

Thematic session 4 – Waste separation at source : Experience of Indore (India)



2nd Sub Regional workshop on Preparation of Status Report and
Sub-regional Roadmap for Implementing
Global Waste Management Goals towards addressing SDGs in South Asia
Hotel Pan Pacific Sonargaon, 15 – 17 July 2019 Dhaka, Bangladesh

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Afghanistan, Bangladesh, Bhutan, India, Maldives, Nepal, Pakistan, Sri Lanka

Indore Municipal Corporation



Population, 2019
= 2571338;
Area : 276 sq. km

No of Wards = 85;
No. of administrative
zones = 19 comprising
of 3 - 4 wards in a zone

No of households =
465766
commercial units =
70543

Waste generation :
1080 tpd
[(Wet, 562 tpd +
Dry, 515 tpd +
Domestic Hazardous
Waste, 3 tpd)

Treatment and disposal

Quantity of Wet Waste : 562 tpd :

494 TPD is treated through centralized composting unit of 600 TPD Capacity
68 TPD through decentralized composting

Quantity of Dry, 515 tpd : Two material recovery facilities of 300 TPD and
200 TPD Capacity respectively

Quantity of Domestic Hazardous waste generated is 3 sent to common Bio-
medical waste treatment facility for further processin

Quantity of Inert in TPD = 50.84 TPD (4.7% of total waste)

March 2015 - Challenges



In 2015, a private company entrusted with the task of waste management was almost defunct and no services were being provided.

The city was filthy. Nearly 1,800 spots in the city identified that were eyesores. A public interest litigation had been filed by an activist in the city against the authorities.



March 2015 – Challenges



Waste Management Systems and Processes

- Only 5% Door-to-Door Collection with no Source Segregation
- Unorganized collection and transportation of Fecal Sludge
- Inefficient management of secondary waste transportation by outsourced party
- No collection of waste from Bulk Waste Generators
- No processing of Bio Degradable waste in Gardens/Parks/Bulk Waste Generator
- No spotfine and user charges mechanism in place
- Water bodies/lakes/ponds in bad conditions with high level of pollution
- No Dry Waste Processing
- No Plastic Waste Management
- Significant influx of stray animals attracted by waste across the city

Status of SWM in 2015



Status – Open Dump Point – Sep,2015



Status – Open Dump Point – Sep,2015



17/07/2019

Status – Open Dump Point – Sep,2015



Case Studt at Indore_Prof. S K Ghosh_Dhaka_16.7.2019

Status – Open Dump Point – Sep,2015

Legal System for establishing “Sound Waste Management” in India

Factories Act, 1881, 1891, 1911, 1922; Factories Act, 1934;

- **Factories Act 1948**
- **The Water (Prevention and Control of Pollution) Act, 1974**
- **The Water (Prevention and Control of Pollution) Cess Act, 1977**
- **The Air (Prevention and Control of Pollution) Act, 1981**
- **The Environment (Protection) Act, 1986**
- **Hazardous Wastes (Management and Handling) Rules, 1989**
- **Manufacture, Storage and Import of Hazardous Chemical Rules, 1989**
- **The Forest (Conservation) Act, 1980**

Basic Environmental Plan [1972 Stockholm Conference];
{42nd amendment, Article 48 part IV & Article 51A(g) in the Constitution }

Fundamental Plan for establishing a sound Waste Management System and 3R concept

- **Biomedical Waste Management and Handling rules, 1998**
- **Plastics Manufacture, Sale and Usage Rules. 1999**
 - **MSW (Management and Handling) Rules, 2000**
- **Batteries (Management and Handling) Rules, 2001**
 - **E-waste (Management and Handling) Rules, 2011**
- **Biomedical waste management and handling rules, 2011**
 - **Battery Rules, 2011**

New & Revised Rules in 2016 on Waste Management based on 5R (Reduce, Reuse, Recover, Recycle, Remanufacture) & Circular Economy

Hazardous and Other Wastes (Management and Transboundary Movement) Rules, 2016

Construction and Demolition Waste Management Rules 2016

Bio-medical Waste management Rules, 2016

E-Waste (Management) Rules, 2016

Plastic Waste Management Rules, 2016

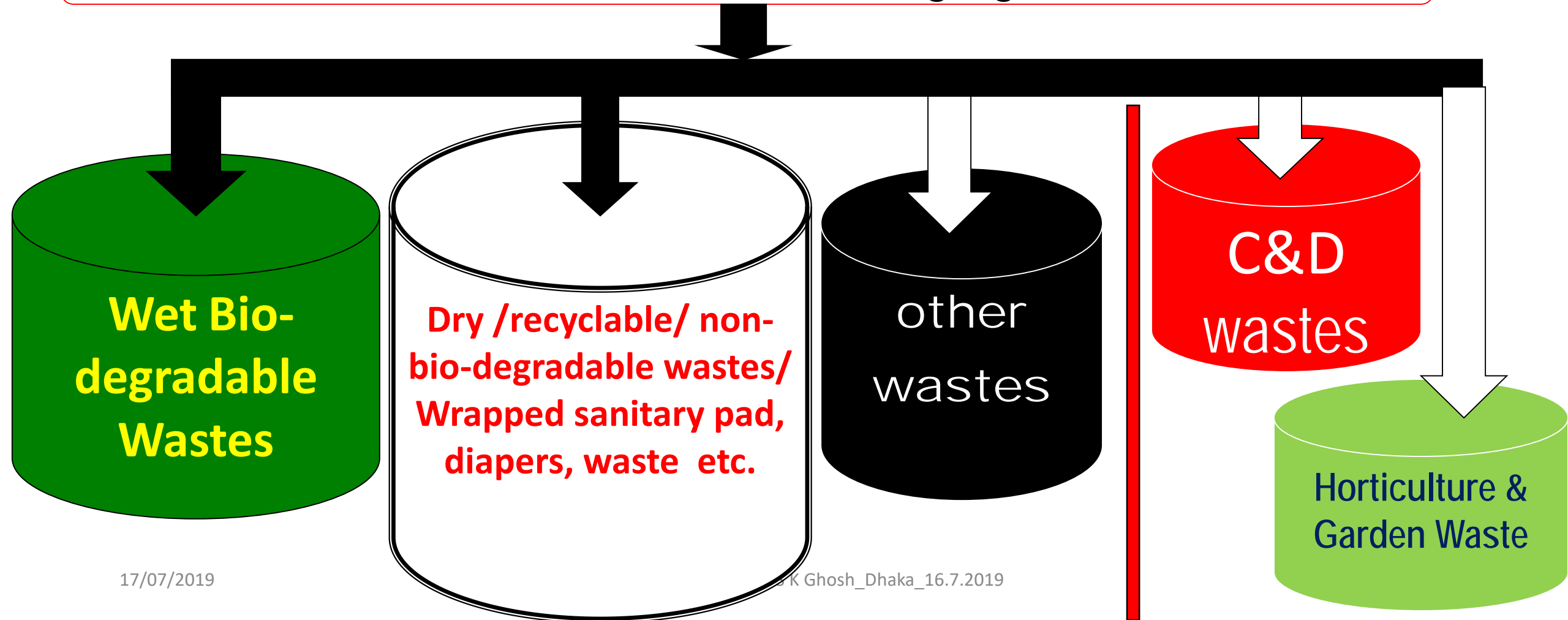
Solid Waste (Management) Rules, 2016

Swachh Survekshan Competition

ULB being assessed on 37 indicators 4237 ULBs have participated in 2019. The survey impact nearly 0.43 billion citizen in India, the biggest ever survey in the world.

SWM Rules 2016 : Segregate and store the waste generated in separate streams. Processing thru :MRF & Recycling, Bio-methanation, WtC, WtE, Gasification, Pyrolysis, Incineration, RDF, Mass Burning, Co-peocessing.

Solid Waste Generated and Segregate, Store



Integrated Solid Waste Management



Strategic Initiatives to address these challenges



- **'As Is' Review – Ward/City Level infrastructure and sanitation staff**
- **Regular meetings with all key stake holders - Safai Karamcharis Union, NGOs, Concessionaires, Municipal Staff and Citizens**
- **Key focus on DTDC Collection, Source Segregation**
- **'Dust-Bin' free city initiative; Special emphasis on Investigation of waste**
- **Mobilized NGOs with each DTDC vehicle to motivate each household**
- **Led by Municipal Commissioner, Municipal Teams visited field daily at 6-6.30 AM**
- **Onboarding MLA/Mayor/Chairman/Corporators in each initiatives/activities taken by IMC**
- **Procurement of vehicles such as Back-hoe loader, Dumper, Garbage Tippers, Rickshaws, etc.,**
- **Developing core competencies at Municipal Corporation Level –**
Phasing out of rental machinery/equipment; Termination of contract for outsourced secondary waste transportation;
Termination of 1000+ Temporary sanitary workers by taking Sanitary Workers Union in confidence;
- **Staff Training/Upgradation of Vehicle Workshop (100% in-house repairing)**

Strategic Initiatives to address these challenges



- **Small Dust-bins for Household/Commercial Areas/Vehicles (Cars, Buses, etc.,) at subsidized rate and CSR Initiatives**
- **Effective monitoring at Ward/Zone Level - Vehicles to all zonal level officials; Biometric Attendance; Wireless handsets;**
- **Special focus on setting up Infrastructure**
- **Liaising with local administration, police, media and political representatives**
- **Pilot project on Mechanized Road Sweeping in Oct 2016; Currently, 400+ Kms of mechanized road sweeping**
- **To ensure the city is 'Litter Free', 'Litter Picking' training; Installed 3,053 litter-bins covering**
- **'Beat' System was introduced for Sweeping/Sanitation workers, depending on the area to be covered**
- **Motivation of Sanitary Workers - Weekly off; Regular free of cost health check-up and treatment; Dress/PPE provided for health/hygiene/safety of sanitary workers**
- **'Indore 311' Mayor Helpline for citizen grievance redressal. 2.5 Lacs+ citizens downloads**
- **Reinstated 500 Ton capacity compost defunct plant**
- **535 vehicles for DTDC covering all the wards**

Motto of IMC



Under Swachh Bharat Mission IMC Planned to Make Indore City:

**BIN
FREE
CITY**

Litter free City



Dust free City

City generates : 1,100 tons of municipal solid waste (MSW) a day.

Scaling up: DTDC and Segregation at Source



Scaling-up: Door-to-Door Collection



Scaling-up: Segregation at Source



DTD Collection Systems

650 vehicles are used for collection of waste from house holds and bulk generators. 19 zones with 85 wards is covered.

•

- Each vehicle is having GPS integrate with the ISWMS.
- Each vehicle is having three members: Driver, Helper, and representative from NGO.
- The vehicle are having division in there storage for collection of wet and dry separately 60% is for wet and 40% for dry.
- The vehicle has small storage place for domestic hazardous waste collection.



Door to Door Collection with Segregation



Wet Waste

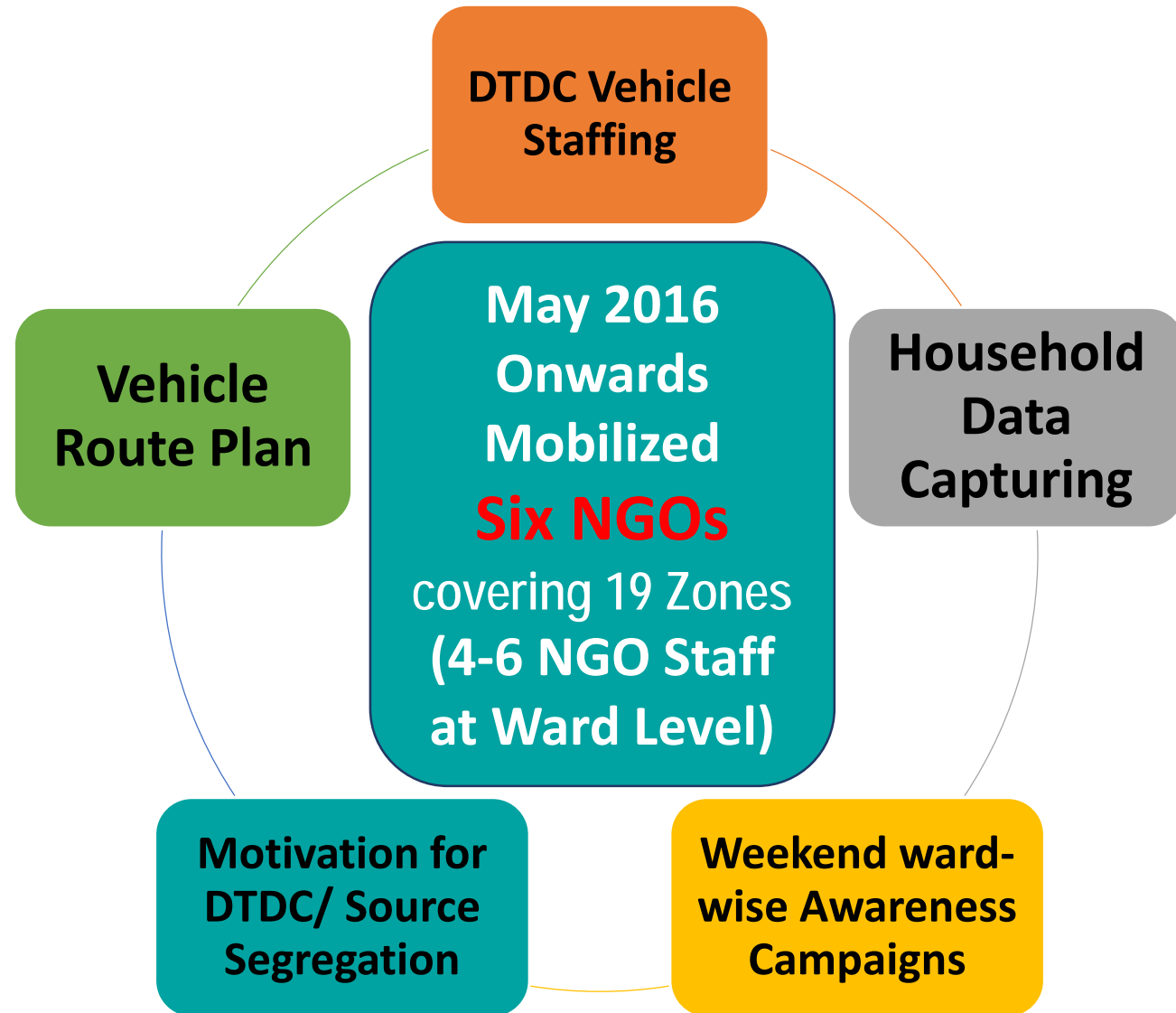
Dry Waste

Sanitary & Domestic
Hazardous Waste

Role of NGOs in setting up SWM Processes



NGOs have played a key role in setting up SWM and creating Large Scale Awareness



Bin Free City – Key Initiative



Pilot Project
Started in
Ward 71 and
42

Dec 2015 –
Jan 2016



Door to Door
Collection of
Waste in 10
Wards

March 2016



Bin Free
Initiative
Started

March 2016



Door to Door
Collection of
Waste in all
Wards

October 2016



Indore got
the status of
Bin Free City

December 2016



Indore
Bin Free City

December 2018



Installation of Litter Bins

Installation of Litterbins in Commercial Areas



Installation of 3053 litter bins in all notified commercial areas, non-notified commercial areas, Parks and Gardens and in all high footfall areas.



Revamped ISO Certified Workshop



Vehicle Tracking & Monitoring System (VTMS)



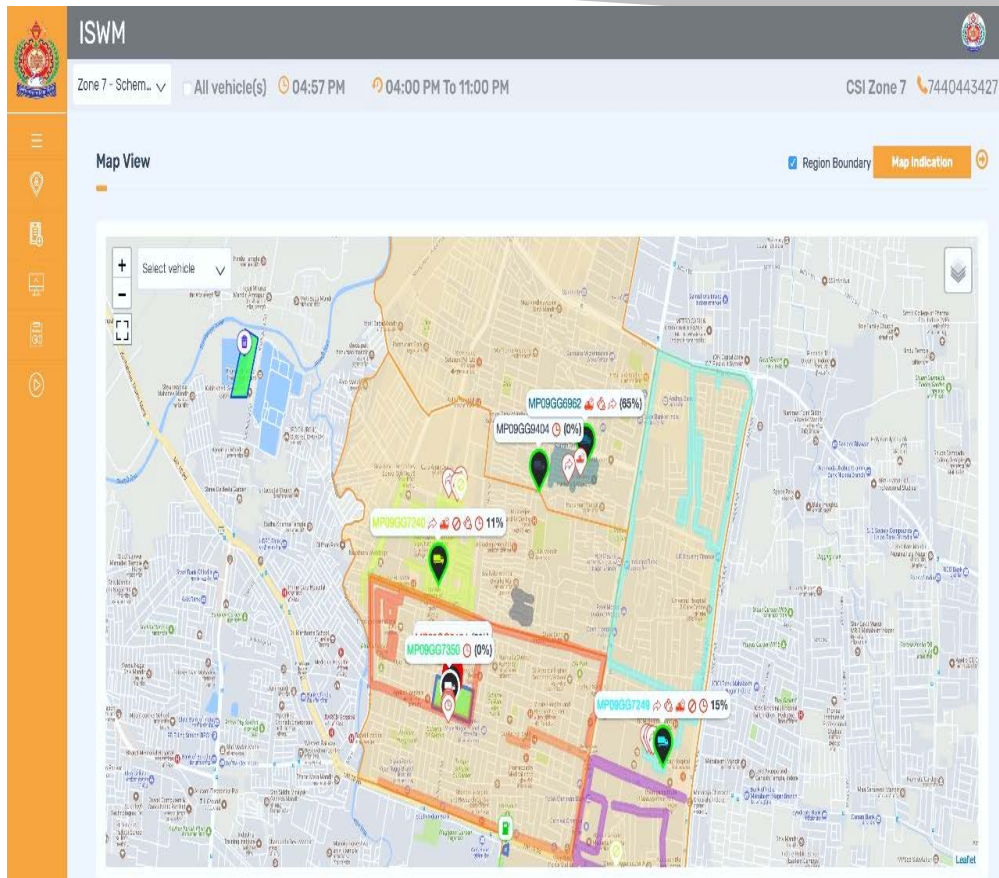
Installation of GPS receivers in 700+ vehicles

Web based vehicle tracking solution

Dashboard, Live Vehicle Tracking, Route Replay, Admin module

Reports, Alerts, Integration requirement

Integration with weight bridge



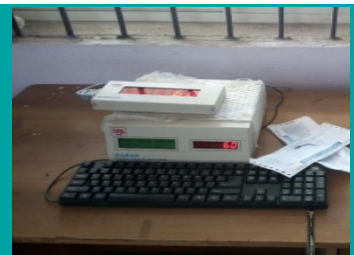
Vehicle on weighbridge at landfill Site



RFID Sticker on Windscreen of Vehicle



Digital Weighing and Recording Mechanism



Ultra Modern Mechanized Transfer Stations

AT SANGAM NAGAR



IT PARK INDORE



STAR SQUARE MR-10



LALBAG INDORE



10

Ultra Modern Mechanized
Transfer Stations

SWM TRANSFER STATION STRUCTURES I/C EQUIPMENT

OBJECTIVES OF ESTABLISHMENT OF TRANSFER STATIONS ARE:

To comply with Solid Waste Management Rules, 2016. Nine GTS (Garbage Transfer Station) is serving in 19 zones

- To improve the existing standards of public health and environmental quality by establishing efficient mechanism for collection and transportation of Municipal Solid Waste. Domestic hazardous waste are kept in a bin and taken weekly to TSDFs
- Ensure clean and hygienic collection and transportation system of Municipal Solid Waste.
- Improve productivity of man, materials and equipment.
- Less requirement of space as compared to conventional static transfer stations. The leachate formed is stored below and are taken weekly by a tanker to the trenching ground for using in bio-methanation.



WASTE COLLECTION



TRANSFER STATION



TRENCHING GROUND

Scientific Treatment and Disposal of Waste



➤ Cement concrete road with drains and electrification with lighting for better working of waste vehicles during night hours

➤ Up gradation and capacity enhancement of Processing plant at Devguradiya



➤ 02 Engineered landfill of 6.25 Acre each

➤ Service center, Boundary wall and construction of internal roads at waste disposal site.

Central Wet Waste Processing Unit



वेस्ट मैनेजमेंट पर वर्कशॉप

इंदौर का कचरा प्रबंधन देख खुश हुए जापान के विशेषज्ञ



वर्कशॉप में शामिल होने आए जापान और कोलकाता के विशेषज्ञ। • नईदुनिया

इंदौर। नईदुनिया प्रतिनिधि

इंदौर में जिस तरह रोज घरों से गीला व सूखा कचरा उठाया जाता है, वैसी व्यवस्था जापान में नहीं। वहां सप्ताह में एक बार कचरा घरों से लिया जाता है और उसे नष्ट कर बिजली तैयार की जाती है। यह बात जापान से आए विशेषज्ञ ने शुक्रवार को वेस्ट मैनेजमेंट पर आयोजित वर्कशॉप में कही। उन्होंने शहर में हो रहे कचरा संग्रहण व कचरा कलेक्शन की व्यवस्था देखी। उन्हें भारत के अन्य शहरों के मुकाबले इंदौर में कचरा संग्रहण का मॉडल काफी पसंद आया। स्मार्ट सिटी के ऑफिस में इंटरनेशनल

सोसायटी ऑफ वेस्ट मैनेजमेंट, एयर एंड वाटर इंडिया और ओडिशा के कलिंगा इंस्टिट्यूट ऑफ इंडस्ट्रियल टेक्नोलॉजी द्वारा वर्कशॉप का आयोजन किया गया। जापान की सीसीईटी संस्था के डायरेक्टर के. ओनोगावा व संस्था की प्रतिनिधि प्रेमा कुमार ने जापान में वेस्ट मैनेजमेंट के लिए किए गए कार्यों की जानकारी दी। अपर आयुक्त रजनीश कसेरा भी शामिल हुए। वहीं जापान, कोलकाता व अन्य शहरों से आए विशेषज्ञों और रिसर्च स्कॉलर ने शहर के कुछ इलाकों में डोर टू डोर कचरा संग्रहण की व्यवस्था देखी। साथ ही खजराना गणेश मंदिर में फूलों की खाद बनाने का संयंत्र भी देखा।

- IMC has obtained ISO 9001:2015, ISO 14001: 2015, OHSAS 18000:2007 for Segregation, Collection, Transportation & Disposal of Solid Waste.



Material Recovery Facility (MRF) – Integrated Ragpickers and Kabaadis



- ▶ Two MRFs of 300 TPD and 200 TPD capacity
- ▶ 700 Rag pickers and 14 Kabaadis provided livelihood
- ▶ Sorting of all type of dry waste such as Paper, plastic, iron, glass, e-waste, polythene, rugs, leather, shoes, pet bottles, rubber etc.
- ▶ Integration with Recycling Industries, Cement Plants and Road Construction Agencies.



Decentralized Processing



Decentralized Organic Waste Processing

238 units

Hotels, Hospitals,
Marriage Gardens,
Schools and
Colleges etc.

76 units

Residential Welfare
Associations
(RWA's)

368 units

City Gardens
covering all 586
developed gardens

5 TPD

Capacity mobile
decentralized
composting unit

2 TPD

Biomethanation Plant
at Star Square



Hon'ble Mayor and IMC
Commissioner at RWA Talk show



RWAs Bulk Garbage generators
practicing Onsite processing

Mobile Composter

Decentralized Processing

Decentralized Organic Waste Processing

20 TPD

Biomethanation Plant at Choithram Mandi



Onsite Composting at
Choithram Mandi

15 TPD

Bio-methanation Plant at Kabitkhedi



Bio-methanation Plant at
Kabitkhedi

Linkage of SWM to Public Transport

Bio-CNG gas
is used as a
fuel to
operate 15
city buses



Plastic
Bottle
Crusher





A tree diagram illustrating the 3R waste management principle. The trunk is labeled '3R'. The branches are labeled with the three R's: 'Recycle', 'Waste to Energy', 'Waste to Compost', 'Reuse', and 'Reduce'.

16.7.2019

Home Composting



- ▶ In Indore about 28,000 household are doing home composting
- ▶ Indore has target 150 ton per day reduction in waste generated by the city on a per capita basis.
- ▶ Pot composting of household waste is started in all 85 wards with the help of different sector volunteers
- ▶ IMC provided 50% subsidy through CSR on home composting units



Zero Waste Events



'Ashara Mubaraka'



एक करोड़ से ज्यादा प्लास्टिक बोतल और कप बचाए बोहरा समाज ने

- 200 टन कचरे की खाद भी बनी
- गिनीज रिकॉर्ड से भी सम्मानित

इंदौर। दाउदी बोहरा समाज का विशाल आयोजन शहर में चल रहा है। आयोजन में स्वच्छता को बरकरार रखा गया, जिसके चलते सैय्यदना साहब को गोल्डन बुक ऑफ वर्ल्ड रिकॉर्ड की ओर से सम्मानित किया गया।



इस पूरे आयोजन पर अभी तक 1 करोड़ से ज्यादा प्लास्टिक बोतल, कप बचाए और 200 टन से ज्यादा कचरे से खाद बनाई गई। कल ग्रीन-री के लिए बुरहानी फाउंडेशन, समाज को साफ-सफाई के लिए प्रेरित करने, दावत-ए-हादिया ट्रस्ट के साथ ही सबसे अधिक प्रवचन सुनने आने वाले अनुयायियों

के लिए गिनोज बुक के अधिकारी खुद सैफी नगर मस्जिद पहुंचे और सैय्यदना साहब को शॉल के साथ अवॉर्ड से सम्मानित किया गया। आयोजन में 15 लाख प्लास्टिक बोतल, 200 टन गीला कचरा और 90 लाख पेपर कम्प बचाए गए। यह विशाल आयोजन क्रांिकरी के साथ पूरा किया गया।

Jatra (Marathi Festival)



IPL Match : 3R Protocol

आइपीएल : हालकर स्टाडियम म पहल, जेकर हाल पहिले जेकरा साह कारला स्टाडियम म भा हांगा अमल

3900 किलो कचरे से बन रही 90 किलो खाद

पर्यावरण संरक्षण के लिए आगे आने वाला देश का पहला स्टेडियम, बीसीसीआई ने देखी प्रक्रिया



कापेला दूध
होती। मलेरूम

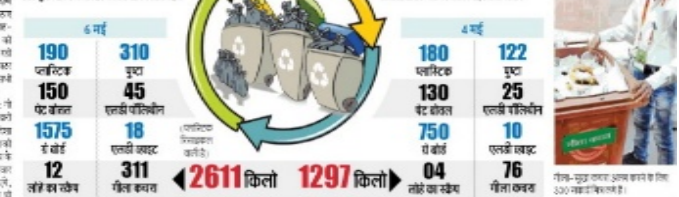
[illegible][illegible]

यहां के पद सिकाहा संस्थित जिनम लुसुना राहा आ गारी, कयारों में लपन भी यहा रुली ही रीपन कासय की-बांही।

20 फीसदी बन जाती है खाद

[illegible]

क्रियाय में दो पैरों में स्थित 150 किग्रा भारों की सहायता से 90 किग्रा भार धरने का अनुमान है। गुरुत्वीय भार धरने में सातवें वर्ष में। मुकुट कवचाद्विध पाठ्य वेत शिक्षा प्राप्त है, जो 90-90 पीसीटी/मिनट का है।



गीला-मुटु लयदा 3000 काले के लिए
300 नमूने बिचलने है।

 लक्ष्मी नारायण से संस्कृत[illegible]

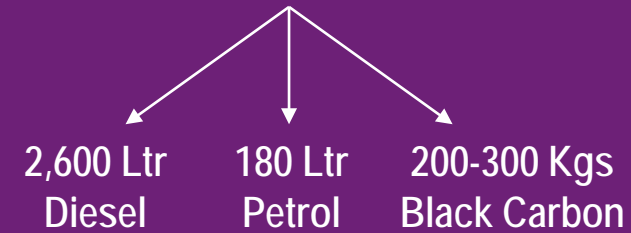
सिपाही के हाथ से अहिंसेवादी साहित्य छीन गई है, जिसे सार्वजनिक में ही जला दिया गया है।

मैंने और नहीं उठने की हिम्मत- उसका घर उठे कि मैं मर जाऊँ

Plastic to Diesel Plant



- ▶ Plastic to diesel Plant of 8 TPD Capacity
- ▶ 6 Ton Raw Plastic → 3,000 Litre Crude Oil



C&D Waste Management

- ▶ C&D waste plant of 100 TPD capacity
- ▶ Facilitation of collection of C&D waste from premises of retail (non-bulk) occasional generators through Transfer Stations
- ▶ Provision were made for use of material made out of C&D waste of municipal construction activities – Non Structural concrete, Paving block, Lower layers of road pavements, inner colony roads



Bio-Remediation

PHASE I:
GREEN BELT
DEVELOPED ON BIO-
REMEDIATED LAND
[50,000 MT]



PHASE II:
GREEN BELT
DEVELOPED ON BIO-
REMEDIATED LAND
[1,00,000 MT]



Bio-Remediation - Transformational Change

BEFORE



BEFORE



PRESENT



- ▶ 100 % legacy waste remediated
- ▶ 100 acres land worth Rs. 300 cr. Reclaimed
- ▶ Proposed Plan to develop Golf Course/ City Forest

Bio-Remediation - Transformational Change



Scientific Landfill Site



Scientific / Engineered Landfill Site



Inert Landfilling operation



Inert Filled and Compacted



Unloading Inert Material at Landfill Site

Aadhar Based Biometric Attendance System



Inbox (1,135) - singhengineer28@ x | Inbox (290) - misexpert.imc@gm x | Dashboard | M P Attendance | Inc x

https://mpimc.attendance.gov.in

M P Attendance

- Dashboard
- Employee Registration
- Employee Login
- FAQ
- Login
- Go to mp.attendance.gov.in

Aadhaar Enabled Bio-metric Attendance System(AE-BAS) Version 2.18

Indore Municipal Corporation

19452

Registered Employee

More info

18469

Active Employees

More info

11260

Present Today

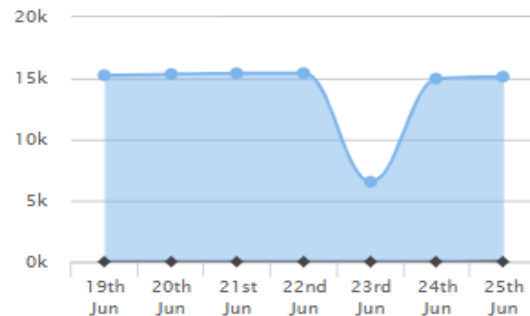
More info

204

Devices Active Today

More info

Attendance Statistics - As On : June 26, 2019



Gov't Employees	4778 / 19452
RD Devices	277 / 277
DemoAuth Cleared Employees	/ 19452
Active Desktops	0 / 277
Auth Request (Desktop)	0 / 11588

3.66 sec

Average Response

08:45

Average In-Time

16:31

Average Out Time

Attendance Activity

Employees Present in Office



17/07/2019

In-Time Statistics

Case Studt at Indore_Prof. S K Ghosh_Dhaka_16.7.2019

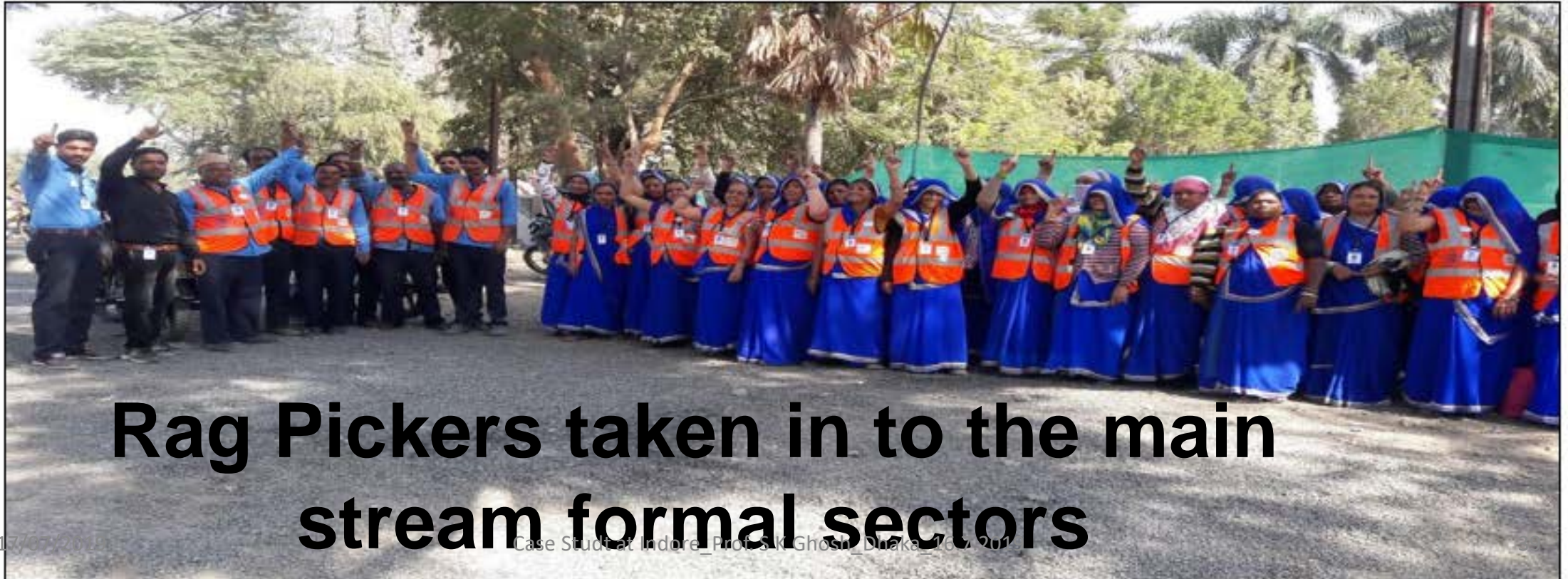
Today's Trend

38

Staff Attendance - "Safaimitra"



- Presently 7000+ *safaimitra* are involved in sweeping and D2D collection
- Adhaar linked Biometric attendance system linked with payroll were established
- Smart Watch introduced in one ward



Rag Pickers taken in to the main stream formal sectors

Distribution of Personal Protection Gears to all SWM workers



- IMC distributed Raincoats, Hand gloves, fluorescent jackets and Masks
- Ensuring that every employee uses personal protective safety gears while working in the field.

Mechanized Road Sweeping and Jet washing



Mechanized Road Sweeping

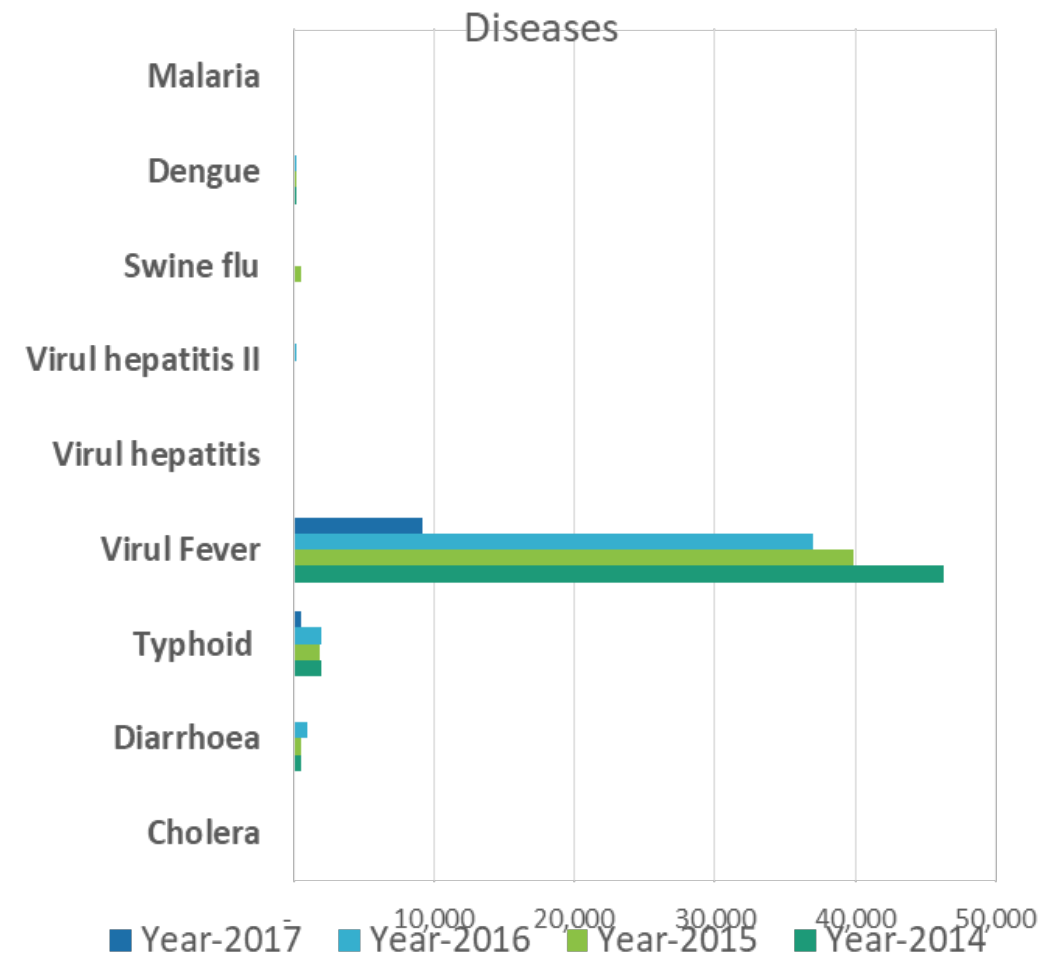


Respiratory and Other Diseases Reduced by 50%



Source: CMHO Indore

Row Labels	Year-2014	Year-2015	Year-2016	Year-2017
Cholera	12	27	16	0
Dengue	160	155	129	0
Diarrhoea	497	517	989	11
Malaria	89	91	62	13
Swine flu	10	524	7	0
Typhoid	1955	1865	1929	467
Viral Fever	46260	39825	37026	9169
Viral hepatitis	76	45	70	15
Viral hepatitis II	81	111	135	28
Grand Total	49140	43160	40363	9703



Grievance Redressal, Complaint & Feedback System through “Mayor Helpline Indore 311” App

Users

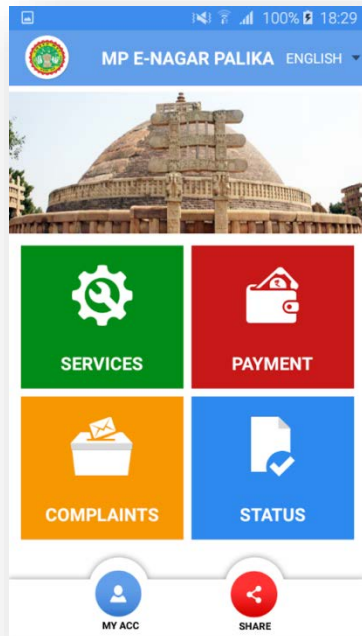


Officials



Residents

- a) To be Integrated with Attendance system.
- b) To have facility to register grievance against any department of IMC
- c) To have SLAs for addressing grievances.
- d) IVRS call to accept the closure or re-open the complaint.
- e) To integrate with grievance redressal system, if exist any?



Grievance
Redressal
Complaint
Feedback



Swachhata APP & Indore 311 (Mayor Helpline)



Disposal Free Markets



1

Installation of Litterbins in Commercial Areas



2

Awareness Drive in Commercial Areas



4

Disposal Free Markets / Commercial Areas



3

Strict Implementation in Commercial Areas



City Beautification



City Beautification



Artistic Wall Paintings



City Beautification



Improvement of Squares: To make dust free city



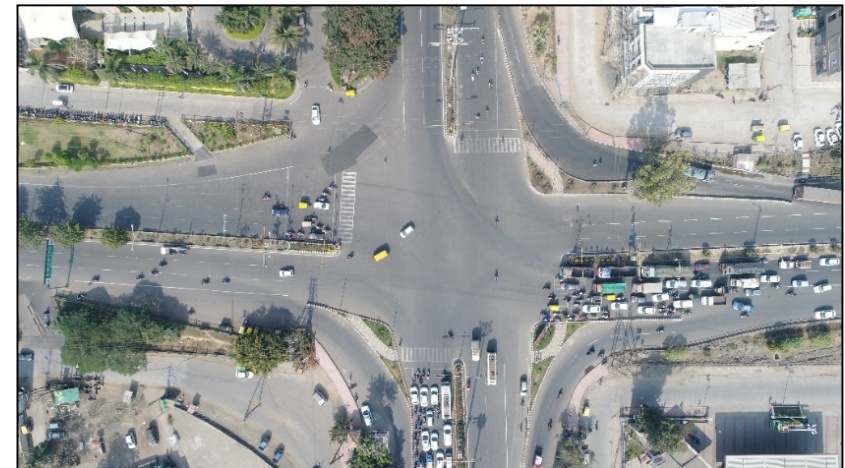
DRP Square



Before



Radisson Square



After

Cleaning of Drains and Water Bodies

Kanha/ Saraswati River Cleaning



Swachh Survekshan Award 2017



Swachh Survekshan Award 2018



Swachh Survekshan Award 2019



Thank You