/ Equipments (PPE's) such as, Glove, mask	 	10 minutes	Glove, mask
5.	Collect 1 gunny bag per Group of 4-5 Volunteers for collection of waste litter		20 minutes	
6.	Pick the litter and collect in the gunny bag and clean the site		60 - 90 minutes	Gunny bag, dust pan, broom

SOP for Clean Up Activities

7.	After collection of litter, report to NPC team		20 minutes	
8.	Weigh Each waste litter bag and record and inform NPC team. In a group of 4-5 volunteers one person shall be responsible for collection, weighing and recording of weight of bag containing waste litter.		20 minutes	Weighing balance, Datasheet for recording
9.	Transfer Weighed bags to the blue sheet (around 3-4 bags in one blue sheet) and place the mixed waste on the sheet		30 minutes	
10.	Volunteers of group 2 (segregation of waste) to join at this stage. And Segregate of Plastic waste from non plastic.		10 minutes	
11.	Weigh Segregated plastic and inform NPC team			
12.	One volunteer to segregate one plastic category from segregation team. Then place it in appropriate carton box labelled with name of plastic waste category.		60-90 minutes	Carton box
13.	Non plastic material shall be discarded and placed in garbage bins available at cleanup site after segregation of waste.		30 minutes	Broom, dustpan
14.	Weigh cardboard boxes with one category of plastic waste and inform NPC team. For each plastic waste category, count waste pieces and volunteers responsible for that category shall inform NPC team.		30 minutes	Weighing box, Datasheet for recording weight and count of plastic waste for

Protocol for segregation of plastic waste

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PLASTIC WASTE

Milk Pouch and Water Pouches		Multilayered packaging material	
Razor toys Plastics		Cloth type- polypropylene Bags	
Ritual Material e.g. Plastic Chains, Gods frame, Plastic moulds		Low density plastic packaging material e.g. Tea packs, Sanitary packs	
Food wrappers (Biscuits, namkin packet etc)		Bottle and Beverage Bottle (plastic)	
Lids (Plastic)		Straws	
Grocery Bags (Plastics)		Polybags	
Woven Bags (e.g. Cement bag)		Tubes (e.g. toothpaste)	
Disposable cups		Rubberised slipper	
Cups & Plates (foams)		Cigarette Butts	

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NON-PLASTIC WASTE

Papers waste		Metal parts	
Food waste		Wood	
Beverage Bottle (glass)		Beverage Cans (Non-Plastic)	
Disposal Plates (paper)		Biodegradable waste	
Cotton fabric			

Do’s and Don’ts

UN environment programme

PLASTIC TIDE TURNERS

The Young Leaders Plastic Challenge

National Productivity Council

clean seas
turn the tide on plastic

Counter MEASURE
FOR PLASTIC FREE RIVERS

Dos and Don'ts

Do’s ✓

1. Wear your protective gear (masks and gloves) when handling the waste
2. Beware of sharps present in the waste. Don't pick them directly with your bare hands
3. Segregate the plastics from the mixed waste
4. The plastic product should be crushed/mutilated to avoid reuse
5. Collect the waste till the bag is 3/4th full
6. Do not drag the bags and lift the bags carefully with support from 3-4 volunteers per bag
7. Use broom and dustpan to pick the waste and clean the area
8. Avoid needle (or from any other sharp) prick injuries
9. Be careful regarding staples on the labels from being torn or separated from the bag
10. Use permanent marker pens for coding/labeling bags
11. Prefer to use tare weight when weighing segregated and sorted plastics on the electronic balance
12. Be cautious while weighing with spring balance such as not to injure hand or so
13. Avoid overcrowding on the tarpaulin areas
14. Wash/rinse hands well after/post clean up exercise and use hand sanitiser before taking refreshments

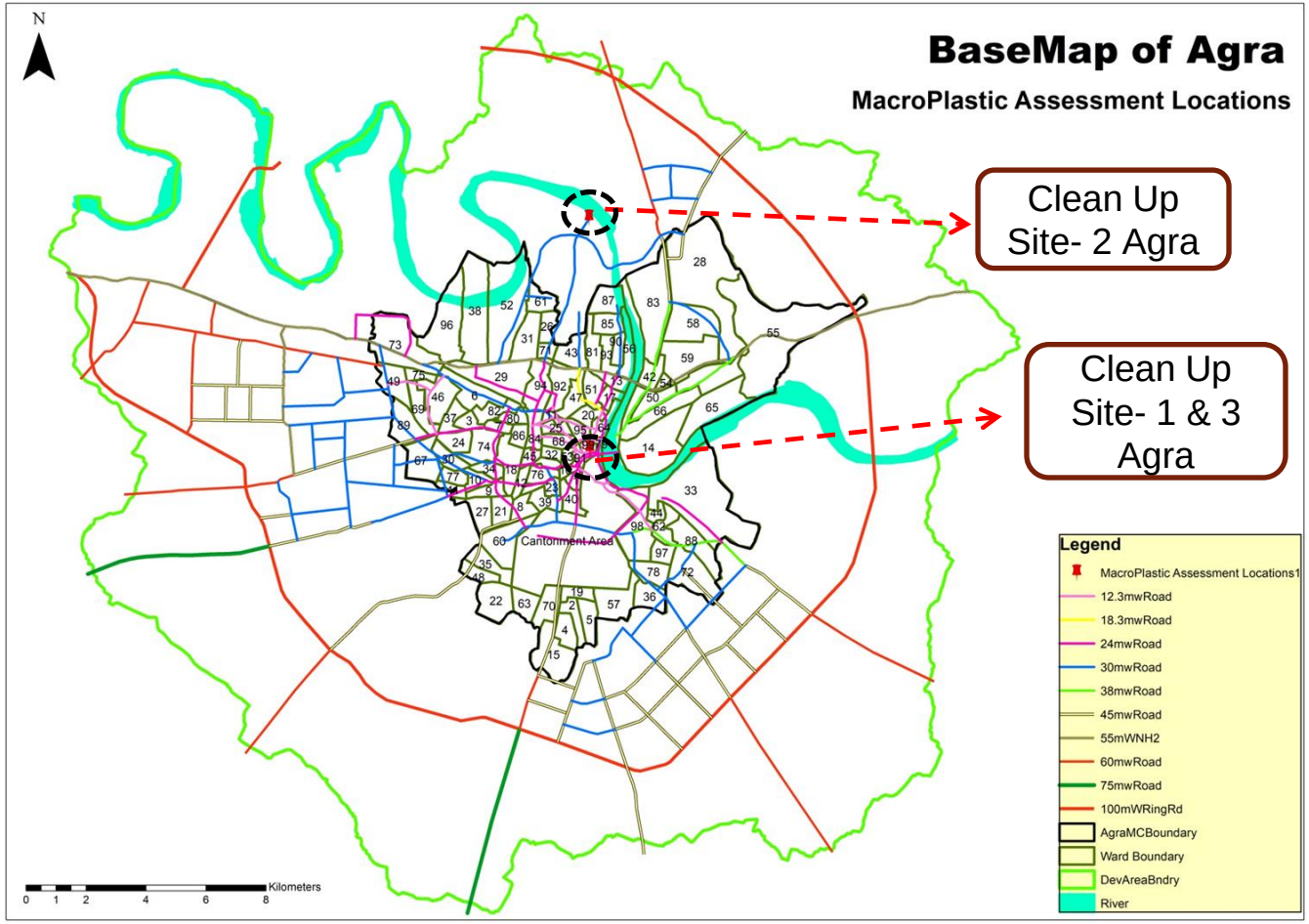
Don’ts ✗

1. Do not Reuse plastic products
2. Do not Mix plastic with other wastes
3. Do not burn plastic waste
4. Do not Spill waste
5. Do not walk into slush or on wet soil and wear proper shoes that can grip the soil or the ground surface
6. Do not vigorously dust the plastics or cloth or such waste being collected to control dust from becoming air borne during the process of clean up

Details of the Macro-plastic assessment/Clean Up drives

S.no.	Name of hot spot	Name of city	Latitude/Longitude	Area of Clean Up (in m2)	Date of Clean Ups
1	Hathi Ghat	Agra	27°11'6.1“, 78°1'26"	5,400	06-Nov-19
2	Pohiya ghat	Agra	27°12'33.05"N, 78°0.38'0"E	1,200	03-Jan-20
3	Hathi Ghat	Agra	27°11'6.1" N, 78°1'26.2" E	726	20-Feb-20
4	Ram ghat	Allahabad	25°25' 55.26"N, 81°52'54.12" E	10000	02-Nov-19
5	Katghar Basti,	Allahabad	25°25'28.38"N, 81°50'29.7"E	10000	03-Nov-19
5	Amitabh Bachan Pulliya	Allahabad	25°28'59.19"N, 81°52'46.2"E	1,380	08-Jan-20
7	Balua Ghat	Allahabad	25.423199 N, 81.839554 E	400	01-Mar-20
8	Katghar Basti	Allahabad	25.424560 N, 81.841739 E	150	01-Mar-20
9	Gau Ghat	Allahabad	25.426538 N, 81.848152 E	100	02-Mar-20
10	Triveni Ghat	Allahabad	25.429253 N, 81.857726 E	100	02-Mar-20
11	Arail Ghat	Allahabad	25.421782 N, 81.880523 E	400	03-Mar-20
12	Sachcha Baba Ghat	Allahabad	25.420153 N, 81.883211 E	400	03-Mar-20
13	Sangam Point (Below Naini Bridge)	Allahabad	25.423770 N, 81.861141 E	400	04-Mar-20
14	Near Naini Bridge	Allahabad	25°25'51.95"N, 81°51'18.17"E	861	12-Mar-20
15	Vishnu ghat	Haridwar	29°57'31.63"N, 78°10'8.72"E	1221	22-Jan-20
16	Pant Deep Parking	Haridwar	29°56'45.6"N, 78°10'3.084"E	1345	24-Jan-20
17	Vashi Mumbai	Mumbai	19°4'33.24"N, 72°59'4.92"E	100	02-Nov-19
18	Chimbai Beach	Mumbai	19°3'26.51"N, 72°49'24.49"E	353	03-Dec-19
19	Gorai Creek, Near Gorai Bridge, Kandivali	Mumbai	19°13'20.433"N, 72°49'42.665"E	29	02-Mar-20

Locations of Clean Ups along the Yamuna Bank in Agra



Trash data sheet adopted for Clean Ups – Reflections regarding Agra sites

S.NO.	MOST LIKELY TO FIND ITEMS:	Total No. of categorized plastics from 22 gunny bags of segregated plastics at Agra city	Total Weight (in Kg) of categorized plastics from 22 gunny bags of segregated plastics at Agra city
1	Cigarette Butts	0	0
2	Multilayer Large and Medium Size for snacks, chips, namkeen, biscuits etc.	670	5.812
3	Multilayer Sachets for Shampoo, Tobacco, tea, coffee, tomato sauce etc.	68	0.512
4	Multilayer Gift Wrapping Paper	1	0.01
5	Monolayer Plastic Packaging used for food, detergent etc.	256	10.85
6	Synthetic woven bags used for cement packaging etc.	110	19.784
7	Hard Plastic such as HDPE Pipes, HDPE bottles, HDPE tubes, tray, PVC etc.	31	0.876
8	Polythene bags (colored white, black)	3521	55.791
9	Woven Polycloth Bags for Carrying Groceries/Vegetables	47	2.572
10	Disposable paper cups coated with plastic film	41	0.104

Trash data sheet adopted for Clean Ups – Reflections regarding Agra sites

S.NO.	MOST LIKELY TO FIND ITEMS:	Total No. of categorized plastics from 22 gunny bags of segregated plastics at Agra city	Total Weight (in Kg) of categorized plastics from 22 gunny bags of segregated plastics at Agra city
11	Disposable plastic Cups/Glasses	148	0.85
12	Packing used for water, milk etc.	275	1.315
13	Take Out/ Away containers (Plastic)	0	0
14	Take Out/ Away containers (Food)	0	0
15	Paper bags coated with plastic film	0	0
16	Bottle plastic caps	0	0
17	Shopping Bags/ Grocery Bags	0	0
18	Plastic tubes (Dant kanti, Facewash cap)	6	0.11
19	Flowers garlands, pooja samagri etc made up of Plastic	0	0
20	Black X ray film	9	3.66
21	Plastic strings used for tying	4	0.16
22	Plastic Purse (Synthetic Leather)	2	0.22

Trash data sheet adopted for Clean Ups – Reflections regarding Agra sites

S. No.	FISHING GEAR	Total No. of categorized plastics from 22 gunny bags of segregated plastics at Agra city	Total Weight (in Kg) of categorized plastics from 22 gunny bags of segregated plastics at Agra city
1	Fishing Buoys pots & traps:	0	0
2	Fishing Net & Pieces:	0	0
3	Fishing Line (1 Yard/ meter)= 1 piece	0	0
4	Rope (1 Yard/ meter)= 1 piece	0	0

Trash data sheet adopted for Clean Ups – Reflections regarding Agra sites

S. No.	OTHER TRASH	Total No. of categorized plastics from 22 gunny bags of segregated plastics at Agra city	Total Weight (in Kg) of categorized plastics from 22 gunny bags of segregated plastics at Agra city
1	Appliances (refrigeration, washers etc)	0	0
2	Balloons	0	0
3	Cigar tips	0	0
4	Cigarette Lighters	0	0
5	Cigarette Packets	0	0
6	Construction Materials with plastic component	0	0
7	Fireworks(Lamination made of plastic film)	0	0
8	Tires & Rubber	0	0
9	Footwear	16	2.995
10	Beverage Bottle (plastic) including PET Bottle	16	0.218
11	Foams	0	0
12	Rubber Ball	0	0
13	Straws	0	0
14	Cups & Plates (Thermocol)	0	0

Trash data sheet adopted for Clean Ups – Reflections regarding Agra sites

S. No.	PACKAGING MATERIALS	Total No. of categorized plastics from 22 gunny bags of segregated plastics at Agra city	Total Weight (in Kg) of categorized plastics from 22 gunny bags of segregated plastics at Agra city
1	6- Packs Holders	0	0
2	Other Plastic/Foam Packaging	0	0
3	Other Plastic Bottle	0	0
4	Strapping Bands	0	0
5	Medicine Packaging	1	0
6	Garment/Textile Packaging Material	18	0.11
7	Low density plastic packaging material (Diapers, Sanitary packs)	38	0.108

Trash data sheet adopted for Clean Ups – Reflections regarding Agra sites

S. No.	PERSONAL HYGIENE	Total No. of categorized plastics from 22 gunny bags of segregated plastics at Agra city	Total Weight (in Kg) of categorized plastics from 22 gunny bags of segregated plastics at Agra city
1	Condoms	0	0
2	Diapers	0	0
3	Syringes	0	0
4	Tampons/Tampon Applicators	0	0
5	Sanitary napkins/pads	15	0.72

Trash data sheet adopted for Clean Ups – Reflections regarding Agra sites

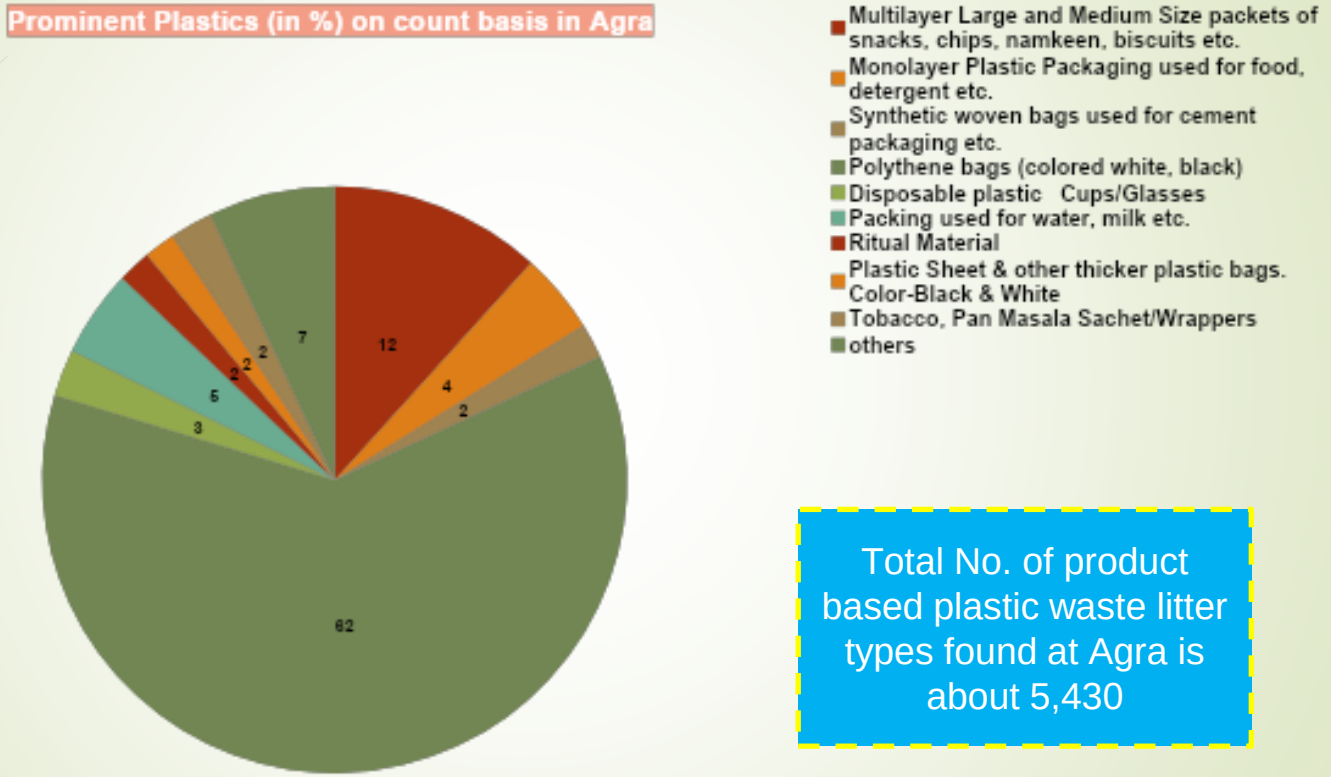
S. No.	TINY TRASH LESS THAN 2.5 CM	Total No. of categorized plastics from 22 gunny bags of segregated plastics at Agra city	Total Weight (in Kg) of categorized plastics from 22 gunny bags of segregated plastics at Agra city
1	Foam pieces	0	0
2	Glassy plastic pieces	0	0
3	Plastic pieces	0	0

Trash data sheet adopted for Clean Ups – Reflections regarding Agra sites

S. No.	ITEMS OF LOCAL CONCERN	Total No. of categorized plastics from 22 gunny bags of segregated plastics at Agra city	Total Weight (in Kg) of categorized plastics from 22 gunny bags of segregated plastics at Agra city
1	Glazed Paper having plastic lamination	0	0
2	Fragmented/ torn/ dusty mixed plastic waste	0	0
3	Synthetic Jackets	0	0
4	Synthetic Bags	0	0
5	Synthetic Belt pouch	0	0
6	Synthetic Clothes/Clothes	0	0
7	Synthetic flowers	0	0
8	Pan shop synthetic sheet	0	0
9	Ritual Material	105	11.393
10	God Sculptures having synthetic cloth material & plastic ornaments.	0	0
11	Plastic Sheet & other thicker plastic bags. Color-Black & White	100	3.261
12	Milky white bottles for carrying gangajal	0	0
13	Tobacco, Pan Masala Sachet/Wrappers	136	1.25
14	Silver foil disposable plates & bowls having plastic lamination	49	0.23

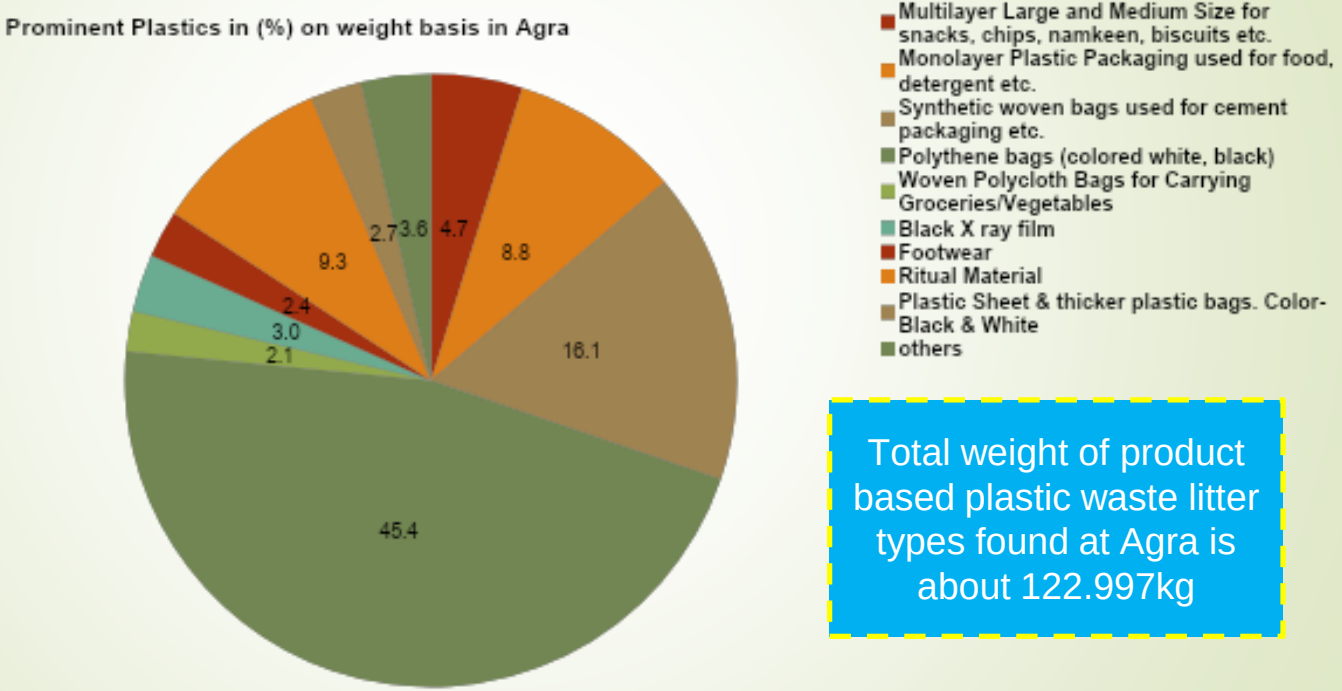
DEAD/INJURED ANIMAL	STATUS	ENTANGLED	TYPE OF ENTANGLEMENT ITEM
-	Dead or injured	Yes or No	-

Charts depict the prominent product based plastic wastes litter types in Agra on the basis of Count



Total No. of product based plastic waste litter types found at Agra is about 5,430

Charts depict the prominent product based plastic wastes litter types in Agra on the basis of Weight



Total weight of product based plastic waste litter types found at Agra is about 122.997kg

Trash Data Sheet – Scenario from a set of sites at Allahabad

Sl No	Types of Plastic categories	Total No. of categorized plastics from 7 sites 22 gunny bags of segregated plastics	Total weight in Kg of categorized plastics from 7 sites in Allahabad from 22 gunny bags of segregated plastics
1	Cigarette Butts	682	0.57
2	Multilayer Large and Medium Size for snacks, chips, namkeen, biscuits etc.	2297	11.33
3	Multilayer Sachets for Shampoo, Tobacco, tea, coffee, tomato sauce etc.	83	0.61
4	Monolayer Plastic Packaging used for food, detergent etc.	3	0.05
5	Synthetic woven bags used for cement packaging etc.	182	46.98
6	Polythene bags (colored white, black)	2628	47.147
7	Disposable paper cups coated with plastic film	765	4.06
8	Disposable plastic Cups/Glasses	648	6.56
9	Packing used for water, milk etc.	388	1.92
10	Bottle plastic caps	168	0.37
11	Shopping Bags/ Grocery Bags	888	10.066
12	Plastic tubes (Dant kanti, Facewash cap)	13	0.25
13	Footwear	64	8.9
14	Beverage Bottle (plastic) including PET Bottle	272	6.16
15	Thermocol & Other Trash	234	3.23
16	Medicine Packaging	8	0.79
17	Diapers	27	1.3
18	Syringes	4	0.02
19	Glass pieces	12	1.34
20	Plastic pieces	116	4.26

Trash Data Sheet – Scenario from a set of sites at Allahabad

Sl No	Types of Plastic categories	Total No. of categorized plastics from 7 sites 22 gunny bags of segregated plastics	Total weight in Kg of categorized plastics from 7 sites in Allahabad from 22 gunny bags of segregated plastics
21	Synthetic Clothes/Clothes	343	43.8
22	God Sculptures having synthetic cloth material & plastic ornaments.	61	23.25
23	Tobacco, Pan Masala Sachet/Wrappers	2760	1.35
24	Appliances (refrigeration, washers etc)	10	0.54
25	Other Plastic Bottle	21	0.75
26	Flowers garlands, pooja samagri etc made up of Plastic	10	0.7
27	Plastic Purse (Synthetic Leather)	5	0.5
28	Fishing Line (1 Yard/ meter)= 1 piece	4	1.9
29	Hard Plastic such as HDPE Pipes, HDPE bottles, HDPE tubes, tray, PVC etc.	5	1.09
30	Take Out/ Away containers (Plastic)	10	0.16
31	Take Out/ Away containers (Food)	4	0.06
32	Condoms	2	0.005
33	Synthetic Bags	2	1.89
	Total	12719	231.908

Trash Data Sheet

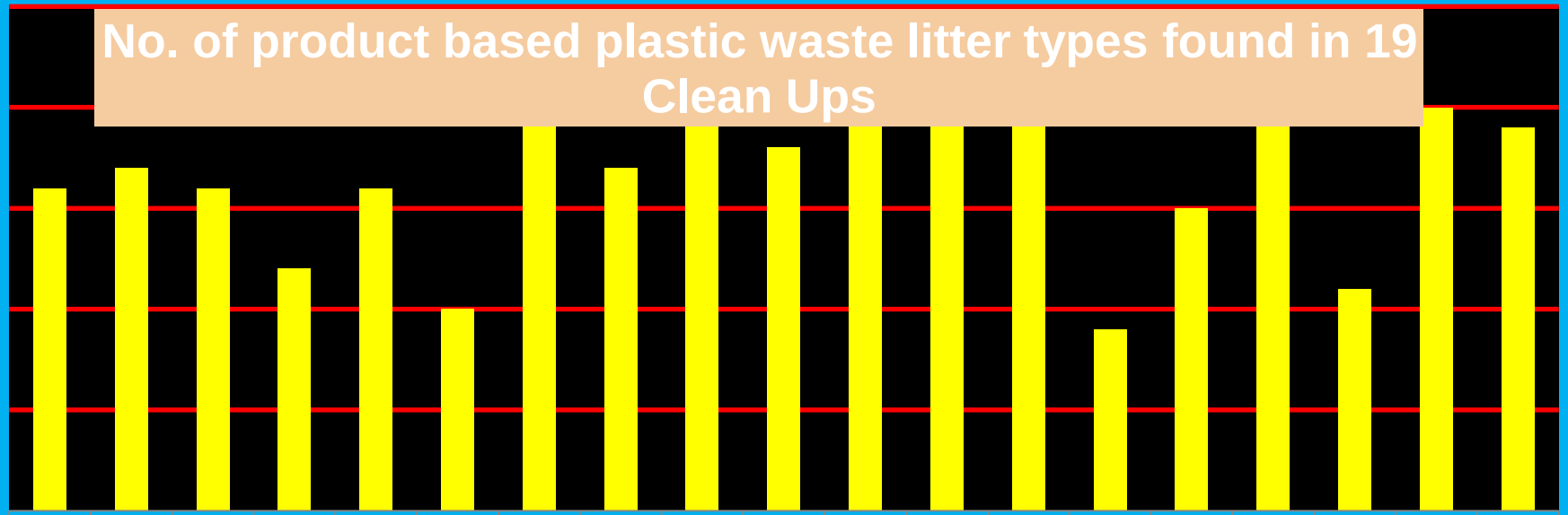
CLEAN-UP SUMMARY		
Number of Gunny Bags Filled with mixed trash:		Nos
Weight of Collected:		kg
Weight of Mixed Trash from Gunny Bags:		kg
Weight of Plastic from Gunny Bags used for segregation of types of plastic:		kg
Area cleaned:		Sq. m
Percentage of aggregate plastics of the site vis a vis mixed waste collected		%
Mixed wate trash weight/Area for Clean Up		gm/sq m
Plastic weight/Area for Clean Up		gm/sq m
Thus, Estimated plastic in all bags		kg

Summary of findings of Clean Up activities

- Total consolidated area of 34,565 square meters of area was covered under the clean up activities in 4 cities.
- Total trash of 2,878 kg was collected from which 1,454 kgs of plastic waste (50.52% of total waste) of different categories (53) were segregated.

S. No.	Particulars	Values
1	Total Clean Ups	19
2	No. of cities covered	4
3	Total area covered under clean up in 4 cities	34,565 sq.mtr
4	Total trash collected	83.26 gm/sq.m
5	Total plastic waste segregated	42.06 gm/sq.m
6	Composite % of plastic in total trash	50.52%
7	No. of categories of plastic found in waste	53

No. of product based plastic waste litter types found in 19 Clean Ups



	Hathi Ghat, Agra 6 Nov 2019	Pohiya ghat, Agra 3 Jan 2020	Hathi Ghat, Agra 20 fEB 2020	Ram ghat Prayagraj 2 Nov 2019	Katghar Basti, Allahabad 3 Nov 2019	AB Pulliya, Allahabad 8 Jan 2020	Baluaghat, Allahabad	Katghar Basti, Allahabad	Gau ghat, Allahabad	Triveni ghat, Allhabad	Arail ghat, Allahabad	Sachcha baba ghat, Allahabad	Sangam Point, Allahabad	Near Naini Bridge, Allahabad	Pant Deep Parking, Haridwar 24 Jan 2020	Vishnu ghat, Haridwar 22 Jan 2020	Vashi Mumbai 2 Nov 2019	Chimbai Beach, Mumbai 3 Dec 2019	Gorai Creek, Near Gorai Bridge, Kandivali (West), Charkop Gaon, Mumbai
Series1	16	17	16	12	16	10	21	17	20	18	22	20	22	9	15	21	11	20	19

Overview :-

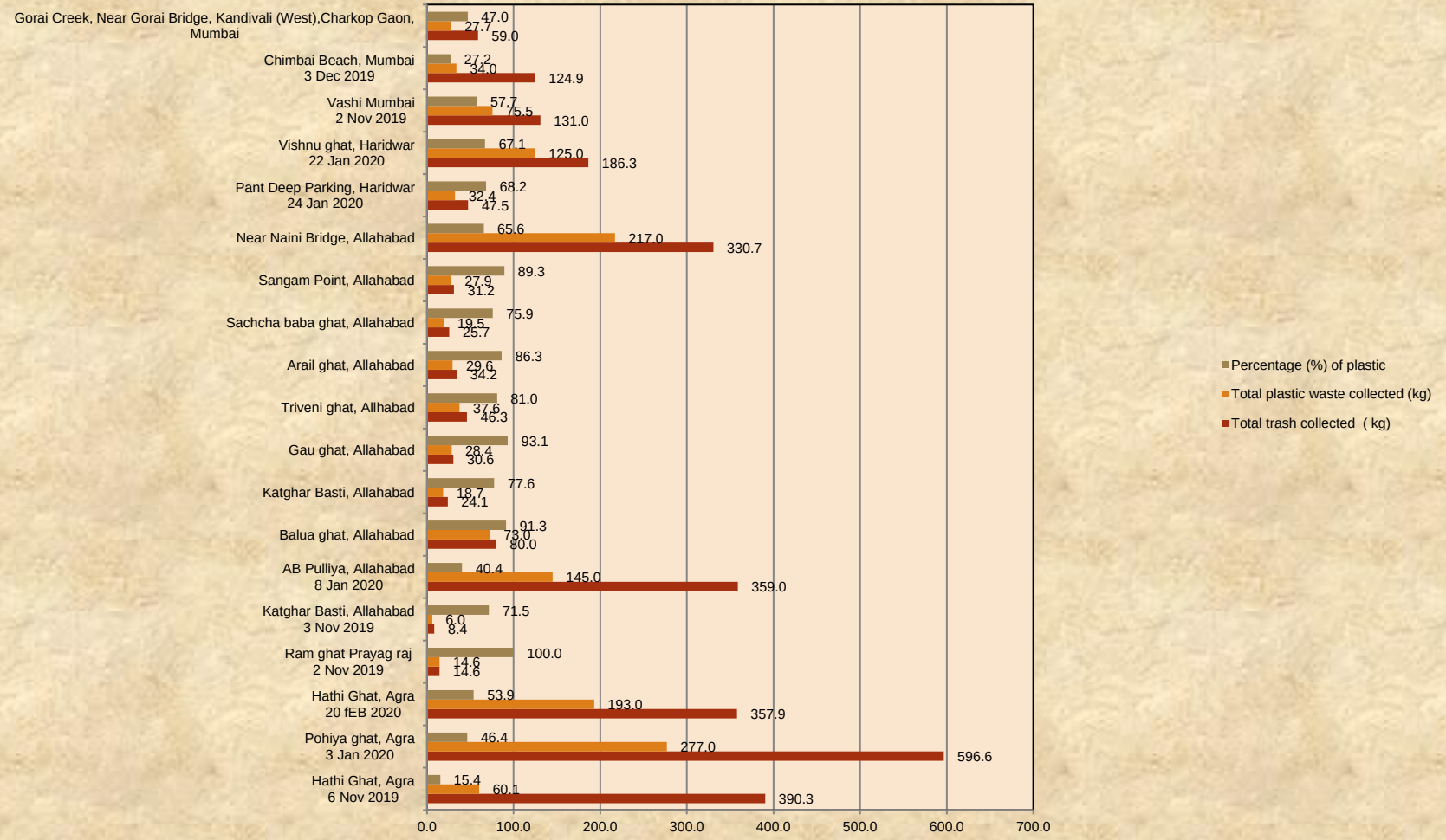
Total Mixed Waste and Plastic waste collection in 19 sites (in Kilogrammes)

&

Depicting % of Plastics at various sites.

S.no.	Name of hot spot	Total trash collected (kg)	Total plastic waste collected (kg)	Percentage (%) of plastic
1	Hathi Ghat, Agra 6 Nov 2019	390.3	60.1	15.4
2	Pohiya ghat, Agra 3 Jan 2020	596.6	277.0	46.4
3	Hathi Ghat, Agra 20 fEB 2020	357.9	193.0	53.9
4	Ram ghat Prayag raj 2 Nov 2019	14.6	14.6	100.0
5	Katghar Basti, Allahabad 3 Nov 2019	8.4	6.0	71.5
18	AB Pulliya, Allahabad 8 Jan 2020	359.0	145.0	40.4
6	Balua ghat, Allahabad	80.0	73.0	91.3
7	Katghar Basti, Allahabad	24.1	18.7	77.6
8	Gau ghat, Allahabad	30.6	28.4	93.1
9	Triveni ghat, Allhabad	46.3	37.6	81.0
10	Arail ghat, Allahabad	34.2	29.6	86.3
11	Sachcha baba ghat, Allahabad	25.7	19.5	75.9
12	Sangam Point, Allahabad	31.2	27.9	89.3
13	Near Naini Bridge, Allahabad	330.7	217.0	65.6
14	Pant Deep Parking, Haridwar 24 Jan 2020	47.5	32.4	68.2
15	Vishnu ghat, Haridwar 22 Jan 2020	186.3	125.0	67.1
16	Vashi Mumbai 2 Nov 2019	131.0	75.5	57.7
17	Chimbai Beach, Mumbai 3 Dec 2019	124.9	34.0	27.2
19	Gorai Creek, Near Gorai Bridge, Kandivali (West),Charkop Gaon, Mumbai	59.0	27.7	47.0

Waste Collected and Segregated



Prominent product based plastic waste litter types found during Clean Ups in 4 cities

Agra	Allahabad	Haridwar	Mumbai
Polythene bags (colored white, black)	Tobacco, Pan Masala Sachet/Wrappers	Polythene bags (colored white, black)	Multilayer Large and Medium Size for snacks, chips, namkeen, biscuits etc.
Multilayer Large and Medium Size for snacks, chips, namkeen, biscuits etc.	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)
Packing used for water, milk etc.	Polythene bags (colored white, black)	Multilayer Large and Medium Size for snacks, chips, namkeen, biscuits etc	Shopping Bags/ Grocery Bags
Synthetic woven bags used for cement packaging etc.	Disposable paper cups coated with plastic film	Garment/Textile Packaging Material	Thermocol & Other Trash
Monolayer Plastic Packaging used for food, detergent etc.	Hard Plastic such as HDPE Pipes, HDPE bottles, HDPE tubes, tray, PVC etc.	Silver foil disposable plates & bowls having plastic lamination	Beverage Bottle (plastic) including PET Bottle

Methodology adopted for Clean Up Activities

Criteria for Selection of hot spot	· Accumulation points, hotspots, accessibility, near drains or river bank or dry portions of river bed, plastic leakage points, mostly within 100-150 meters from river bank or near drains, safety · Finalization of the location of "Hotspots" related to the rivers and waterways within a city boundary in consultation with the urban local body (ULB) and Clean up partners/agency (like Chintan/TERI/DA) · Recording direction of flow of water in waterways/river
Demarcation of clean up area	· Survey of Hot Spot site with Clean up partner/agency (like Chintan/TERI/DA) · Finalization of "Clean Up Area" related to the Hotspot in consultation with the Clean up partner/agency (like Chintan/TERI/DA). · Demarcating the Clean Up Area with fluorescent strip along the boundary (or by suitable approach using chalk powder). · Geo coordinates at four corners and one centre for each Clean Up Area (Via GPS readings) or Google map.
Setup for clean up activities	· Set up of temporary office/site office (including Shed/shamiyana, chairs, tables etc.) · Registration of volunteers (Sl. No./Name/Details of School/College etc or any other affiliation /Phone No./E-mail if available)

Methodology adopted for Clean Up Activities

Instructions for activities to be performed	· Introductory speech/instructions by NPC/Clean Up partner for following (along with initial photographs) i. activities for volunteers ii. brief about the procedures for the activities iii. related safety and security measures to be adapted · Building two teams (mainly one team for collection and other for segregation) for following activities: a) Collection of trash/waste with suitable gunny bags etc coding and accurate weighing and recording b) Segregation and weighing of segregated plastics c) Photography (DSLR or smart phone camera) of the cleanup activities process with GPS coordinates captured during the activity For photography and winding up activities, volunteers from above teams (for collection and segregation) may extend their support. d) Documentation in detail and accuracy e) winding up f) The above activities are followed by a Group Photo Session

Methodology adopted for Clean Up Activities

Collection of Trash/waste and quantification	i. All the volunteers will equip themselves with available Personnel protective equipment (PPE's). Rubber gloves, gum boots, apron etc.) i. Each collection bag is distinguishably labelled by the representative of the Clean Up partners in consultation with NPC team. i. 2 to 3 nos. thick, sturdy blue tarpaulin sheet (size approx 5m*5m) are spread at designated collection point by the volunteers and arrangements for suitable weighing balance are made. (electronic weighing balance and spring balance) i. After equipping with PPE's the volunteers will pick their gunny bags and start collection of trash/waste from the demarcated Clean Up area and will ensure weighing as responsibility Note: each volunteer has to ensure that his/her collection bag is properly labeled. i. After trash/waste collection activity the volunteers with trash/waste in their collection bags, are to bring the bags at designated collection centres (spread of blue sheets) ii. All the filled collection bags are to be weighed and the weights of the bags against their label ID are recorded in the record sheet as per Annexure- II by the NPC team. iii. The weighed bags are stored at designated area near to blue sheet and the same procedures has to be repeated till all collection bags are weighed and their weights against label ID's are recorded in the record sheet as per Annexure- II.


Polyester

Methodology adopted for Clean Up Activities

Separation , Segregation of types of plastics and quantification	i. The weighed collection bags are emptied on blue sheet at designated area and tared weight is noted for the collection bag against label ID of the bag in the record sheet. ii. Each type of plastic as per the classification of plastic is separated and segregated on the blue sheet. iii. Now each type of segregated plastic items as categorized are counted and weighed accurately again. The number of plastic items and their total weight recorded as per the record sheet.
Winding up	· Hand over the collected Trash/waste to ULB · Take off PPEs, Clear them and place at designated places and (re bundle unused for future use and used hand over to ULBs mainly) · Wash hands with Liquid soap and apply sanitizer · Refreshments
Safety and security measures	*All the activities shall be carried out with proper safety and security measures so that it does not cause any harm/losses to anyone*

Pre Clean Up Plate

Post Clean Up Plate

Some plates of product based plastic waste litter types

Lessons Learnt

I. Clean - Up activity and Macro-plastics assessment:-

i. Towards enabling good efforts in Clean Up activities & macro-plastic segregation and assessment of categories of macro-plastic. Focus areas that emerged include :-

- **Detailed reconnaissance of the site for various aspects on a couple of occasions atleast**
- Ideally **one clean up study per day** by a team at a hotspot to be organized and **suitable briefing to all volunteers** made at the start.
- **Adequate number of Volunteers and scope for more** to be available for the Clean Up study.
- **Appropriate grid size** for clean up activity to be chosen **depending upon the waste litter quantity in the area**.
- **Cleaning staff of municipal corporation may be invited for participation** in cleaning activity / plogging and further in **segregation of plastics from mixed waste, counting, measuring weights etc.** of segregated plastics varieties as part of subsequent stages in association with volunteering school and college students.

Lessons Learnt

- **Circulation of the procedure of the activity to all volunteers in advance** to be made and a pre interaction session before the clean up activity to be made.
- **Dividing the volunteer group into four groups** could be useful – (i) collection of mixed waste, (ii) mixed waste segregation into plastics and non plastics, (iii) further segregation of only plastics components into various categories and weighing and counting and recording at the multiple stages, and (iv) documenting the event along with photography.
- **Use of Jute bags could be standardised for mixed waste collection** instead of any other types for collection of mixed waste (these are sturdy and of reasonable sizes and biodegradable too).
- **Use of carton boxes with a lid for placing segregated plastic categories** (or Cotton bags minimum 20 litre capacity) to prevent light weight plastic waste items from being blown away by wind.
- **Adding new categories of local plastic waste in the Trash sheet** developed for Mekong basin studies.
- **Developing step by step process of the activity and developing posters** for clear understanding of the volunteers. Listing and displaying of Do's and Don'ts for the activity.

Lessons Learnt

- **Use of electronic weighing balance primarily for a range of 0 to 100 kg** (**along with availability of spring balance as well**), however spring balance may be used with caution for large mass only, but using gloves etc as it can cause injury while weighing a heavy bag.
- **Ensuring PPEs are worn by the volunteers throughout the activity**.
- A special **care must be taken in selecting site**, the site not to consist of tiny crops / agricultural activity being carried out by farmers who may / may not be willing to allow macro-plastics assessments. Accordingly, macro-plastics assessments in river banks, various hotspots in land areas and dried river beds etc in government or on privately unclaimed/owned land.
- Special care must be taken in **ensuring non usage of plastic materials in packaging of refreshments** in the Clean Ups.
- **Adequate time for briefing volunteers and enhancing clarity of action** for smooth clean up efforts and timely completion of the activity.

Lessons Learnt

- **Pre - and Post - Clean Up site photographs to be captured from the same locations and directionality** to ensure appropriate representation of the change achieved during clean - up exercise.
- **Highly skilled sanitation workers and informal waste pickers and segregators be also sought to be involved** in macro-plastics category identification and segregation teams.

- **Standby and additional arrangement of hand wash/sanitizers** at the Clean Up location and suitable quantum of seating arrangements.

- **Refreshment location at a suitable yet optimal distance** from Clean Up site.

- **All the collected waste as well as used PPEs such as gloves, masks, besides the gunny bags** can be arranged to be handed over to the ULB for its final disposal.

Way Ahead

- **Drone survey** and artificial intelligence can be used in choosing a Clean Up site and engaging in the project cycles of macro-plastics and micro-plastics studies.

- Macro-plastics assessments be undertaken in selected **range of hotspots in different seasons** and parts of the year to assess trends for the specific regions / areas in this context.

- **Macro-plastics assessment to include identifying polymer types via supportive laboratory testing** of the samples of plastics from various categories for cross checking, including reaffirming the plastic types codes.

- **Additional river banks and river beds** to to cover for macro-plastics sampling and laboratory assessments.

- **Further Standardization of the clean up exercises and its adaptation** to new areas and harmonization of macro-plastics clean –up and sampling and laboratory based assessments.

- **Establishing a data portal** for receiving structured data from various cities / ULBs and for various geo-referenced hotspots for the City / State / National levels of database collation for further analysis and modeling to link macroplastics and microplastics assessments .

Way Ahead

- **Integrating primary data based research and econometric studies of various focus areas with secondary data and data obtained via IoT system / devices** on real time basis as well, with linked laboratory analysis aspects to correlate the macro-plastics assessments and micro-plastics assessments towards identifying and **constructing the leakage scenarios** for varying plastics consumption and disposal practices, mismanaged plastics flows, across time periods / seasons and factor conditions.

- **Continual application of GIS tools** and modeling components for site selection and assessments and recording inputs for analysis.

- **Assessment needed at all nodes of waste disposal and reverse logistics chain** (not primarily focused on waste accumulation hotspots only) and including points of consumer discharge of plastics from households as well as at points of source of bulk plastics waste generation.

- Encouraging FMCG companies, manufacturers of plastics packagings and components and plastics products producers, including brands, to engage in **product composition declarations including for plastics content** and other materials as well as consistently labeling the polymer types for each plastic component / packaging / product to strengthen prospects for circular economy implementation.

Thank You !

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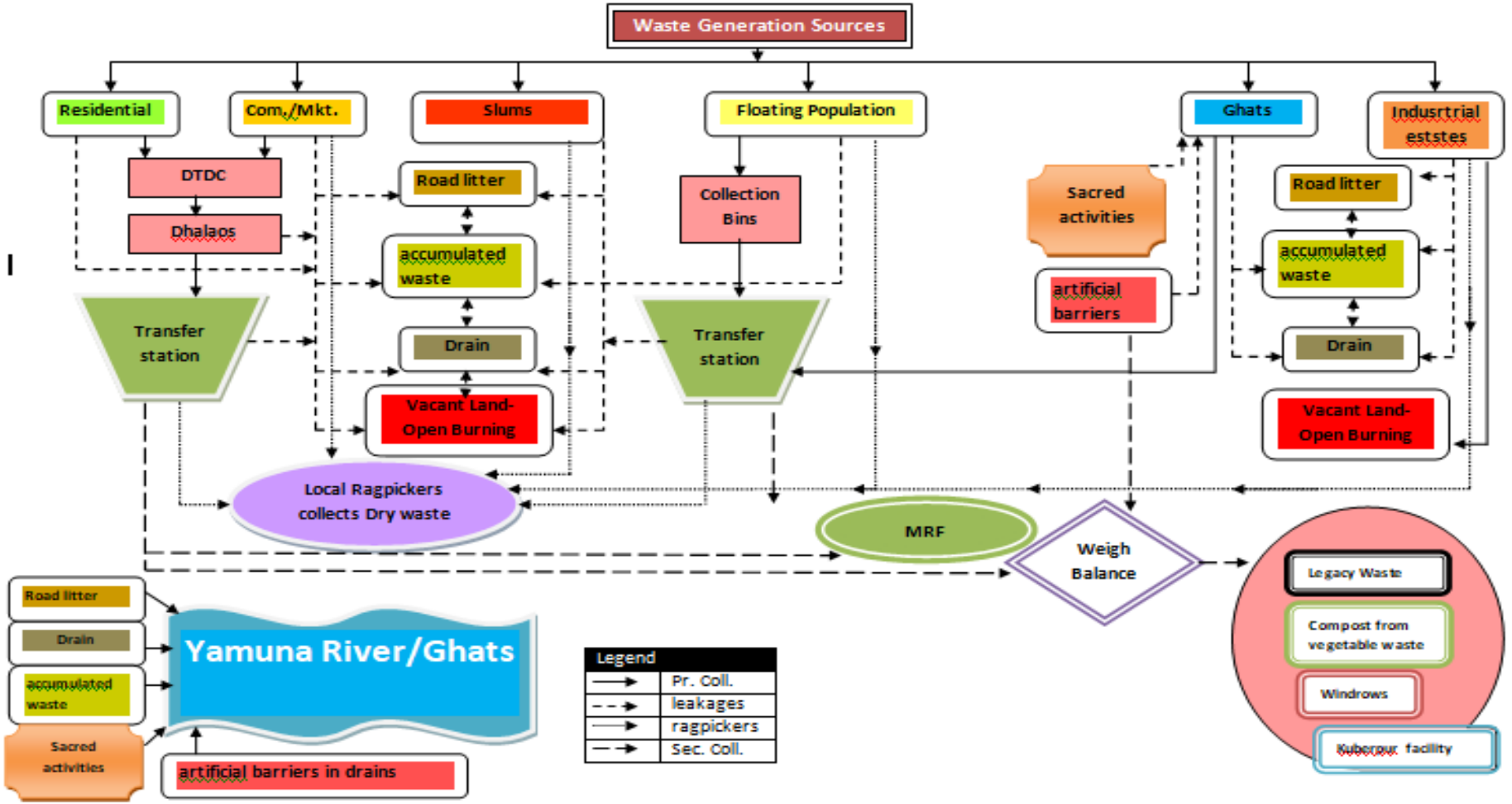
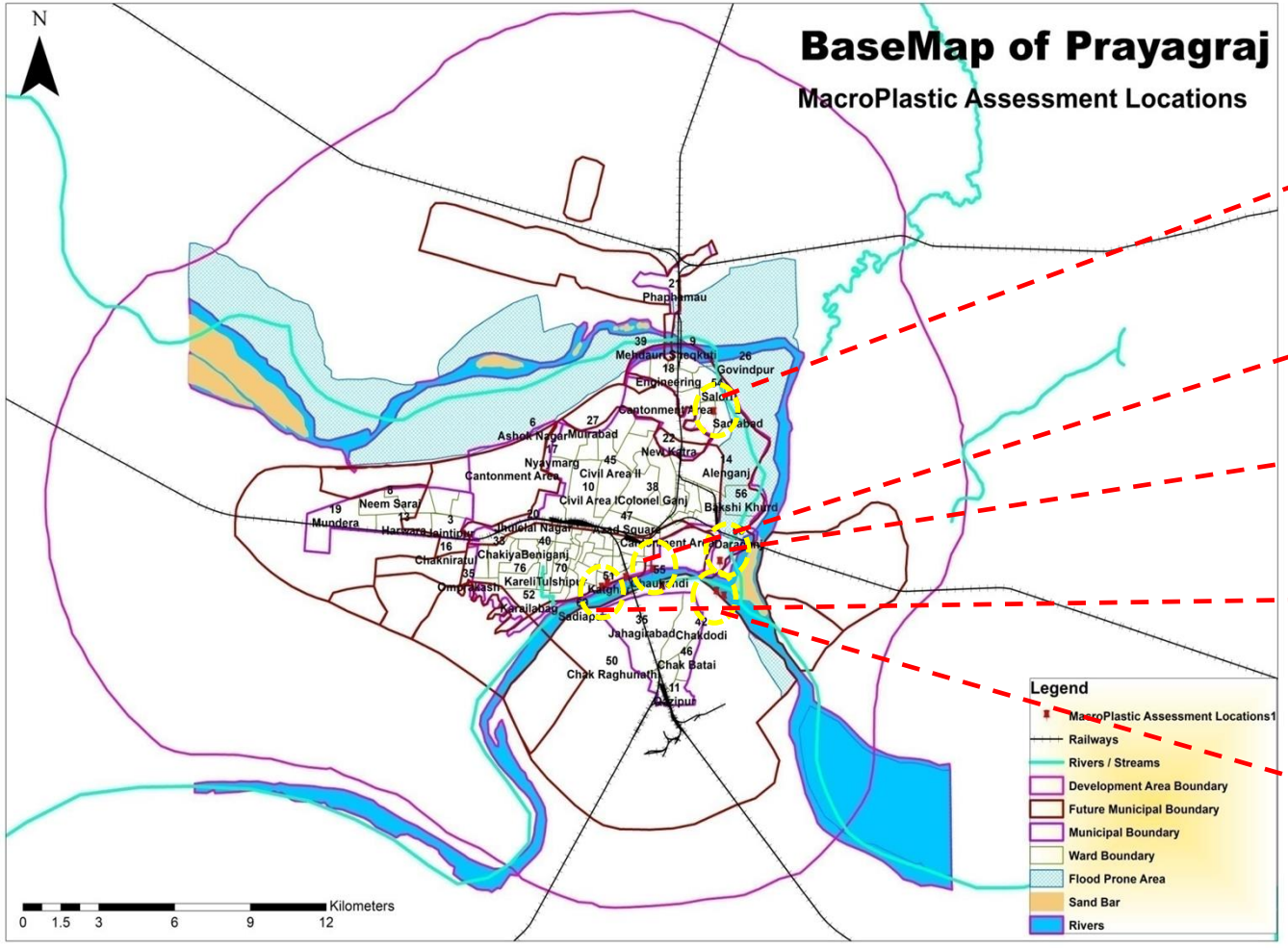
Plastic Leakages in Agra city within Municipal boundary



Some Locations of Clean Up at Allahabad along Ganges



Clean Up site - Allahabad

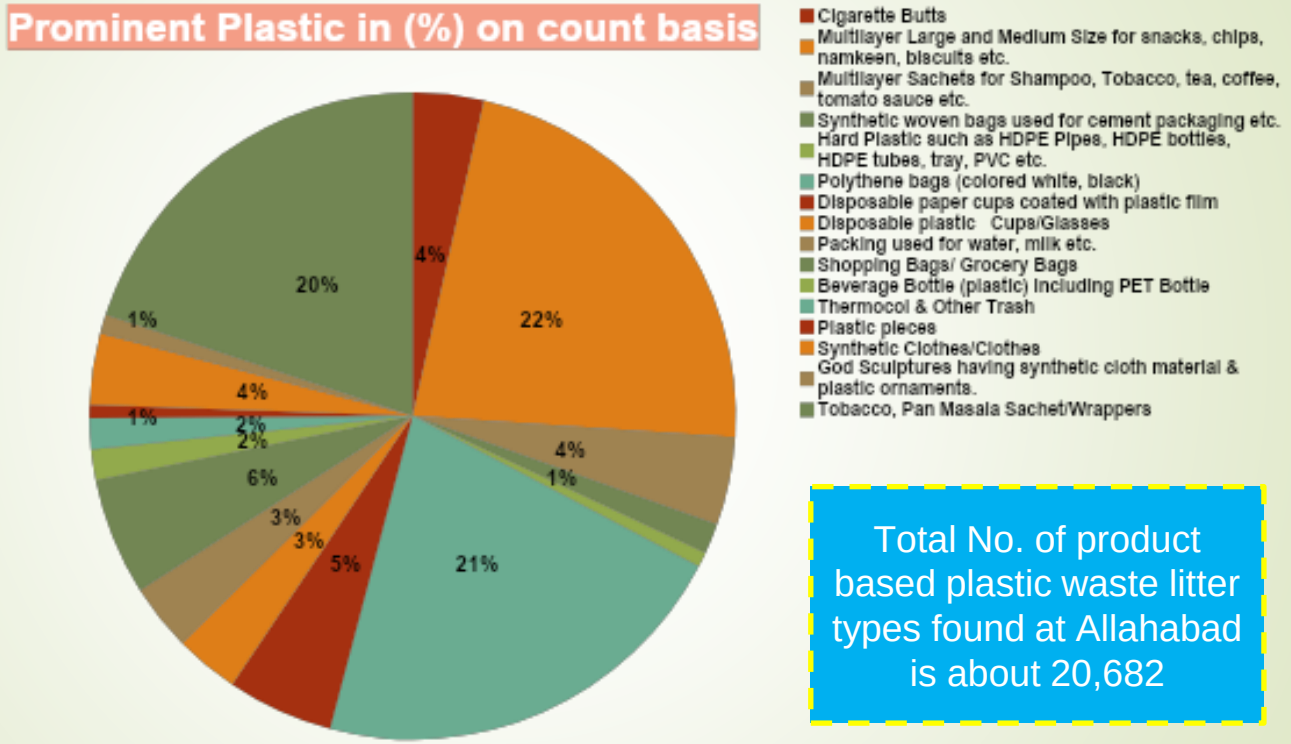
Clean Up site - Allahabad

Clean Up site - Allahabad

Clean Up site - Allahabad

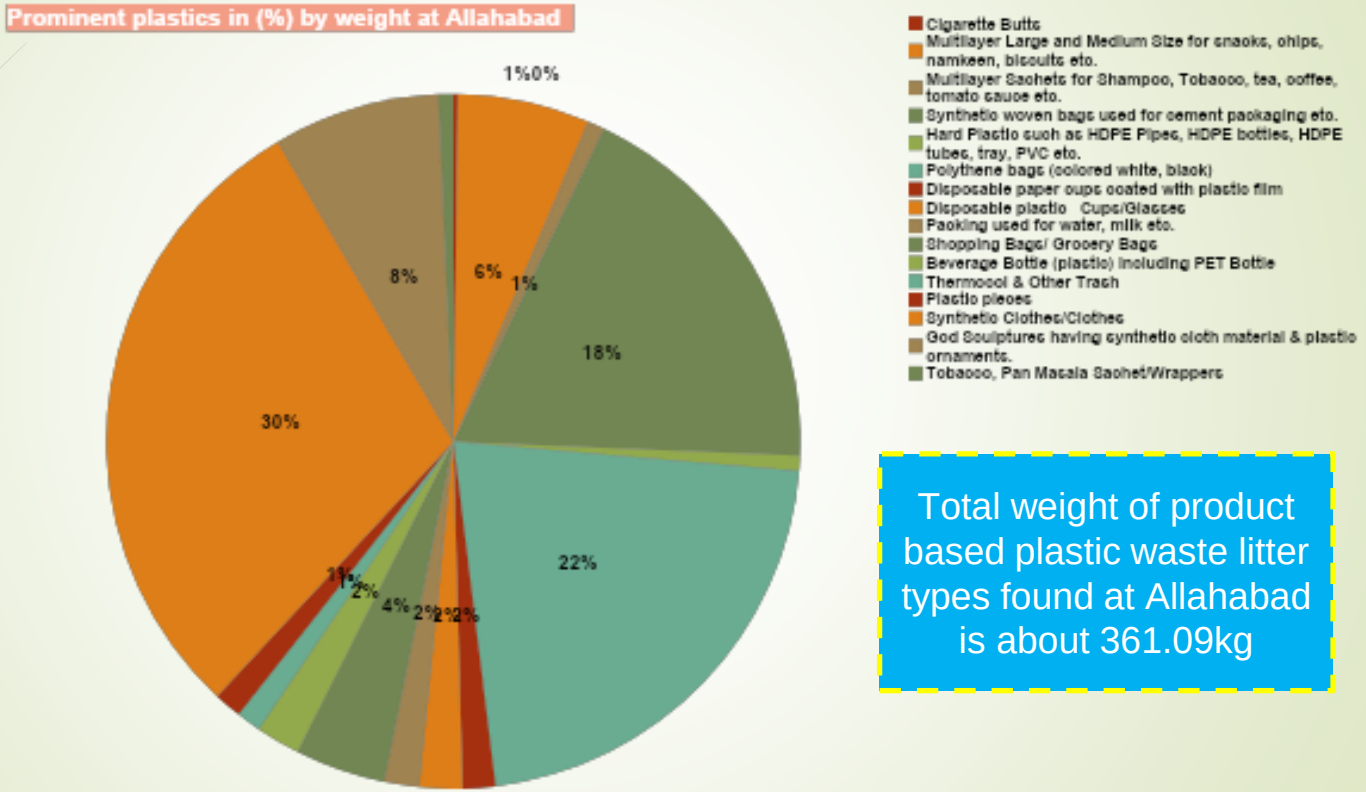
Clean Up site - Allahabad

Charts depict the prominent product based plastic wastes litter types in Allahabad on the basis of Count



Total No. of product based plastic waste litter types found at Allahabad is about 20,682

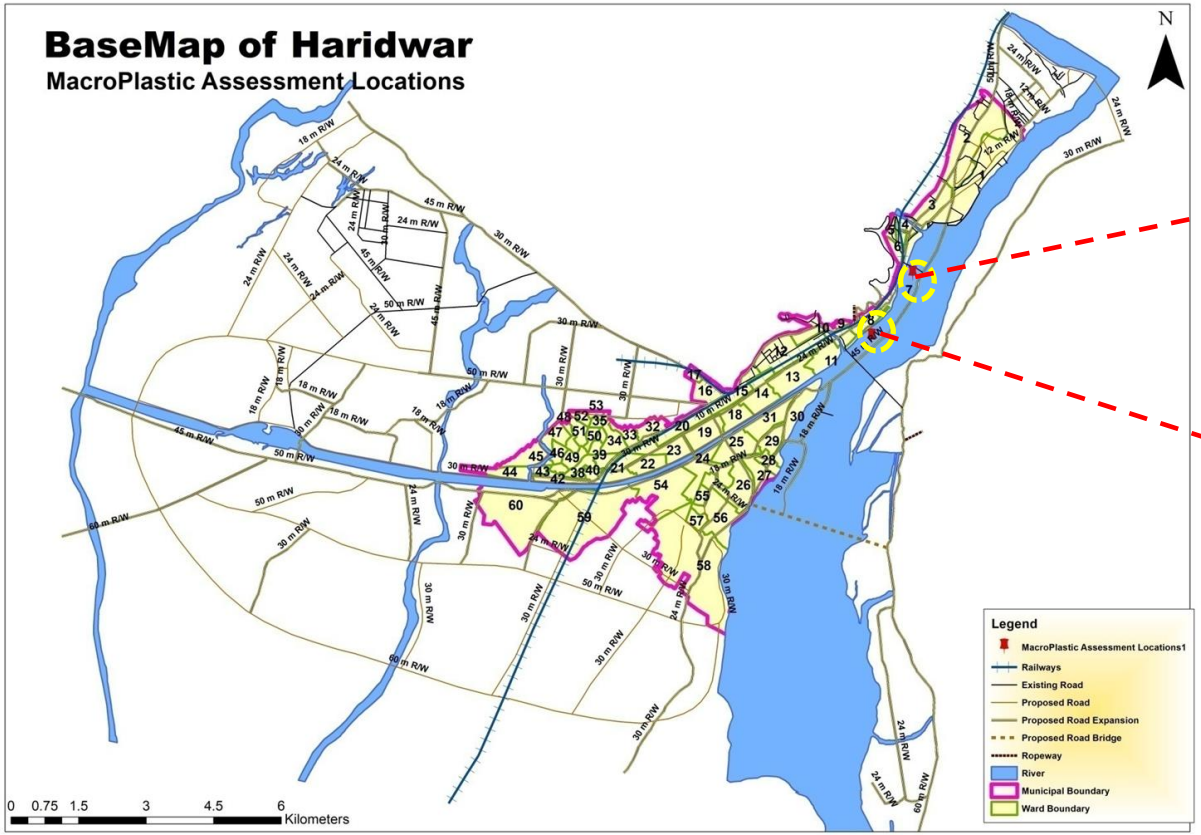
Charts depict the prominent product based plastic wastes litter types in Allahabad on the basis of weight



Total weight of product based plastic waste litter types found at Allahabad is about 361.09kg

Locations of Clean Up at Haridwar along Ganges

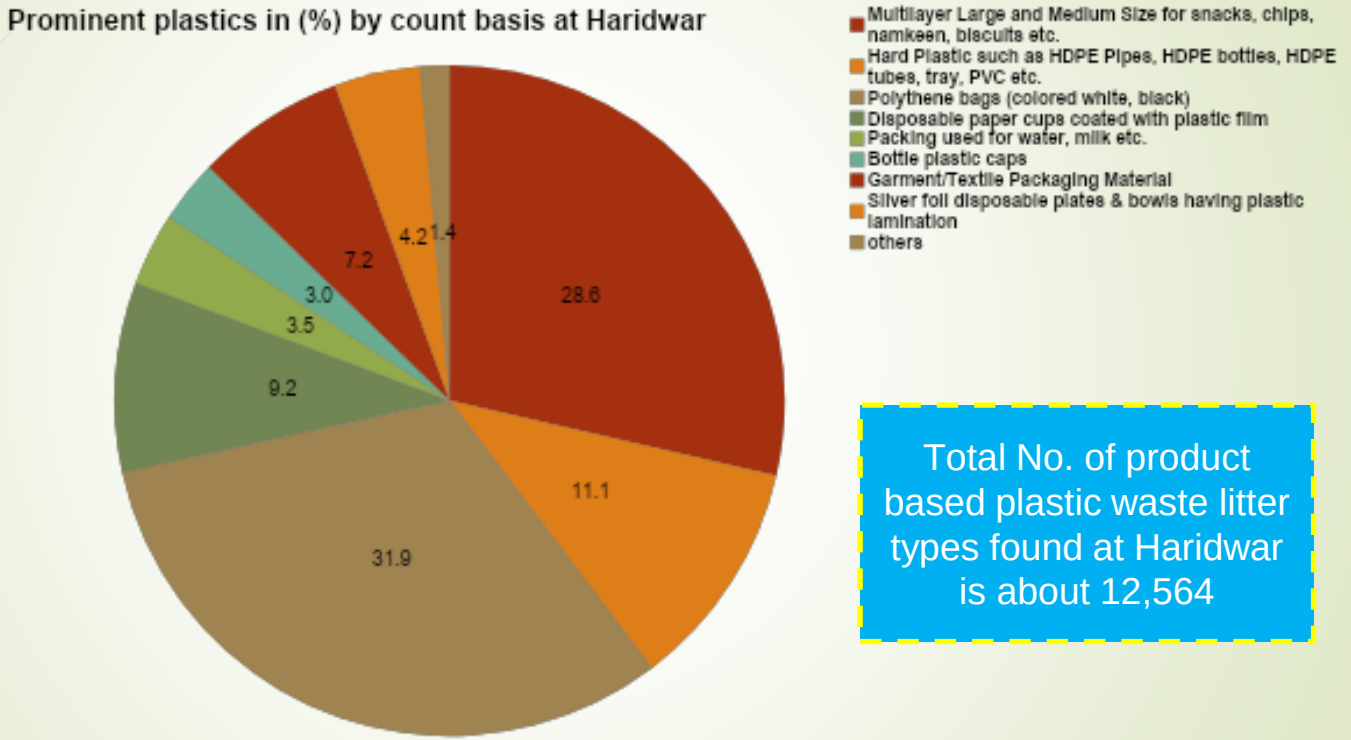
Locations of Clean Up at Haridwar along Ganges



Clean Up site-2, Haridwar

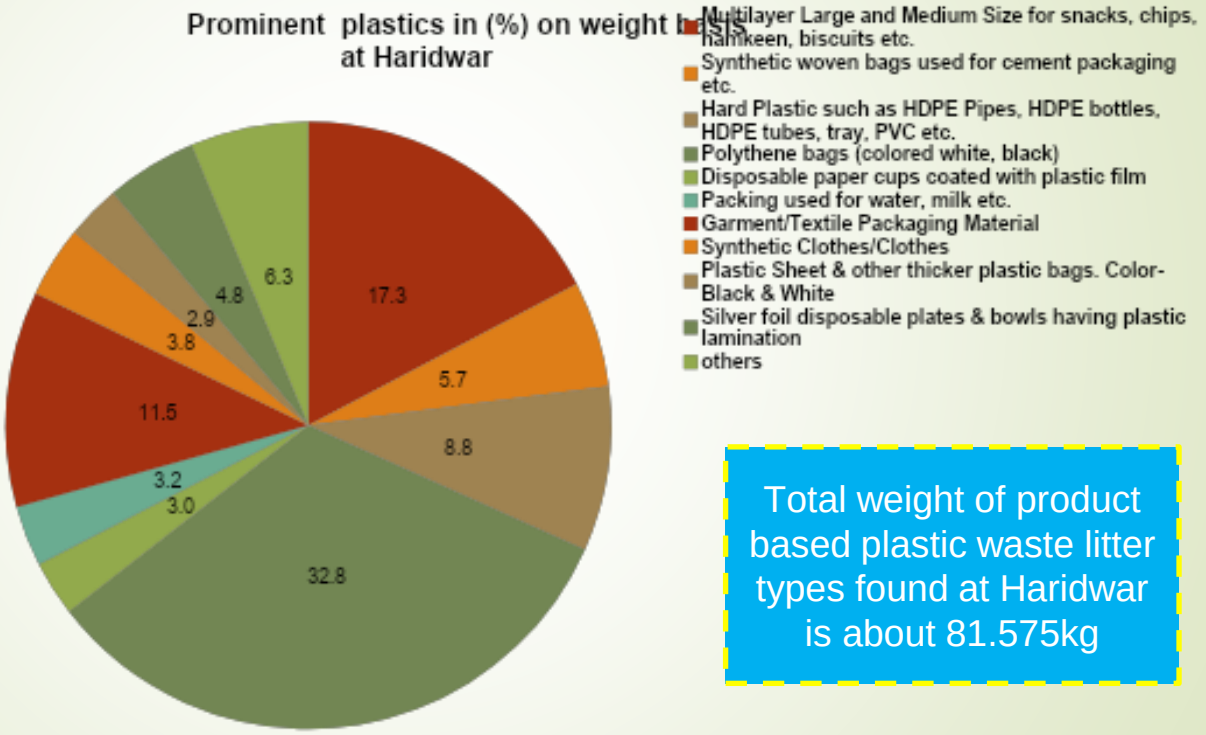
Clean Up site-1, Haridwar

Chart depict the prominent plastic wastes in Haridwar, on the basis of count



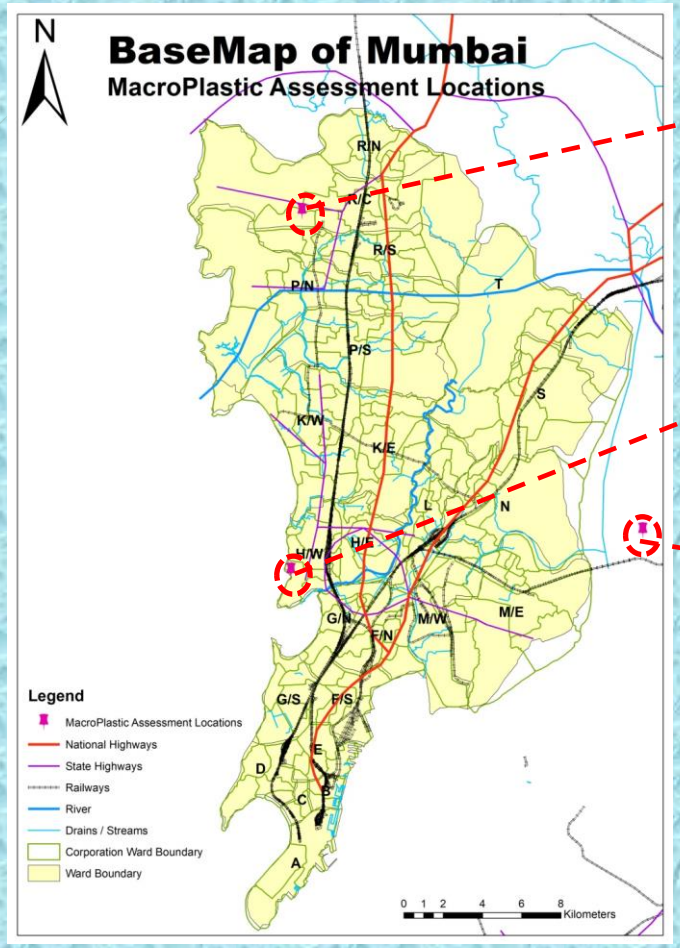
Total No. of product based plastic waste litter types found at Haridwar is about 12,564

Chart depict the prominent plastic wastes in Haridwar, on the basis of weight



Total weight of product based plastic waste litter types found at Haridwar is about 81.575kg

Locations of Clean Up at Mumbai along Indian coastal line

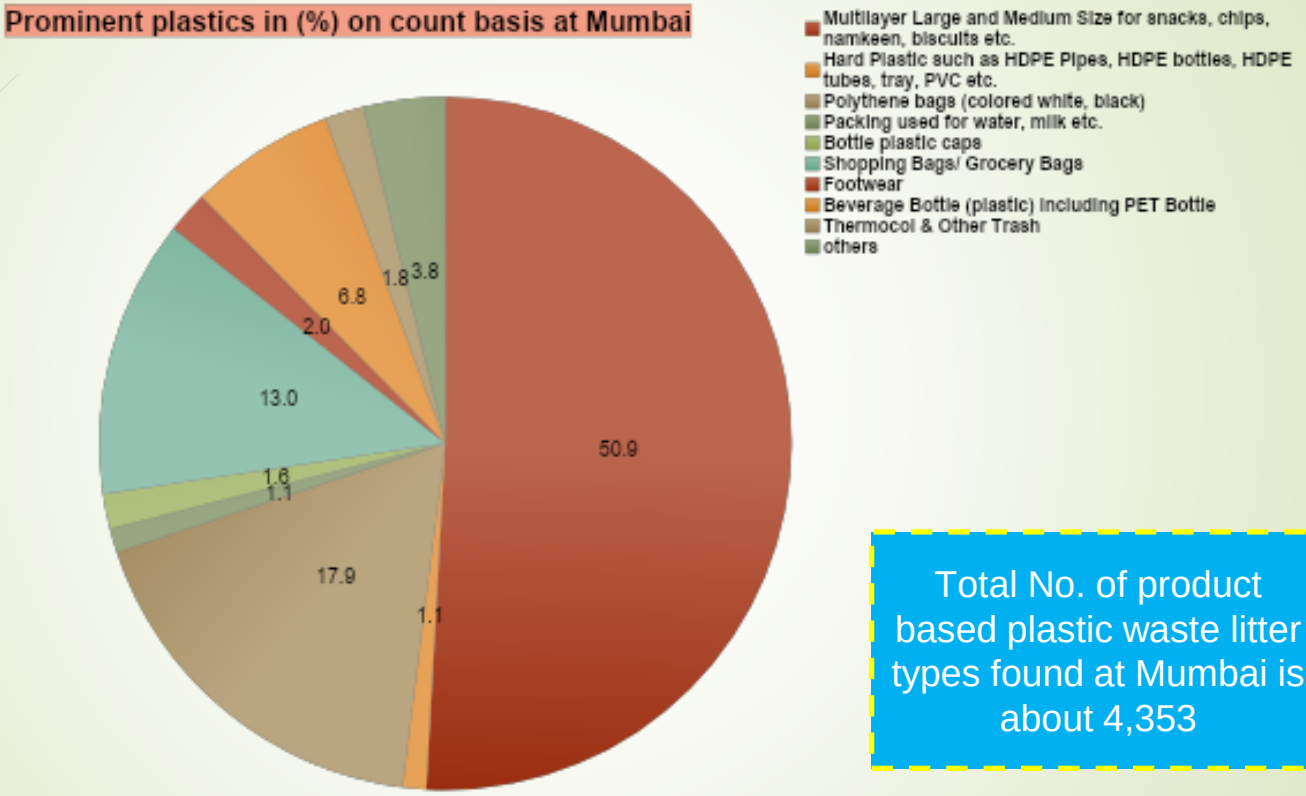


Clean Up site-3, Mumbai

Clean Up site-2, Mumbai

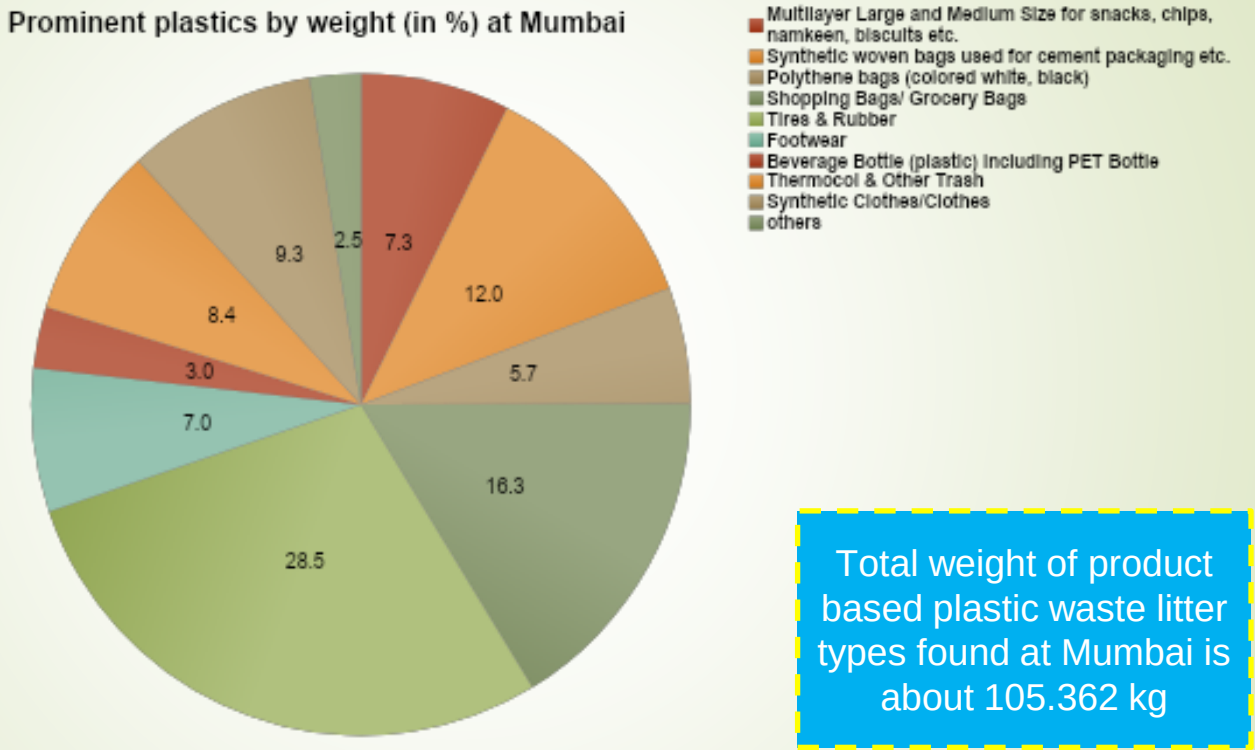
Clean Up site-1, Mumbai

Chart depict the prominent plastic wastes in Mumbai, on the basis of count



Total No. of product based plastic waste litter types found at Mumbai is about 4,353

Chart depict the prominent plastic wastes in Mumbai, on the basis of weight



Total weight of product based plastic waste litter types found at Mumbai is about 105.362 kg