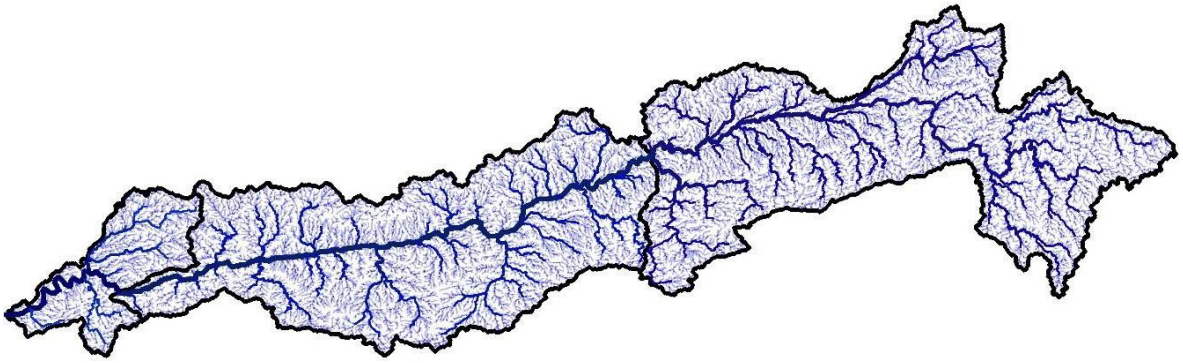
National River Conservation Directorate
Ministry of Jal Shakti, Department of Water Resources,
River Development & Ganga Rejuvenation
Government of India

Infrastructure and Planning of Narmada River Basin



December 2024

Infrastructure and Planning of Narmada River Basin

National River Conservation Directorate (NRCD)

The National River Conservation Directorate, functioning under the Department of Water Resources, River Development & Ganga Rejuvenation, and Ministry of Jal Shakti providing financial assistance to the State Government for conservation of rivers under the Centrally Sponsored Schemes of 'National River Conservation Plan (NRCP)'. National River Conservation Plan to the State Governments/ local bodies to set up infrastructure for pollution abatement of rivers in identified polluted river stretches based on proposals received from the State Governments/ local bodies.

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The Center for Narmada River Basin Management and Studies (cNarmada) is a Brain Trust dedicated to River Science and River Basin Management. Established in 2024 by IIT Gandhinagar and IIT Indore, under the supervision of cGanga at IIT Kanpur, the center serves as a knowledge wing of the National River Conservation Directorate (NRCD). cNarmada is committed to restoring and conserving the Narmada River and its resources through the collation of information and knowledge, research and development, planning, monitoring, education, advocacy, and stakeholder engagement.

www.cnarmada.org

Centres for Ganga River Basin Management and Studies (cGanga)

cGanga is a think tank formed under the aegis of NMCG, and one of its stated objectives is to make India a world leader in river and water science. The Centre is headquartered at IIT Kanpur and has representation from most leading science and technological institutes of the country. cGanga's mandate is to serve as think-tank in implementation and dynamic evolution of Ganga River Basin Management Plan (GRBMP) prepared by the Consortium of 7 IITs. In addition to this, it is also responsible for introducing new technologies, innovations, and solutions into India.

www.cganga.org

Acknowledgment

This report is a comprehensive outcome of the project jointly executed by IIT Gandhinagar (Lead Institute) and IIT Indore (Fellow Institute) under the supervision of cGanga at IIT Kanpur. It was submitted to the National River Conservation Directorate (NRCD) in 2024. We gratefully acknowledge the individuals who provided information and photographs for this report.

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PREFACE

This report provides an overview of the infrastructure in the Narmada River Basin. The report presents detailed data summaries of existing and planned infrastructure in the Narmada River Basin, including land use and land cover, urban development initiatives, river infrastructure, environmental protection initiatives, water supply systems, and waste management systems. This report compiles and organises previously fragmented data using government sources, official reports, and research material while acknowledging the challenges of working with imperfect data and highlighting caveats where necessary.

The findings and data presented in this report could be helpful for policymakers, researchers, social activists, and all the direct and indirect stakeholders engaged in the Narmada River system. This report hopes to serve as a resource for those committed to the sustainable development, resource management, and socio-economic upliftment of the communities inhabiting the Narmada Basin while ensuring the sustainability of the river.

We extend our heartfelt gratitude to the numerous contributors, including project staff, government agencies, research institutions, and individuals who provided data, insights, and support. Their contributions have been invaluable in shaping this report. We hope this report will inspire thoughtful engagement with the challenges and opportunities facing the Narmada River Basin, ultimately contributing to a brighter future for the region and its inhabitants.

Centres for Narmada River Basin Management and Studies (cNarmada)

IIT Gandhinagar, IIT Indore

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Basin Overview

The Narmada River basin, covering an extensive geographical area of approximately 97,162 square kilometres, is the ninth-largest in India. It spans across four Indian states: Chhattisgarh, Madhya Pradesh, Gujarat, and Maharashtra, covering significant portions of the central and western regions of the country. The Narmada River, sometimes called Madhya Pradesh's “lifeline”, originates from Amarkantak and flows 1,312 kilometres westward before emptying into the Gulf of Khambhat, Arabian Sea. The river flows 1,077 km in Madhya Pradesh, 74 km in Maharashtra, and 161 km in Gujarat. Of the total catchment area, about 87% is in Madhya Pradesh, 2% in Maharashtra, and 11% in Gujarat.

The basin is essential to the region's ecology, society, and economy, providing vital water resources for drinking, agriculture, and hydropower, which benefits millions of people in the basin. With a total population of 20,799,195, the basin is divided into three sub-basins: Upper, Middle, and Lower. The Upper Basin is home to 8,603,425 individuals, the Middle Basin to 9,126,886, and the Lower Basin to 2,689,365. The sub-basins span multiple districts across the four states. The Upper Basin covers 16 districts in Madhya Pradesh and two districts in Chhattisgarh. The Middle Basin spans 25 districts in Madhya Pradesh, two districts in Gujarat, and two districts in Maharashtra. The Lower Basin covers six districts in Gujarat, one in Madhya Pradesh, and one in Maharashtra. However, it's worth noting that only portions of these districts are within the basin areas.

The districts within the basin are varied in their economic, demographic, social, and geographical characteristics. The population distribution is uneven, with many regions having high population densities, while others are relatively sparsely populated. The areas also have diverse cultural traditions and social systems, influencing local administration and community life. Furthermore, the districts feature a range of terrains, including river valleys, fertile plains, and forested hills, which present varied environmental challenges and opportunities within the Narmada River Basin.

The regional economy is predominantly agricultural, with crops like cotton, sugarcane, and rice being the major contributors. Despite the economic significance of agriculture, the region faces challenges such as rural poverty, limited access to education and healthcare, and environmental concerns stemming from industrial pollution and deforestation. These issues

underscore the region's need for sustainable development and balanced growth. The districts within the basin offer a unique blend of natural resources, cultural diversity, and economic potential.

Land use/land cover

Land use and land cover (LULC) refer to the human activities and natural features that occupy the Earth's surface. Understanding LULC patterns helps manage natural resources, mitigate environmental degradation, and promote sustainable development. In the context of the Narmada River basin, this section will examine the LULC categories that dominate the region. Through maps and associated statistics, this section will provide an overview of the LULC status of the Narmada River by each of its sub-basins.

Table 1: Land use and land cover statistics (2017,2023). Source: Esri, Impact Observatory (Sentinel-2 L2A)

	Lower Basin		Middle Basin		Upper Basin	
Category	2017	2023	2017	2023	2017	2023
Water	1.7	2.0	2.8	3.5	1.6	1.9
Trees	7.4	4.9	8.3	3.6	26.9	24.8
Crops	60.0	63.0	62.0	63.7	48.3	50.9
Built Areas	5.1	7.9	1.8	2.8	2.0	3.0
Rangelands	25.6	22.1	25.1	26.4	21.1	19.4
Total	100	100	100	100	100	100
Area in sq.km.	8,583	8,583	42,204	42,204	44,916	44,915

Table 1 presents the land use and land cover categories in the Narmada River basin for the years 2017 and 2023. The basin is divided into three sub-basins: Lower Basin, Middle Basin, and Upper Basin. The LULC categories include Water, which refers to areas with predominant water presence throughout the year, such as rivers, ponds, lakes, and oceans. Trees are defined as dense vegetation with a closed or dense canopy, including wooded vegetation, plantations, and swamp or mangrove forests. Crops include human-planted cereals, grasses, and crops not at tree height, such as corn, wheat, and soy. Built Areas comprise human-made structures, including major road and rail networks, large homogeneous impervious surfaces, and residential housing. Rangelands are open areas covered in homogeneous grasses with little to no taller vegetation, including natural meadows, open savannas, and pastures.

The table shows the percentage distribution of each LULC category within each sub-basin for both 2017 and 2023. Additionally, the table provides the total area in square kilometres for each sub-basin.

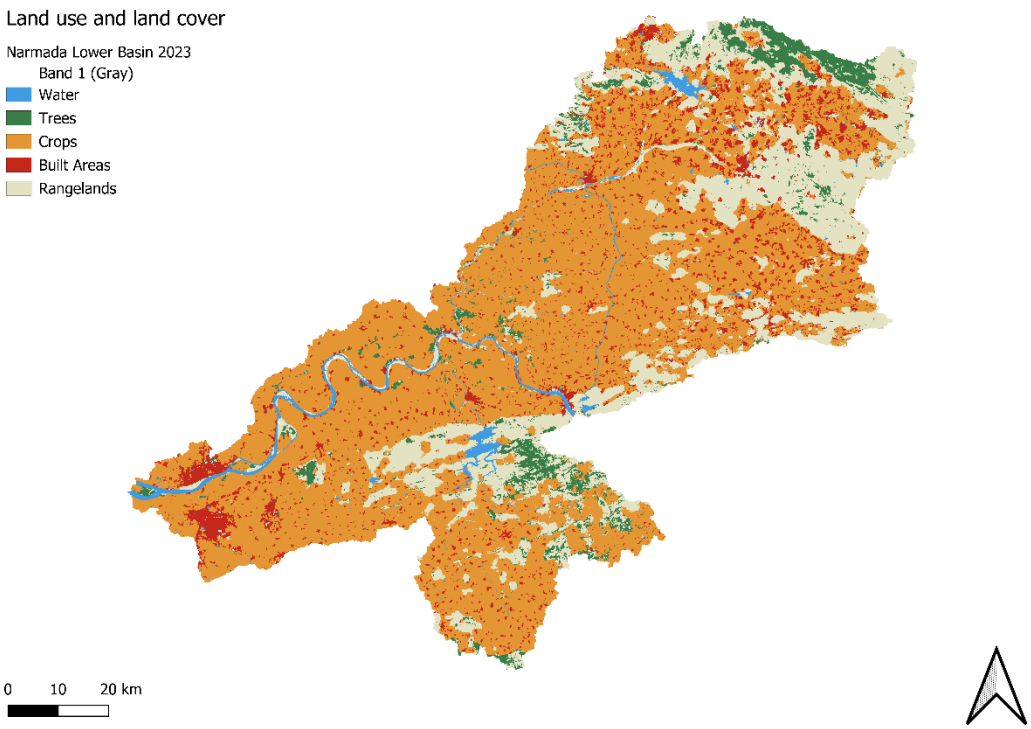

Figure 1: Land use and land cover map for 2017 of lower Narmada basin. Source: Esri, Impact Observatory (Sentinel-2 L2A)

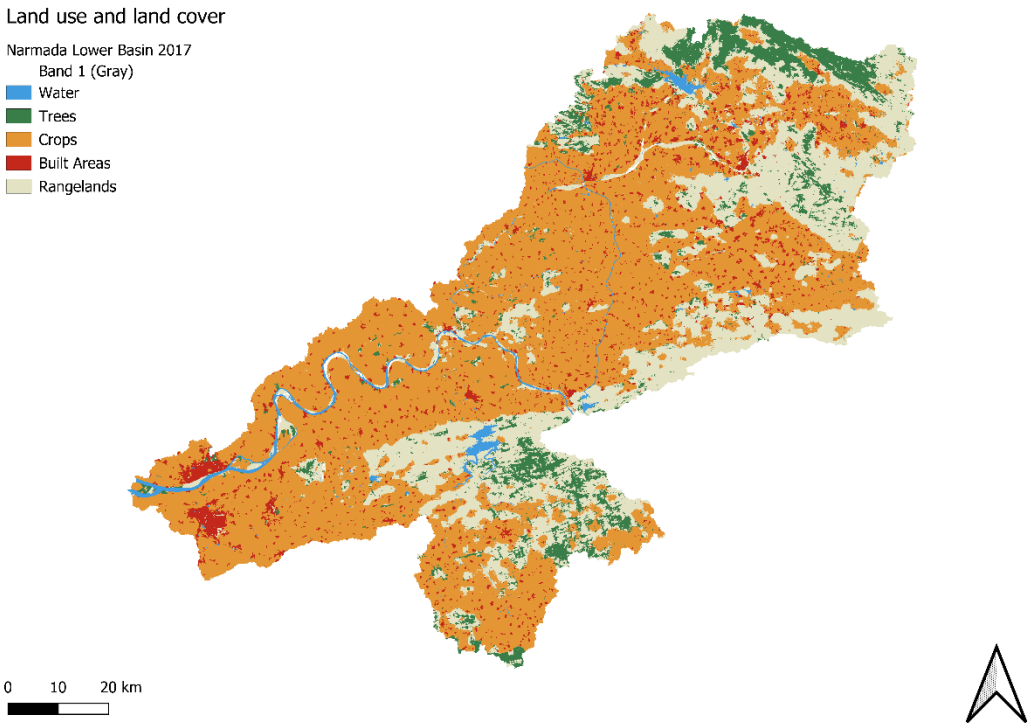

Figure 2: Land use and land cover map of 2023 of lower Narmada basin. Source: Esri, Impact Observatory (Sentinel-2 L2A)

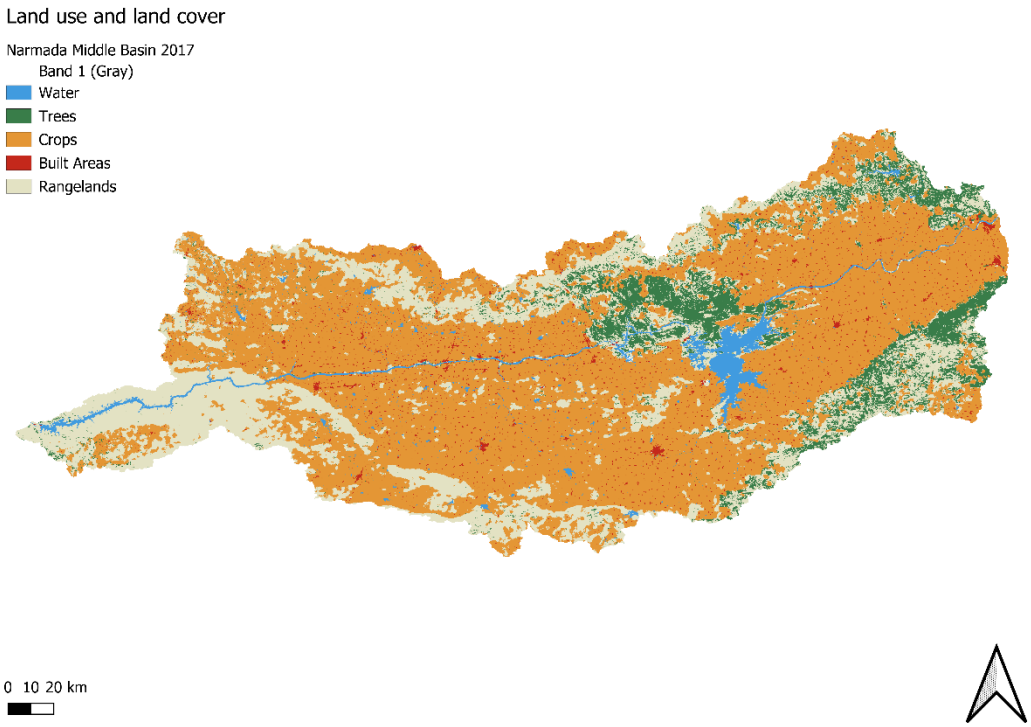

Figure 3: Land use and land cover map of 2017 of middle Narmada basin. Source: Esri, Impact Observatory (Sentinel-2 L2A)

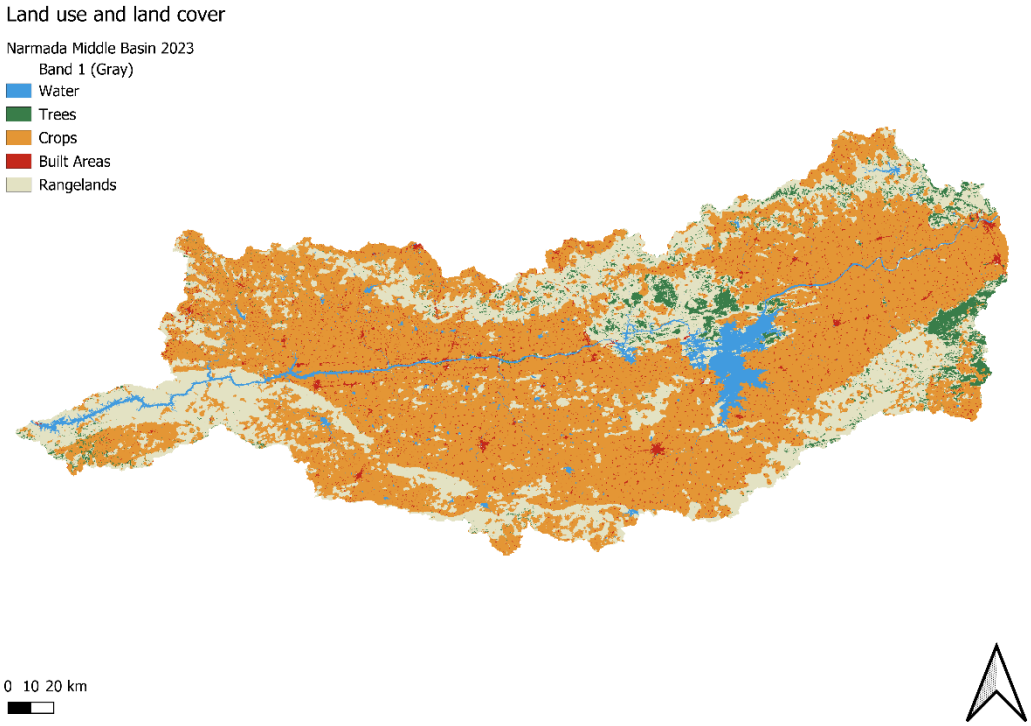

Figure 4: Land use and land cover map of 2023 of middle Narmada basin. Source: Esri, Impact Observatory (Sentinel-2 L2A)

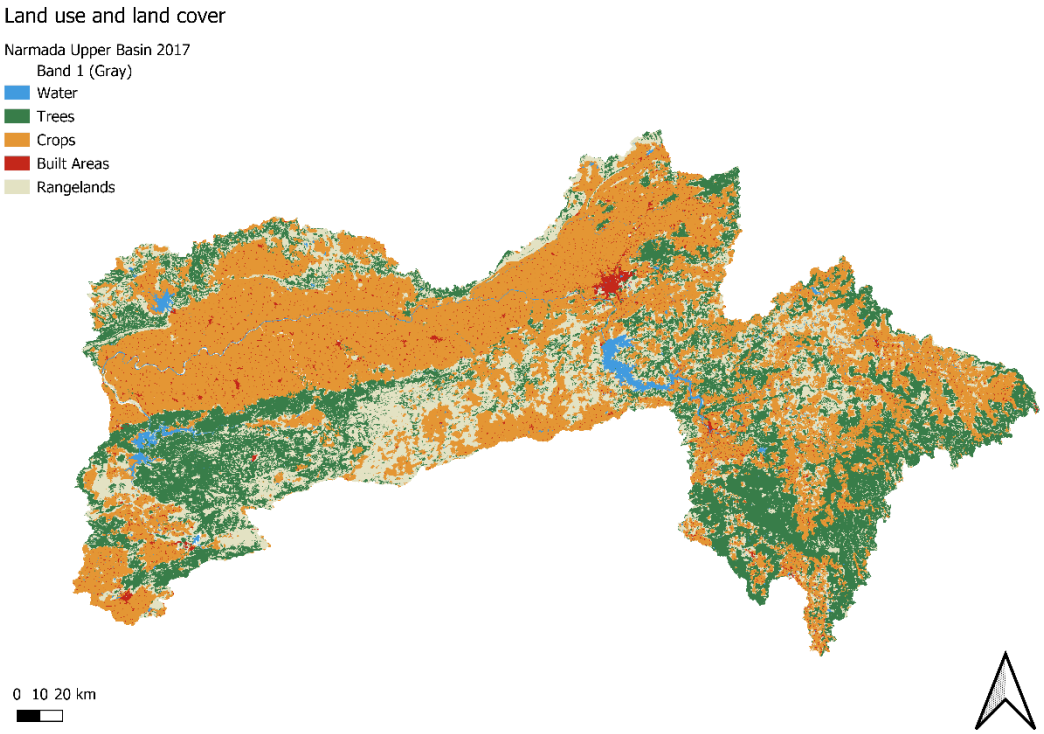

Figure 5: Land use and land cover map of 2017 of upper Narmada basin. Source: Esri, Impact Observatory (Sentinel-2 L2A)

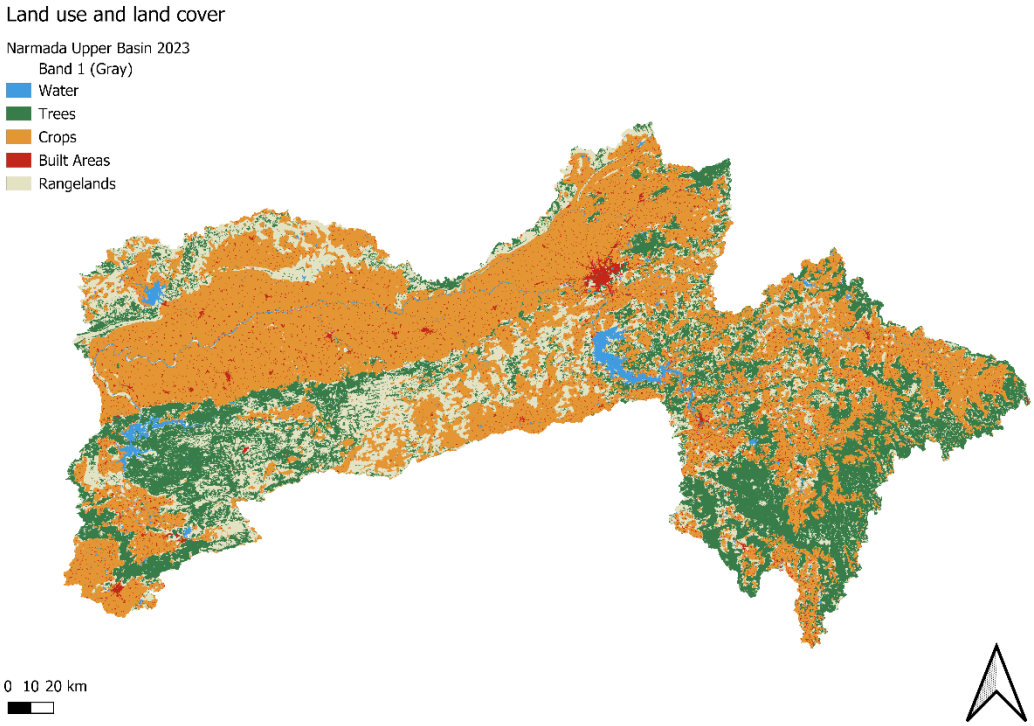

Figure 6: Land use and land cover map of 2023 of upper Narmada basin. Source: Esri, Impact Observatory (Sentinel-2 L2A)

Between 2017 and 2023, the land use and land cover categories in the Narmada River basin underwent notable changes. See Figure 1 and Figure 2 for lower, Figure 3 and Figure 4 for middle, and Figure 5 and Figure 6 for upper basin. Water areas increased in all three sub-basins, with the largest increase in the Middle Basin. Conversely, tree cover decreased significantly in all three sub-basins, with the largest decrease in the Middle Basin. Crop areas increased slightly in all three sub-basins, with the largest increase in the Middle Basin. Built Areas expanded in all three sub-basins, with the largest increase in the Lower Basin.

Infrastructure and Planning for Narmada Basin

The Narmada Valley Development Authority (NVDA) is a multidisciplinary organization in Madhya Pradesh responsible for planning and implementing major water resources development projects in the Narmada Basin. Its primary focus is on sustainable water management, improving agricultural productivity, and enhancing water supply for various needs.

The Table 2, Table 3, Table 4 provide a summary of the progress of ongoing and completed irrigation and multipurpose projects in the Upper, Middle, and Lower parts of the Narmada Basin. It includes details such as the project name, percentage of completion, and project type. The completion percentages indicate the status of each project, helping stakeholders monitor implementation and prioritize resources.

Table 2: Progress of irrigation and multipurpose projects in upper Narmada basin.
Source: NVDA

S. No	Completion %	Work Name	Type
1	63.95%	Group Micro-Irrigation Pamakhedi	Irrigation
2	63.16%	Dhimarkheda Micro Lift Scheme	Irrigation
3	0.00%	Halon Irrigation Project	Irrigation

Table 3: Progress of irrigation and multipurpose projects in middle Narmada basin:
Source: NVDA

S. No	Completion %	Work Name	Type
1	100.00%	Narmada Kshipra Link Project	Multipurpose
2	97.20%	Harsud Micro Lift Scheme	Irrigation
3	96.55%	Alirajpur Lift Scheme	Irrigation
4	94.51%	Chhaigaonmakhan Lift Scheme	Irrigation
5	90.75%	Nagalwadi Micro Lift Project	Irrigation

7	87.28%	Bistan Lift Scheme	Irrigation
8	85.22%	Narmada Malwa Gambhir Link	Irrigation
9	83.78%	Group Micro-Irrigation Kodwar	Irrigation
10	80.71%	Chhipaner Micro Lift Project	Irrigation
11	79.37%	Group Micro-Irrigation Punasa	Irrigation
12	77.18%	Group Micro-Irrigation Killod	Irrigation
16	59.50%	Balalkwada Micro Lift Scheme	Irrigation
18	56.02%	ISP-Parwati Phases I & II	Irrigation
19	55.66%	Choundi Jamuniya Micro Lift	Irrigation
20	44.46%	Bhikangaon Binjalwara Scheme	Irrigation
23	25.69%	Narmada-Jhabua Micro Scheme	Irrigation
24	14.07%	Badnawar Micro Lift Project	Irrigation
25	5.51%	Dahi Micro Lift Scheme	Irrigation
26	0.90%	Pipari Micro Lift Scheme	Irrigation
27	0.60%	Khalwa Micro Lift Project	Irrigation
29	0.00%	Balwada Micro Scheme	Irrigation
30	0.00%	Morand & Ganjal Complex	Irrigation
32	0.00%	Amba Rodiya Micro Project	Irrigation

Table 4: Progress of irrigation and multipurpose projects on Lower Narmada Basin. Source: Narmada Control Authority (NCA), Gujarat Water Resources Development Corporation Ltd. (GWRDCL)

S. No.	Completion %	Work Name	Type
1	100.00%	Sardar Sarovar Project (Gujarat Portion)	Multipurpose
2	95.00%	Narmada Main Canal (Gujarat Portion)	Irrigation
3	90.00%	Kutch Branch Canal	Irrigation
4	85.00%	Saurashtra Narmada Avtaran Irrigation (SAUNI) Yojana	Irrigation
5	80.00%	Dholera SIR (Special Investment Region) Water Supply	Water Supply
6	75.00%	Groundwater Recharge Projects	Water Conservation
7	70.00%	Industrial Water Supply Schemes	Water Supply
8	65.00%	Urban Water Supply Schemes (Narmada Water)	Water Supply
9	60.00%	Minor Irrigation Projects (Narmada Lift Irrigation)	Irrigation
10	55.00%	Narmada Right Bank Canal (Gujarat Portion)	Irrigation

11	50.00%	Water Conservation and Groundwater Recharge Schemes	Water Conservation
12	45.00%	Drinking Water Supply Schemes (Rural)	Water Supply
13	40.00%	Industrial Effluent Treatment Plants (Narmada Basin)	Environmental
14	35.00%	Flood Control Measures	Flood Protection
15	30.00%	Environmental Restoration Projects	Environmental
16	25.00%	Eco-tourism Development Projects	Tourism
17	20.00%	Research and Development Projects (Narmada Basin)	Research
18	15.00%	Community-Based Water Management Programs	Water Management
19	10.00%	Riverfront Development Projects (Narmada River)	Urban Development
20	5.00%	Integrated Water Resources Management Plans	Planning

Urban Development in Narmada Basin

A mix of large cities and smaller towns characterizes the urban landscape of Madhya Pradesh. The State capital, Bhopal, is one of the largest cities in the state and serves as the center of administration, education, and industry. Another major city, Indore, is the state's economic capital. Indore's economy is expanding rapidly, including the traditional agro-industries and modern corporate and IT companies. There is a very small area of Indore (26 %) and Bhopal (0.12 %) in the Narmada Basin.

The major cities in the Narmada Basin include Jabalpur, Narmadapuram, Khandwa, Harda, etc. all of them have a significant population and contribute to the state's economy. According to the Census in 2011, Madhya Pradesh ranks 19th among the most urbanized states of India, with 27.60% of its population living in urban areas.

Gujarat has a significant urban population in the lower basin (20.9%). The rural population dominates the distribution in most districts, except for Bharuch, where the urban population is significant. Bharuch district has the largest urban population share of 49.8% (4,46,683).

Urban Local Bodies

The government of Madhya Pradesh has gradually increased the number of Urban Local Bodies (ULBs) to cater to the increasing urbanization trend in the state. In 2003-04, the total ULBs in the state were 337, which increased to 413 in 2021-22.

In the context of urban local bodies, there are 202 towns within the Narmada Basin. Out of these 202 ULBs, there are only two municipal corporations, namely Khandwa and Jabalpur. Additionally, six municipalities are in Barwani, Damoh, Jabalpur, Khargone, Narshimpur, and Umaria districts. There are 32 town panchayats present in the Narmada Basin.
There has been a continuous increase in the budget allocation to the Urban Local Bodies of the state from the Urban Development and Housing Department. For the financial year 2022-23, the State Government has set aside Rs. 10,371.76 crores for the ULBs. The allocation of funds to municipal corporations is 43% among the ULBs, against its population share of 46.46%. Similarly, 33% of funds are allocated to 29.86% of the Municipal Council population and 24% of funds to the Nagar Panchayat population. The State Government is equally prioritizing the development of small towns.

There are 23 towns in the lower Narmada basin across districts in Gujarat (Bharuch, Narmada, and Vadodara) and Madhya Pradesh (Alirajpur). Notably, the majority of towns (15) fall under Class III, IV, or V, indicating smaller population sizes. Only three towns - Anklesvar, Bharuch, and Rajpipla - have a Class I or III designation and are governed by municipalities. Most towns (17) lack ULBs.

Infrastructure Projects and Urban Development Schemes
India's infrastructure projects and schemes aim to transform urban and rural landscapes through sustainable and innovative solutions. Initiatives like Smart Cities focus on creating technology-driven, liveable urban spaces, while Metro Rail and Housing for All address mobility and affordable housing needs. Programs like AMRUT rejuvenate urban infrastructure, enhancing water supply, sewerage, and green spaces. Comprehensive waste management and water and sanitation projects ensure cleaner environments and healthier living conditions, driving progress toward sustainable development goals.

In Upper Narmada Basin, Jabalpur, and in the middle Basin, Bhopal and Indore are among the 20 cities that have sanctioned funds towards Urban Mobility under the AMRUT scheme. The government of Madhya Pradesh has been constantly upgrading the state's urban infrastructure and services and increasing fund allocation in the urban sector to improve the living conditions of its citizens. It also enhances city governance through innovative policies and schemes in the urban domain and promotes the ULBs to generate their funds. It is implementing various schemes in the state with the support of the Centre, aligned with the

National Mission of Sustainable Habitat. The National Mission on Sustainable Habitat (NMSH) is being implemented through three programs:

- Atal Mission on Rejuvenation
- Urban Transformation, Swachh Bharat Mission
- Smart Cities Mission

Since the Narmada Basin covers a significant portion of Madhya Pradesh, these schemes have been thoughtfully considered for the region. This report discusses explicitly two key missions related to Narmada Basin development: the Swachh Bharat Mission and the Smart City Mission. Additionally, details of various other schemes active in the Narmada Basin, along with their objectives and implementation status, are provided in Table 5.

In the lower basin, the Gujarat Urban Development Mission (GUDM) is the State Level Nodal Agency (SLNA) for urban development. The GUDM aims to support urban renewal and infrastructure development in Gujarat's urban areas, focusing on better living standards, amenities, and a congenial environment for residents and workers. To achieve this, the mission has outlined several objectives.

The mission seeks to support ULBs and communities in planning, building, and maintaining basic urban infrastructures such as drinking water, sewerage, and social infrastructure in education and health. It also aims to provide financial, technical, and technological support for modern infrastructure development and bridge knowledge gaps in urban technology and management. Additionally, the mission aims to promote collaboration with civil societies, resident welfare associations, and research institutions to support urban renewal. It also seeks to make urban areas conducive to living and working, with modern facilities, and enable them to contribute to various fields. Other objectives include supporting slum rehabilitation, affordable housing, and livelihood support activities for slum dwellers and the urban poor. The mission also aims to engage private enterprises and the public in implementing projects, undertake research on policy reforms, strengthen urban transport systems, promote regional planning, and develop heritage sites.

Details of schemes for urban development in the upper and middle basins are listed in Table 5 and for the lower basin in Table 6.

Table 5: Schemes for urban development in Upper and Middle Narmada Basin

Scheme Name	Objective	Implementation Status	Location of Implementation
National Mission on Sustainable Habitat (NMSH)	Promote sustainable urban development through programs focusing on sanitation, urban transformation, and smart infrastructure.	Active under various urban development programs such as Atal Mission for Rejuvenation, Swachh Bharat Mission, and Smart Cities Mission.	Applicable statewide across urban areas in Madhya Pradesh, with integration into local and state initiatives.
Prime Minister's Street Vendor's Self-Reliant Fund Scheme	Support economic recovery and sustainability for urban street vendors through capital loans during and after the COVID-19 pandemic.	Three phases implemented: Rs. 10,000 loans (Phase 1), Rs. 20,000 loans (Phase 2), and Rs. 50,000 loans (Phase 3). Madhya Pradesh ranks first nationally in Phase 1 disbursements.	Urban areas across Madhya Pradesh, focusing on street vendor-dominated regions. Urban areas across Gujarat, focusing on street vendor-dominated regions.
Deendayal Antyodaya Yojana National Urban Livelihood Mission (DAY-NULM)	Alleviate urban poverty by providing skill training, facilitating self-employment, and strengthening social and economic support systems.	Programs include social awareness campaigns, institutional development, and skill-based placements. Actively supported by ULBs.	Urban centers and small towns in Madhya Pradesh.
CM Urban Infrastructure Development Scheme (Phase I, II, III)	Upgrade urban infrastructure, including roads, parks, stormwater management, and smart roads.	Phase I (2012): 1,428 crores allocated. Phase II (2016): 1,800 crores allocated. Phase III (2020): 536 crores allocated; work in progress.	All urban local bodies across Madhya Pradesh with a focus on mini-smart cities.
Chief Minister Urban Infrastructure Construction Scheme	Promote infrastructure projects in urban bodies, emphasizing roads, traffic management, and city beautification.	800 crores allocated (2022-23); 388.57 crore already under implementation.	Urban bodies in Madhya Pradesh, including tourism and religious hubs.

Urban Infrastructure Upgradation through MPUDC	Improve urban water supply, sewage treatment, and reduce environmental impacts in towns along river Basins.	Supported by international agencies (ADB, World Bank, KfW). 5,400 crore projects with ADB;1,080 crore with World Bank; 525 crores with KfW.	Barwani, Narshingpur, Narmadapuram, Mandla, Sendhwa, and surrounding river-based towns.
Metrorail Projects	Develop metro connectivity for urban mobility and reduce traffic congestion.	Under implementation by MP Metro Rail Corporation Limited, a joint venture between the Centre and the State.	Bhopal and Indore, two major urban centers.
Automated Layout Process Approval and Scrutiny System (ALPASS)	Digitize layout and planning permissions, ensuring streamlined approval processes and transparency.	Operational for issuing digital NOCs and land-use certificates following state development guidelines.	Applicable in district planning offices across Madhya Pradesh.
Automated Building Plan Approval System (ABPAS)	Improve building permit services by automating approvals, standardizing fees, and ensuring quick processing.	Active in multiple municipalities across the state.	Statewide urban areas of Madhya Pradesh.
E-Nagar Palika	Develop a centralized web solution for municipal services, enhancing citizen accessibility and service transparency.	Fully functional for essential citizen services through online platforms.	Covers all cities and towns across Madhya Pradesh.
Pradhan Mantri Awas Yojana Urban (PMAY-U)	Provide affordable housing for economically weaker sections and low-income groups.	9.5 lakh houses sanctioned; 6 lakhs completed; 18,284.50 crore investment from 2018-2023.	Implemented in urban local bodies across the state.
Atal Mission for Rejuvenation and Urban Transformation (AMRUT)	Enhance urban infrastructure for water supply, sewerage, and green areas.	AMRUT 1.0 completed (6,686.97 crore). AMRUT 2.0 launched (2021-26) with 4,065 crores allocated to Madhya Pradesh.	Urban bodies and major cities of Madhya Pradesh.

Swachh Bharat Mission (SBM) (1.0 & 2.0)	Promote sanitation and waste management, achieving 100% collection of wet and dry waste.	State ranked first in Swachh Survekshan 2022; infrastructure and sustainable practices established.	Urban bodies statewide, with emphasis on sustainable waste solutions.
Smart Cities Mission	Develop smart infrastructure and core urban services for better quality of life.	Active in cities like Jabalpur, Sagar, Satna. Jabalpur leading in the Narmada Basin.	Specific focus on Narmada Basin cities and other smart city clusters.
Chief Minister Urban Drinking Water Scheme	Provide reliable drinking water to urban areas.	Active since 2012 with cost-sharing model.	Cities across Madhya Pradesh.
PM Street Vendor AtmaNirbhar Nidhi Scheme (PM Swanidhi)	Provide loans for urban street vendors to sustain livelihoods.	Three phases actively implemented; digital transactions incentivized.	Urban areas statewide in Madhya Pradesh.

Table 6: Schemes for urban development in Lower Narmada Basin

Scheme Name	Objective	Implementation Status	Location of Implementation
National Mission on Sustainable Habitat (NMSH)	Promote sustainable urban development through programs focusing on sanitation, urban transformation, and smart infrastructure.	Active under various urban development programs such as Atal Mission for Rejuvenation, Swachh Bharat Mission, and Smart Cities Mission.	Applicable statewide across urban areas in Madhya Pradesh and gujarat, with integration into local and state initiatives.
PM Street Vendor's AtmaNirbhar Nidhi (PM SVANidhi)	Support economic recovery and sustainability for urban street vendors through capital loans during and after the COVID-19 pandemic.	Actively implemented with three phases of loans (Rs. 10,000, Rs. 20,000, and Rs. 50,000). Gujarat has shown significant success in disbursing loans under the scheme.	Urban areas across Gujarat, focusing on street vendor-dominated regions.
Deendayal Antyodaya Yojana - National Urban Livelihoods Mission (DAY-NULM)	Alleviate urban poverty by providing skill training, facilitating self-employment, and strengthening social and economic support systems.	Programs include social awareness campaigns, institutional development, and skill-based placements. Actively supported by ULBs.	Urban centers and small towns in Gujarat.
Gujarat Infrastructure Development Board (GIDB) Projects	Improve urban infrastructure, including water supply, sewerage, and sanitation, with a focus on environmental sustainability.	GIDB undertakes various infrastructure projects, including those related to urban development, often with support from international agencies like the World Bank and ADB.	Statewide, with a focus on key urban centres and infrastructure corridors.
E-Nagar	Develop a centralised web solution for municipal services, enhancing	Fully functional for essential citizen services through online platforms.	Covers all cities and towns across Gujarat.

	citizen accessibility and service transparency.		
Pradhan Mantri Awas Yojana - Urban (PMAY-U)	Provide affordable housing for economically weaker sections and low-income groups.	10,05,204 houses sanctioned; 9,18,185 completed; 18,284.50 crore investment from 2015-2024.	Implemented in urban local bodies across Gujarat.
Atal Mission for Rejuvenation and Urban Transformation (AMRUT)	Enhance urban infrastructure for water supply, sewerage, and green areas.	AMRUT 1.0 completed; AMRUT 2.0 underway with significant allocations.	Urban bodies and major cities in Gujarat.
Swachh Bharat Mission (SBM) (1.0 & 2.0)	Promote sanitation and waste management, achieve 100% collection of wet and dry waste.	Actively implemented; Gujarat has consistently ranked high in Swachh Survekshan rankings.	Statewide in urban areas of Gujarat.
Swarnim Jayanti Mukhya Mantri Shaheri Vikas Yojana	Upgrade urban infrastructure, including roads, water supply, sanitation, drainage, and other essential services.	Active since 2009-10 Budget provision under SJMMSVY is as below: Year 2009-12: Rs. 7000 Cr Year 2012-17: Rs.15000 Cr Year 2017-22: Rs. 22615 Cr Year 2023-26 Rs 57,000 crore has been allocated	All urban local bodies in Gujarat.

Swachh Bharat Mission (SBM) – (1.0) & (2.0)

The evolution of sanitation in India is a rich tapestry woven with ancient wisdom and modern initiatives. From the Sindhu Valley civilization's innovative toilet construction to contemporary nationwide movements, the journey reflects a commitment to improving public health and hygiene. In the middle Narmada Basin, Indore City bagged the 'Cleanest City of the Country' award for the 7th consecutive time in the Swachh Survekshan Award-2023. This is an excellent example of public participation in Indore. Madhya Pradesh is the first state to prepare guidelines and issue work orders for STP Inception and Diversion-based sewage treatment systems at low cost. This year, in March 2024, Madhya Pradesh published the "Utility Water and Septage Management Policy" for urban bodies, in which 100 percent mechanized cleaning of sewers and septic tanks has been ensured. Indore is the first city in the country to achieve Water Plus certification and a 7-star rating. Recently, in the Clean Air Survey-2024 under the National Clean Air Programme, Jabalpur part of Upper Narmada Basin has got the second position in the country for improvement in air quality in the category of cities with a population above ten lakhs. ULBs like Katni, Chhindwara Sagar Damoh of upper Narmada Basin, and Dewas, Khargone, and Dhar of middle Narmada Basin also performed well in SBM. Detail of the last three-year survey is given in Table 7 and Table 8. In Gujarat, only Bharuch is a large town in the lower Narmada basin and ranked 13 in the state in 2023.

Table 7: Swachh Survekshan top 100 ranking survey in Upper Narmada Basin (2020-23). Source: SBM, 2023.

ULBs	2023 Ranking (> 1lakh)	2022 Ranking (> 1lakh)	2020 Ranking (> 1lakh)
Jabalpur	26	83	
Katni		49	39
Chhindwara		22	29
Sagar			66
Damoh		98	

Table 8: Swachh Survekshan top 100 ranking survey in Middle Narmada Basin (2020-23). Source: SBM, 2023.

ULBs	2023 Ranking (> 1lakh)	2022 Ranking (> 1lakh)	2020 Ranking (> 1lakh)
Indore	1	1	1
Bhopal	5	6	14

Dewas	31	25	47
Khandwa	52	21	35
Dhar	53		
Nasrullaganj	87		
Khargone	99	60	10
Betul		59	67
Burhanpur		63	24
Sehore		68	
Narmadapuram		90	

Khargone Solar Power Plant

In a first-of-its-kind initiative in India, the Indore Municipal Corporation (IMC) has issued green bonds worth Rs. 244 crores for setting up a 60-megawatt solar power plant in Khargone, which is the first city in the state to do so. The non-convertible green municipal bonds have been oversubscribed 5.91 times, generating Rs. 720 crores.

Under the Swachh Bharat Mission, "The Jabalpur MSW (JMPL)" is an award-winning project. Establishment of a 10-acre Waste to Energy plant in the Kathonda area on PPP model providing a round solution to the waste problems of the city.

- The plant consumes 600 tons of waste daily and generates 11.5 Mega Watt electricity.
- Installation of an ICT-based 100% door-to-door garbage collection monitoring system with 276000 RFID tags installed across the city to eliminate bins and make it a bin-free city.
- It is the first-of-its-kind Municipal Solid Waste (MSW) treatment plant in India. It is fully functional at present. Reduction of approximately 37,000 tons of carbon emission in Jabalpur. 4.4 hectares of land can be saved by processing 2,19,000 tons of solid waste a year.

Figure 7: Waste to Energy Plant at Kathonda, Jabalpur. Source: https://jabalpursmartcity.com/jabalpur/

Smart City Mission

India's Smart Cities Mission aims to promote cities with core infrastructure, decent quality of life, clean and sustainable environments, and smart solutions. The government's initiative focuses on replicable models, aiming to create similar Smart Cities in various regions and parts of the country. The goal is to provide sustainable and inclusive development, aiming to create a replicable model that can be applied to other aspiring cities.

Smart Cities under the Upper Narmada Basin include Jabalpur, Sagar, and Satna, with Jabalpur taking the lead in initiating the development as a smart city. Jabalpur is the most significant urban center in the Basin. Around 130 projects under the smart city mission covering areas like the IT sector, Urban transport, solid waste management, sewerage and septage management, economic development, area development, and many more are completed in Jabalpur. A detailed description of the completed projects is provided in the table. The other important urban centres are Bharuch and Ankleshwar in Gujarat; Murwara (Katni), Jabalpur, Khandwa, Betul, Hoshangabad, Itarsi and Khargone in Madhya Pradesh. The projects under the Smart City Mission are listed for Jabalpur (Table 9) and Bharuch (Table 10).

Table 9: Projects under Smart City Mission in Jabalpur

S. No.	Project Name	Category	Sector	Impact	Implementation Agency	Cost as per Work Order in Rs. (crores)
1	24x7Water Supply with SCADA ABD Area	Development of Core Infrastructure (restricted to ABD)	Water Supply	Assured water supply	JAIN IRRIGATION	23.25
2	Free Wi-Fi zones at 10 locations	Smart Solutions	IT Connectivity and Digitalization	Boost to local identity and economy	Reliance Jio	0.01
3	Road Safety Audit and Identification of Black spots	Development of Core Infrastructure (pan city)	Urban Transport	Improved safety and security of citizens, particularly vulnerable groups (women, children and elders)	Loin engineering	0.57
4	Door To Door collection of Solid waste	Development of Core Infrastructure (pan city)	Solid Waste Management	Preservation of ecosystems and open spaces	Essel Infra project Ltd	93.6
5	RFID Tag for household's dustbin	Smart Solutions	Solid Waste Management	Improved health and education services	M/S Tech Mahindra Ltd	3.97

6	M-Governance System for Resource Tracking and Project Management	Smart Solutions	IT Connectivity and Digitalization	Citizen friendly and cost-effective governance and public services	Civic Solutions	1
7	Multipurpose Smart card for cashless Transaction for city transport and various other purposes	Smart Solutions	IT Connectivity and Digitalization	Citizen friendly and cost-effective governance and public services	SimPal Mobile Payment and Information Services Pvt Ltd	0.01
8	Ranital Lake development	Other ABD interventions	Area Development	Preservation of ecosystems and open spaces	A4 Star Infrastructure Pvt Ltd	9.07
9	Development of Multi sports complex at Wright Town, Phase-1	Other ABD interventions	Economic Development	Boost to local identity and economy	Nipani Infra & Industries Pvt Ltd	40
10	Multi-Level Parking at Manas Bhawan	Other ABD interventions	Urban Transport	Transportation and mobility	For Manas Bhawan (M/S Ram Ratna infrastructure Pvt. Ltd)	3.41
11	Junction Improvement at Choti Line Crossing	Development of Core Infrastructure (pan city)	Urban Transport	Transportation and mobility	Smart city	0.09
12	Solar Power plant, Lalpur, ramgara, and kathonda	Development of Core Infrastructure (pan city)	Energy	Reliability of power supply	D. K Electrical Industries	2.66
13	E-Rickshaws - charging facility for E-Rickshaws at 10 locations	Development of Core	Urban Transport	Transportation and mobility	MP Urja Vikas Nigam Ltd	2.65

		Infrastructure (pan city)				
14	Beautification, restoration and improvement of Gokuldas Dharamshala	Development of Core Infrastructure (pan city)	Economic Development	Conservation and reuse of critical resources	BNS Construction, Bhopal	4.73
15	Development of Dumna Nature Reserve Phase-2	Development of Core Infrastructure (pan city)	Area Development	Preservation of ecosystems and open spaces	Prem Constructions	2.05
16	Establishment of JSCL office	Other ABD interventions	Economic Development	Citizen friendly and cost-effective governance and public services	M/S Step-up Construction	5.52
17	Development of Tripuri Memorial	Development of Core Infrastructure (pan city)	Economic Development	Boost to local identity and economy	M/s Shailendra Pachori	3.65
18	Mini sports Centre at Shakti Nagar	Development of Core Infrastructure (pan city)	Economic Development	Access to open spaces	Nipani Infra & Industries Pvt Ltd	5.05
19	City Branding and Related events	Development of Core Infrastructure (pan city)	Economic Development	Boost to local identity and economy	Drishti Videotech	9.24
20	Cultural and Information Centre at Ghantaghar	Other ABD interventions	Economic Development	Citizen friendly and cost-effective	Nipani Infra & Industries Pvt Ltd	83.19

				governance and public services		
21	Waste to Energy	Smart Solutions	Energy	Reliability of power supply	Essel Infra project Ltd	178
22	Development of Incubation Centers	Smart Solutions	Economic Development	Citizen friendly and cost-effective governance and public services	Pratap Constructions	0.6
23	Smart classroom with Wi-Fi facility for 22 schools in Area	Smart Solutions	Social Sectors Health and Education	Improved living conditions for the urban poor	Bharat Sanchar Nigam Ltd	3.42
24	Intelligent Traffic Management System, ITMS	Smart Solutions	IT Connectivity and Digitalization	Transportation and mobility	Technosys securities system pvt Ltd	25.48
25	Command and Control center With Hardware and Software	Smart Solutions	IT Connectivity and Digitalization	Citizen friendly and cost-effective governance and public services	Hewlett Packard Limited	36
26	Smart bins, Geo-tagging of bins	Smart Solutions	Solid Waste Management	Citizen friendly and cost-effective governance and public services	Zonta Infratech Pvt LTD	2
27	NMT from Gorakhpur, Katanga to Gwarighat, approx. 6KM	Development of Core Infrastructure (pan city)	Non-Motorised Transport and Walkability	Transportation and mobility	M/s Prakash Construction	6.31
28	Smart ISBT	Smart Solutions	Urban Transport	Transportation and mobility	JCTSL	1

29	Public ranking of public toilets	Smart Solutions	Sewerage and Septage	Citizen friendly and cost-effective governance and public services	.	0.09
30	Septage Management	Development of Core Infrastructure (pan city)	Sewerage and Septage	Improved sanitation condition	JSCL	2.08
31	Implementation of mobile Application and Web portal for Tourism	Smart Solutions	IT Connectivity and Digitalization	Citizen friendly and cost-effective governance and public services	M/S Precise Automation Pvt Ltd	0.16
32	Sanskruti theatre and OAT at Bhawar Tal	Development of Core Infrastructure (restricted to ABD)	Economic Development	Preservation of ecosystems and open spaces	VASUNDHRA CONSTRUCTION	14.09
33	Laying of Sewer line on both sides of Omti nala	Development of Core Infrastructure (restricted to ABD)	Sewerage and Septage	Improved sanitation condition	M/S Banco Construction Pvt Ltd	3.63
34	Jabalpur Smart Road Phase - 1, Wright Town Roads, 5.4 Km	Development of Core Infrastructure (restricted to ABD)	Urban Transport	Transportation and mobility	M/s Lisha Engineering Pvt Ltd	80.47

35	NMT- Phase - 1 Nav Bharat to Madan Mahal Omti nala 1.2 Km	Development of Core Infrastructure (restricted to ABD)	Non-Motorised Transport and Walkability	Improved walkability	M/s Waris Construction	8.01
36	NMT- Phase - 3 Naudra Bridge to Ghoda Hospital Omti nala	Development of Core Infrastructure (pan city)	Non-Motorised Transport and Walkability	Transportation and mobility	M/s Amit Tiwari	2.98
37	NMT- Phase - 2 Nav Bharat to Naudra Bridge Omti nala	Development of Core Infrastructure (restricted to ABD)	Non-Motorised Transport and Walkability	Improved walkability	M/s Sumit Singh	3.31
38	Development of Dumna Nature Reserve Phase-1	Development of Core Infrastructure (pan city)	Area Development	Preservation of ecosystems and open spaces	M/s Prakash Construction	4.67
39	Smart Parking	Development of Core Infrastructure (restricted to ABD)	Urban Transport	Citizen friendly and cost-effective governance and public services	Building Control Solution Pvt Ltd	5
40	Gulauaa Talab development and Musical fountain	Development of Core Infrastructure (pan city)	Area Development	Preservation of ecosystems and open spaces	M/s Manoj Patkar	2.41
41	Bus Stops Phase-I	Development of Core	Urban Transport	Transportation and mobility	Sagardeep Ads pvt Ltd	5.9

		Infrastructure (pan city)				
42	Bus Stops Phase-II	Development of Core Infrastructure (pan city)	Urban Transport	Transportation and mobility	SS Ads pvt Ltd	0.62
43	Development of OAT and Visarjan kund at Bhatauli	Development of Core Infrastructure (pan city)	Area Development	Access to open spaces	VASUNDHRA CONSTRUCTION	14.21
44	Jabalpur Smart Road Phase - 2 Gol Bazaar roads, 4.5 Km	Development of Core Infrastructure (restricted to ABD)	Urban Transport	Transportation and mobility	Bhasha Associate	44.89
45	Development of Conservancies	Development of Core Infrastructure (restricted to ABD)	Sewerage and Septage	Transportation and mobility	M. SRK Construction	3.1
46	Jabalpur Smart Road Phase - 3 2.32 Km	Development of Core Infrastructure (pan city)	Urban Transport	Transportation and mobility	Shyam Construction	43.08
47	Construction of Smart Road from Ghamapur chowk to Chungi Chowk Gokalpur to Ranjhi	Development of Core Infrastructure (pan city)	Urban Transport	Transportation and mobility	P S CONSTRUCTION	27.8

48	Command and Control center, Civil Works	Development of Core Infrastructure (pan city)	IT Connectivity and Digitalization	Citizen friendly and cost-effective governance and public services	M/s Anil Grover	3.77
49	Development of Multi sports complex at Wright Town, Phase-2	Development of Core Infrastructure (restricted to ABD)	Economic Development	Boost to local identity and economy	M/s Rawani Construction, Jabalpur	34
50	Place Making and Visual Improvement of Jabalpur city	Development of Core Infrastructure (pan city)	Area Development	Access to open spaces	M/s Belief Buildcom	18.89
51	Design and Development of Footpath and its beautification	Development of Core Infrastructure (pan city)	Non-Motorised Transport and Walkability	Transportation and mobility	Arjit Construction	24.19
52	Design and Development of Junction in various location	Development of Core Infrastructure (pan city)	Urban Transport	Transportation and mobility	Prakash Constructions	15.96
53	Design and Development of MR4 road and Damoh Naka to ITI chowk	Development of Core Infrastructure (pan city)	Urban Transport	Transportation and mobility	M/s Belief Buildcom	14.36
54	Incubation Center at Udyog Bhavan	Smart Solutions	Economic Development	Citizen friendly and cost-effective governance and public services	MKM Associates	2.3

55	Conservation work of Gandhi Library Town Hall	Development of Core Infrastructure (pan city)	Economic Development	Conservation and reuse of critical resources	BNS Constructions	3.71
56	Conservation work of Kamania Gate	Development of Core Infrastructure (pan city)	Economic Development	Conservation and reuse of critical resources	BMS Constructions	0.26
57	Conservation work of Baradari, Sangram Sagar	Development of Core Infrastructure (pan city)	Economic Development	Conservation and reuse of critical resources	RAJPUTANA CONSTRUCTIONS LTD	0.69
58	Multi-Level Parking at Bhawartal	Development of Core Infrastructure (restricted to ABD)	Urban Transport	Transportation and mobility	Ram Ratan Infra Ltd	8.43
59	Multi-Level Parking at Civic Center	Development of Core Infrastructure (restricted to ABD)	Urban Transport	Transportation and mobility	RR Parcon	11.1
60	Conservation work of Ghanta Ghar	Development of Core Infrastructure (pan city)	Economic Development	Conservation and reuse of critical resources	Aadharshila Constructions	0.41
61	Digital Library at Gandhi Bhawan	Smart Solutions	Social Sectors Health and Education	Improved health and education services	Digibook Technologies Pvt Ltd	8.39

62	Development of Cycle track corridor at Jabalpur	Development of Core Infrastructure (pan city)	Non-Motorised Transport and Walkability	Transportation and mobility	Krishna Murari Gupta & Sons	7.11
63	Development Improvement of Road from Sharda Chowk to Sharda Mandir	Development of Core Infrastructure (pan city)	Urban Transport	Transportation and mobility	M/s Sumit Singh	1.9
64	Rainwater Harvesting System at various locations	Smart Solutions	Environment Including Pollution	Preservation of ecosystems and open spaces	Ashwath Infratech	5.11
65	Tensile Membrane Roof Covering at Gulaua Hawker Zone	Development of Core Infrastructure (pan city)	Economic Development	Access to open spaces	M/s Kuldeep Kumar	3
66	Fencing Boundary wall work at Madan Mahal	Development of Core Infrastructure (pan city)	Economic Development	Preservation of ecosystems and open spaces	M/s Amit Agrawal	3.02
67	Development of Mini Sports complex at Shiv Nagar	Development of Core Infrastructure (pan city)	Economic Development	Access to open spaces	Nipani Infra & Industries Pvt Ltd	5.21
68	Development of Mini Sports complex at Kariya Pathar	Development of Core Infrastructure (pan city)	Economic Development	Access to open spaces	Nipani Infra & Industries Pvt Ltd	4.91
69	Development of Mini Sports complex at Foota Taal	Development of Core	Economic Development	Access to open spaces	Nipani Infra & Industries Pvt Ltd	4.91

		Infrastructure (pan city)				
70	Construction of Elevated Corridor Fly Over from Damoh Naka to Dashmesh Dwar Madan Mahal (Part -A)	Development of Core Infrastructure (restricted to ABD)	Urban Transport	Transportation and mobility	Nagarjuna Constrcution company	768
71	Survey, Design, Construction Commissioning of Water Supply Scheme	Development of Core Infrastructure (pan city)	Water Supply	Assured water supply	Gondwana Engineers Ltd JV with CMR Infra Pvt. Ltd	143.43
72	Construction of road from Rani Dugrawati University to Dumna Airport	Development of Core Infrastructure (pan city)	Urban Transport	Transportation and mobility	M/s Pareta Associate	42.75
73	Renovation of Manas Bhawan Auditorium	Development of Core Infrastructure (restricted to ABD)	Area Development	Conservation and reuse of critical resources	Vasundhra Construction	1.42
74	SITC of Post Top Pole from Katanga Chowk to Gwarighat at Non-Motorized Path	Development of Core Infrastructure (pan city)	Energy	Reliability of power supply	M/s Samanvay Contractor & Suppliers	2.12
75	Supply Erection, Commissioning and Testing of Electrical Pole Shifting works at various locations	Development of Core Infrastructure (pan city)	Energy	Reliability of power supply	M/s Archana Electricals	0.65

76	External Electrification work at Integrated Command Control Center	Development of Core Infrastructure (pan city)	Energy	Reliability of power supply	M/s M.R. Electricals	0.32
77	Supply, Installation, Commissioning and Testing of lift elevator G+3 at ICCC	Development of Core Infrastructure (pan city)	Energy	Reliability of power supply	M/s Sanjay Raghav	0.21
78	Supply, Installation, Commissioning and Testing of Firefighting Equipments at ICCC	Development of Core Infrastructure (pan city)	Energy	Reliability of power supply	M/s Shiv Shakti Enterprises	0.09
79	Supply, Installation, Commissioning Testing of Post Top Lantern at ICCC	Development of Core Infrastructure (pan city)	Energy	Reliability of power supply	Pushpak Enterprises	0.03
80	Supply Erection, Commissioning Testing of Electrical Pole Shifting New work at various location in Jabalpur	Development of Core Infrastructure (pan city)	Energy	Reliability of power supply	M/s Shakti Infrastructure	0.99
81	Mining of Legacy Waste and Recovery of Land at the Ranital Dumping Ground	Development of Core Infrastructure (restricted to ABD)	Solid Waste Management	Preservation of ecosystems and open spaces	M/s PH Jadhav, Pune in JV with Hydro India engineering consultant	13.13
82	Supply of Road safety equipment	Development of Core	Urban Transport	Transportation and mobility	M.P. Laghu Udyog Nigam Ltd.	1.06

		Infrastructure (pan city)					
83	Development of Recreational Zone at Sangram Sagar	Development of Core Infrastructure (pan city)	Area Development	Access to open spaces	M/s Bhoopendra Singh	4.85
84	Development of Landscape along NMT from Katanga to Gwarighat	Development of Core Infrastructure (pan city)	Area Development	Preservation of ecosystems and open spaces	Prakash Constructions	0.4
85	Underground Electrification work at Gulauaa Talab	Development of Core Infrastructure (pan city)	Energy	Access to open spaces	MR Electricals	0.4
86	Central lighting work from Ghamapur to Ranjhi	Development of Core Infrastructure (pan city)	Energy	Transportation and mobility	MR Electricals	1.24
87	Operation & Maintenance of Jabalpur Incubation Center	Development of Core Infrastructure (pan city)	Economic Development	Boost to local identity and economy	Drishti Videotech	6.14
88	Supply & fixing of furniture of Digital Library at Gandhi Bhawan	Development of Core Infrastructure (pan city)	Social Sectors Health and Education	Improved health and education services	Neelkamal Limited	0.27
89	Design, Supply, Installation & Commissioning of Floating Fountain & Highjet	Development of Core	Area Development	Access to open spaces	Uberty Engineers	1.08

	Fountain with mist at Gulauaa Talab	Infrastructure (pan city)					
90	Construction of Boundary wall at various locations along Smart Road	Development of Core Infrastructure (restricted to ABD)		Urban Transport	Transportation and mobility	MKS Engineering Comp Pvt Ltd	2.19
91	Supply & Installation of AC in Digital Library	Development of Core Infrastructure (pan city)		Social Sectors Health and Education	Improved health and education services	Godrej & Boyce Mfg. Co. Ltd	0.03
92	Renovation work of 1st floor of Govt. School at Kachhpura	Development of Core Infrastructure (pan city)		Social Sectors Health and Education	Improved health and education services	M/s Paramhans Constructions	0.08
93	Supply & Installation of open air (Outdoor) Gym equipment's at Various locations	Development of Core Infrastructure (pan city)		Area Development	Improved health and education services	Khalsa Gymnastic Works	0.76
94	Wireless Communication system with GPS tracking facility at Dumna Nature Reserve	Development of Core Infrastructure (pan city)		Area Development	Improved safety and security of citizens, particularly vulnerable groups (women, children and elders)	Space Communication Pvt Ltd	0.33
95	Implementation of LED streetlight project at Jabalpur Smart City	Development of Core Infrastructure (pan city)		Energy	Improved safety and security of citizens, particularly	Energy Efficiency Services Ltd. (EESL), New Delhi	13

					vulnerable groups (women, children and elders)		
96	Construction of road from Adhartal Birsa Munda chowk to Maharajpur	Development of Core Infrastructure (pan city)	Urban Transport	Transportation and mobility	M/s Trishul Construction		29.24
97	Chain Link Fencing work around Open-AirTheatre Bhatauli	Development of Core Infrastructure (pan city)	Area Development	Access to open spaces	M/s Aaradhy Projects		0.37
98	Irrigation work at Madan Mahal	Development of Core Infrastructure (pan city)	Water Supply	Preservation of ecosystems and open spaces	M/s Amit Tiwari		0.35
99	Sewer line work in ABD area	Development of Core Infrastructure (restricted to ABD)	Sewerage and Septage	Improved sanitation condition	M/s M SRK Construction		2.2
100	SITC of Street light poles along with LED luminaires	Development of Core Infrastructure (pan city)	Energy	Improved safety and security of citizens, particularly vulnerable groups (women, children and elders)	M/s Shakti Infrastructures		3.13
101	External Electrification Work in Different Mini Sports Complex and Other	Development of Core	Energy	Improved safety and security of citizens,	M/s Brinda Electricals		0.21

	Places Under Smart City Jabalpur	Infrastructure (pan city)			particularly vulnerable groups (women, children and elders)		
102	Supply, Erection, Testing & Commissioning of decorative pole lighting work on NMT Phase-II & remaining work of NMT-I	Development of Core Infrastructure (restricted to ABD)	Energy		Improved safety and security of citizens, particularly vulnerable groups (women, children and elders)	M/s Archana Electricals	0.77
103	Supply, Erection, Testing & Commissioning of Electrical pole shifting works (Phase-III)	Development of Core Infrastructure (restricted to ABD)	Energy		Improved safety and security of citizens, particularly vulnerable groups (women, children and elders)	M/s Archana Electricals	0.63
104	SITC of Cable Laying Work for Street Lights in Jabalpur City	Development of Core Infrastructure (pan city)	Energy		Reliability of power supply	M/s Archana Electricals	0.87
105	Construction of footpath with integrated multiple utilities parallel to Flyover from Madan Mahal to Damoh Naka	Development of Core Infrastructure (restricted to ABD)	Urban Transport		Improved walkability	M/s Shyam Constructions	17.63
106	Construction of Ranital Lake development Phase - 2	Development of Core Infrastructure	Area Development		Access to open spaces	M/s Shyam Construction, Meerut	5.11

		(restricted to ABD)					
107	Construction of C.C. Road from MPEB Sub Station Rampur to Medical Tilwara Road via IT Park	Development of Core Infrastructure (pan city)	Urban Transport	Transportation and mobility	Belief Buildcom Pvt Ltd	26.4
108	Construction of Football Ground with Artificial Turf, 8 lane athletic track, fencing & related works at wright town stadium	Development of Core Infrastructure (restricted to ABD)	Area Development	Access to open spaces	M/s L.R. Brothers	7.08
109	Construction of Civil Structure and Allied work for Cultural and Information Centre	Development of Core Infrastructure (restricted to ABD)	Economic Development	Boost to local identity and economy	M/s Citydel Pvt Ltd	15.91
110	Construction of B.T. road from Gohalpur (Amkhera) to Khajri Bypass	Development of Core Infrastructure (pan city)	Urban Transport	Transportation and mobility	R K Construction	11.81
111	Survey, Design, Construction, Testing & Commissioning of 5 MLD STP of SBR Technology including 5 years O& M at Ranital Lake	Development of Core Infrastructure (restricted to ABD)	Sewerage and Septage	Reduced pollution	M/s Meco technologies Pvt Ltd	8.08
112	Design and Development of Civic centre Park	Development of Core Infrastructure	Area Development	Access to open spaces	M/s Pratap Buildtech Pvt Ltd, Bhopal	2.51

		(restricted to ABD)				
113	Creation of 3D city model using UAV survey techniques including creation, updation and integration of property tax records through household survey	Development of Core Infrastructure (pan city)	IT Connectivity and Digitalization	Citizen friendly and cost-effective governance and public services	M/s RSI softech india Pvt Ltd	4.48
114	Solid waste/ Municipal vehicle tracking system	Development of Core Infrastructure (pan city)	Solid Waste Management	Citizen friendly and cost-effective governance and public services	M/s Incubate Soft tech Pvt. Ltd.	2.11
115	Mechanized road sweeping work (ABD Area)	Development of Core Infrastructure (pan city)	Solid Waste Management	Citizen friendly and cost-effective governance and public services	International Waste Management Pvt. ltd.	1.15
116	Water supply work (Utility Shifting) along proposed Flyover from Damoh Naka to Madan Mahal	Development of Core Infrastructure (restricted to ABD)	Water Supply	Assured water supply	M/s Ravi Traders	6.95
117	Construction of CC Road from CIC building (Bataliya Clinic) to Kartik Hotel	Development of Core Infrastructure (restricted to ABD)	Urban Transport	Transportation and mobility	M/s Manoj Patkar	1.27
118	Development of Nagpur Road from Andhmukh	Development of Core	Urban Transport	Transportation and mobility	M/s Arun Construction	11.76

	chowk to LIC office via medical college.	Infrastructure (pan city)					
119	Infrastructure improvement of city entry junctions at different locations	Development of Core Infrastructure (pan city)	Urban Transport	Transportation and mobility	M/s Prakash Construction	3.89	
120	Development of amenities like walkway, heritage lighting, road work near balancing rock of Madan mahal	Development of Core Infrastructure (pan city)	Non-Motorised Transport and Walkability	Transportation and mobility	M/s Ascon Infratech Pvt. Ltd.	2.28	
121	Construction of garbage transfer station at various places in JMC	Development of Core Infrastructure (pan city)	Solid Waste Management	Improved sanitation condition	M. Waris Construction	1.76	
122	Installation of Bio CNG Plant	Development of Core Infrastructure (pan city)	Energy	Reduced dependence on and conservation of energy from conventional sources	Jabalpur Sahkari Dugdh Sangh Maryadit	18	
123	Conservation of Gandhi Library Phase - 2, Part-A	Development of Core Infrastructure (pan city)	Social Sectors Health and Education	Conservation and reuse of critical resources	M/s Nipani Infra & industries Pvt Ltd	1.63	
124	Conservation of Gandhi Library Phase - 2, Part-B	Development of Core Infrastructure (pan city)	Social Sectors Health and Education	Conservation and reuse of critical resources	M/s BNS Construction	1.14	

125	Development of Garden at Various locations with JMC	Development of Core Infrastructure (pan city)	Area Development	Access to open spaces	M/s Amit Agrawal	1.7
126	Development of Conservancy Lanes at Wright town	Development of Core Infrastructure (restricted to ABD)	Sewerage and Septage	Improved sanitation condition	M/s Amit Agrawal	1.37
127	Construction of Culvert and Conservancy at Golbazaar	Development of Core Infrastructure (restricted to ABD)	Sewerage and Septage	Improved sanitation condition	M/s Amit Tiwari	1.38
128	Lighting Arrangement using Post top lantern in Jabalpur	Smart Solutions	Energy	Improved safety and security of citizens, particularly vulnerable groups (women, children and elders)	M/s Future Energy Solutions	1.33
129	Fencing & Drip irrigation work at Madan Mahal Eco-Zone Phase -2	Development of Core Infrastructure (pan city)	Economic Development	Access to open spaces	M/s Amit Agrawal	1.87
130	Different Works at various locations for GoI Challenges	Development of Core Infrastructure (pan city)	Area Development	Access to open spaces	M/s Arpit Dixit	0.5

Table 10: Projects in Smart City Mission in Bharuch

S.No.	Project Name	Category	Sector	Impact	Implementation Agency	Cost as per Work Order in Rs. (crores)
1	24x7 Water Supply with SCADA	Development of Core Infrastructure (ABD)	Water Supply	Assured water supply	L&T Water Management Pvt. Ltd	35.25
2	Free Wi-Fi Zones at Key Locations	Smart Solutions	IT Connectivity and Digitalization	Boost to local economy and connectivity	Reliance Jio Infocomm Ltd	0.15
3	Road Safety Audit and Black Spot Identification	Development of Core Infrastructure (Pan-City)	Urban Transport	Improved safety and security	Safe Roads Engineering Pvt. Ltd	0.75
4	Door-to-Door Collection of Solid Waste	Development of Core Infrastructure (Pan-City)	Solid Waste Management	Enhanced cleanliness and ecosystem preservation	EcoGreen Waste Solutions Pvt. Ltd	45.30
5	RFID Tagging for Household Dustbins	Smart Solutions	Solid Waste Management	Improved waste tracking and sanitation	Tech Mahindra Ltd	4.85
6	E-Governance System for Resource Tracking	Smart Solutions	IT Connectivity and Digitalization	Transparent and efficient governance	Civic Innovations Pvt. Ltd	1.25
7	Multipurpose Smart Card for Cashless Transactions	Smart Solutions	IT Connectivity and Digitalization	Citizen convenience for transport and payments	Bharat Pay Services Pvt. Ltd	0.50
8	Beautification of Narmada Riverfront	Area Development	Urban Landscaping	Boost to tourism and ecological balance	Narmada Constructions Pvt. Ltd	25.00
9	Development of Multi-Sports Complex	Economic Development	Sports and Recreation	Boost to local identity and youth engagement	Nipani Infra & Industries Pvt. Ltd	55.00
10	Solar Power Plant Installation	Core Infrastructure	Renewable Energy	Enhanced renewable energy capacity	Gujarat Solar Development Agency	10.50

11	Intelligent Traffic Management System (ITMS)	Smart Solutions	Urban Transport	Reduced traffic congestion and emissions	Traffic Solutions India Pvt. Ltd	20.75
12	Smart Parking Solutions at Key Locations	Core Infrastructure	Urban Transport	Citizen-friendly parking management	SmartPark Pvt. Ltd	6.20
13	NMT (Non-Motorized Transport) Corridor	Core Infrastructure	Walkability and Transport	Improved pedestrian and cyclist safety	GreenPaths Pvt. Ltd	8.00
14	Command and Control Center with Hardware & Software	Smart Solutions	IT Connectivity and Digitalization	Centralized monitoring for city operations	Hewlett Packard Enterprise	40.00
15	Development of Cultural and Information Center	Economic Development	Tourism and Heritage	Conservation and promotion of local heritage	Heritage Builders Pvt. Ltd	30.50
16	Waste-to-Energy Facility	Smart Solutions	Solid Waste Management	Efficient waste utilization and power generation	EcoWaste Energy Pvt. Ltd	120.00
17	Smart Classrooms in 20 Schools	Social Sectors	Education	Improved learning facilities for urban children	Bharat Sanchar Nigam Ltd	4.00
18	Beautification and Restoration of Public Parks	Area Development	Urban Landscaping	Enhanced green cover and recreation spaces	CityScape Developers Pvt. Ltd	15.00
19	Riverfront Musical Fountain Installation	Area Development	Tourism and Recreation	Increased tourism and aesthetic value	AquaTechnics Pvt. Ltd	12.50
20	Development of Footpath in Bharuch City	Development of Core Infrastructure	Non-Motorised Transport	Walkability & Transport	Bharuch Municipality	20.50
21	Construction of Elevated Road from Bharuch to Ankleshwar	Urban Transport	Transportation Infrastructure	Improved Traffic Flow	XYZ Infrastructure Ltd	35.70
22	Construction of Sewage Treatment Plant at GIDC	Water Supply	Sewerage & Septage	Improved Sanitation	GIDC Infrastructure Pvt Ltd	10.30

23	Renovation of Heritage Sites in Bharuch	Cultural & Heritage Development	Conservation & Reuse	Preservation of Historical Sites	Heritage India Pvt. Ltd.	5.60
24	Installation of Solar Street Lights in Bharuch City	Energy	Renewable Energy	Energy Efficiency & Safety	Solar Power Solutions Ltd	8.40
25	Construction of Multi-level Parking near Bharuch Railway Station	Urban Transport	Parking & Mobility	Improved Transport Efficiency	Bharuch Constructions	15.20
26	Development of Parks and Recreational Zones in Bharuch	Area Development	Open Spaces	Access to Green Spaces	Eco Developments Pvt. Ltd.	7.85
27	Smart City Infrastructure for Bharuch (Phase 1)	Smart Solutions	IT Connectivity & Digitalization	Smart Governance & Services	Bharuch Smart City Ltd.	40.00
28	Improvement of Roads in Bharuch Industrial Area	Urban Transport	Road Infrastructure	Economic Development & Mobility	Bharuch Civil Works Co.	12.10
29	Waste Management System for Bharuch City	Solid Waste Management	Waste Collection & Processing	Improved Sanitation & Waste Disposal	Clean City Pvt. Ltd.	6.00
30	Bus Stops with Digital Display Boards	Core Infrastructure	Urban Transport	Improved commuter convenience	SmartCommute Pvt. Ltd	8.50

River Infrastructure

Major and medium irrigation projects

There are 21 Major and 23 Medium irrigation projects in the Basin. Some of the Major Irrigation project's details are discussed in the report. Out of which, 4 major projects are in the Upper Narmada Basin, 9 in the Middle Narmada Basin, and 2 in the Lower Narmada Basin.

Projects in the Upper Narmada Basin are described below:

- *Remodelling Of Bohri Bund Project:* Located on Bhuta Nalla, the project is a remodelling of the Bohri bund medium irrigation project. The additional culturable command area of the project is 2.0 Th ha with an ultimate irrigation potential of 3.6 Th ha. The gross and live storage capacity of the Bohri bund reservoir is 36.98 and 34.52 MCM, respectively. Jabalpur is the district that benefitted from this scheme.
- *Barna Major Irrigation Project*: This project is located on the Barna River, a major tributary of the Narmada River, about 20 km from Bareli in Raisen District. The culturable command area of the project is 57.90 Th ha and Ultimate Irrigation Potential is 62 Th ha. The Barna reservoir's gross and live storage capacity is 539 MCM and 455.8 MCM, respectively.
- *Bargi Diversion Major Irrigation Project:* This ongoing project is located on the main river Narmada near Jabalpur. The culturable command area of the project is 245 Th ha. The gross and live storage capacity of the Bargi reservoir is 3924.8 MCM and 3238.4 MCM respectively.
- *Bargi (Rani Avanti Bai Lodhi Sagar) Major Irrigation Project*: This project is located on the main river Narmada near Jabalpur. The culturable command area of the project is 157 Th ha and Ultimate Irrigation Potential is 219.80 Th ha.

Projects in the Middle Narmada Basin are described below:

- *Tawa Major Irrigation Project*: This project is located on river Tawa, a tributary of river Narmada, 9 km from Bagra Tawa railway station in Hoshangabad District. The culturable command area of the project is 247 Th ha. The Tawa reservoir's gross and live storage capacity is 2312 MCM and 2050 MCM, respectively. About 2.47 lakh ha of land is being irrigated through 187 km canal length.
- *Omkareshwar Major Irrigation Project*: This is an ongoing project located on the Narmada River near Khandwa. The culturable command area of the project is 146.80 Th ha and Ultimate Irrigation Potential is 283.32 Th ha. The gross and live storage capacity of the Omkareshwar reservoir is 987 MCM and 299 MCM respectively.

- *Indira Sagar /Narmada Sagar Project Major Irrigation Project*: This project is on the Narmada River near Khandwa. The culturable command area of the project is 123 Th ha, and Ultimate Irrigation Potential is 169 Th ha. The gross and live storage capacity of the Indira Sagar reservoir is 12200 MCM and 9750 MCM, respectively
- *Kolar Major Irrigation Project*: This project is located on river Kolar, a tributary of river Narmada near the village Lavakhedi (Birpur), about 32 km southwest of Bhopal. The culturable command area of the project is 45.10 Th ha, and Ultimate Irrigation Potential is 60.90 Th ha. The gross and live storage capacity of the Kolar reservoir is 270 MCM and 265 MCM, respectively.
- *Sukta (Bhagwant Sagar) Major Irrigation Project*: The project is located on river Sukta, a tributary of the Narmada River in the East Nimar district of Madhya Pradesh. The culturable command area of the project is 16.59 Th ha, and Ultimate Irrigation Potential is 18.58 Th ha. The gross and live storage capacity of the Sukta reservoir is 89.5 MCM and 78 MCM, respectively.
- *Man, Major Irrigation Project*: The project is located on Man River, a major tributary of the Narmada River in the Dhar district of Madhya Pradesh. The culturable command area of the project is 15 Th ha, and Ultimate Irrigation Potential is 17.7 Th ha. The gross and live storage capacity of the Sukta reservoir is 145 MCM and 127 MCM, respectively.
- *Jobat (Shahid Chandra Shekhar Azad Sagar) Major Irrigation Project*: The project is located on Hatni River, a major tributary of the Narmada River in Dhar district of Madhya Pradesh. The culturable command area of the project is 9.85 Th ha, and the Ultimate Irrigation Potential is 12.5 Th ha. The gross and live storage capacity of the Sukta reservoir is 77.84 MCM and 70.04 MCM, respectively.
- *Punasa Lift Irrigation Project*: The project is located on the Chhota Tawa River and consists of 8 lifts/pumps in 3 stages. The culturable command area of the project is 35.01 Th ha, and Ultimate Irrigation Potential is 36.76 Th ha. The district that benefitted from this irrigation scheme is Khandwa.
- *Baneta Lift Irrigation Project*: The project is located on the main Narmada River and consists of one lifting station in the Sehore district of Madhya Pradesh. It is an ongoing project.
- Projects in Lower Narmada Basin

    Karjan Major Irrigation Project: This project is located on river Karjan, a major tributary of river Narmada, near the village Jitgadh in district Bharuch. The culturable command area of the project is 51 Th ha and Ultimate Irrigation

Potential is 70.38 Th ha. The gross and live storage capacity of the Karjan reservoir is 630 MCM and 581 MCM, respectively.

- *Sardar Sarovar Major Irrigation Project Gujarat*: This is an on-going project located on the main river Narmada near Rajpipla. The culturable command area and the ultimate irrigation potential of the project is 2120 Th ha and 1792 Th ha respectively. The gross and live storage capacity of the Sardar Sarovar reservoir is 9500 MCM and 5800 MCM respectively.

Table 11: Major and Medium Irrigation Projects in Lower Narmada Basin

S.No.	Project Name	Location	Culturable Command Area (Th ha)	Ultimate Irrigation Potential (Th ha)	Gross Storage Capacity (MCM)	Live Storage Capacity (MCM)	Benefiting District(s)
1	Karjan Major Irrigation Project	River Karjan, Bharuch	51	70.38	630	581	Bharuch
2	Sardar Sarovar Major Irrigation Project	River Narmada, Rajpipla	2120	1792	9500	5800	Narmada, Gujarat

Hydro Electric projects

As per the latest assessment, the total Installed capacity of the hydro-power projects in the Basin is 3498.5 MW. There are total of 6 Hydroelectric projects with 9 powerhouses in the Basin, out of which 4 are Major hydropower projects. The total installed capacity of Major operational power projects is 3060 MW. (Indira Sagar Hydroelectric Project-1000 MW, Omkareswar Hydroelectric Project-520 MW, Rani Avanti Bai Sagar (Bargi) Hydroelectric Project-100 MW, Sardar Sarovar Hydroelectric Project-1450 MW).

- *Rani Avanti Bai Sagar (Bargi) Hydroelectric Project*: A major hydroelectric power project located on the main Narmada River of Upper Narmada Basin with an installed capacity of 90 MW. The project involves 2 powerhouses located in Jabalpur district of Madhya Pradesh (45 MW*2 + 5 MW*2).
- *Omkareswar Hydroelectric Project*: A major operational hydro-power project involving 1 powerhouse located on the main Narmada River in the East Nimar district of the Middle Narmada Basin of Madhya Pradesh. With 8 no. of turbines and 65 MW capacity of each turbine, the project's total installed capacity is 520 MW (65 MW*8).

- *Indira Sagar Hydroelectric Project*: This is a major hydro-power project located on the main Narmada River with a total installed capacity of 1015 MW. The project consists of 2 powerhouses located in the East Nimar district of Madhya Pradesh. A total of 11 no. of turbines are part of the hydro-power project (125 MW*8 + 5 MW*3). It is the Part of middle Narmada Basin.
- *Maheshwar Hydroelectric Project*: A major under-construction HE project with an installed capacity of 400 MW and 8 turbines/units. The project consists of 1 powerhouse on the Main Narmada River in the West Nimar district of the Middle Narmada Basin of Madhya Pradesh (40 MW*10).
- *Sardar Sarovar Hydroelectric Project*: The major operational hydro-power project of the Narmada Lower Basin involves power sharing between 3 states, namely Gujarat (16%), Madhya Pradesh (57%), and Maharashtra (27%). The total installed capacity of the project is 1450 MW, which involves 2 power houses located in the Narmada district of Gujarat and 11 no. of turbines/units (50 MW*5 + 200 MW*6).

Dams, Barrages/Weirs/Anicuts Water resource structures are manmade structures to store water for hydropower, irrigation, drinking water supply, etc. As per available data (India-WRIS), there are a total of 277 dams in the Narmada Basin.

Based on storage in the reservoir, many dams come under the range of 0-25 MCM. Most of the dams (93.86%) are used for Irrigation Purposes. The longest dam in the Basin is Rani Avanti Bai Sagar (Bargi NVDA) Dam, located in the Jabalpur district of Madhya Pradesh, with a total length of 5.357 km and 3238.4 MCM live storage capacity. The highest dam in the Basin is the Sardar Sarovar Dam, located in the Narmada district of Gujarat, with a height of 163 meters.

There are 2 barrages and 2 Weirs in the Basin, details are provided in the table below. The Kolar barrage is the longest and the highest barrage in the Basin, with a length of 1.195 km and a height of 15.5 m, located on the Kolar River in the Sehore District of Madhya Pradesh.

According to Mission Antyodaya data, groundwater remains the most important source of irrigation across the basin (Figure 8), while canals and other sources form a small proportion of irrigation in the rural parts of the basin.

Table 12: Sub-Basin-wise number and type of water resource structures. Source: IWRIS, Narmada Basin 2014

No. of Basins	Dams	Barrages	Weirs Lifts	Powerhouse
Narmada Lower Sub Basin	22	0	0	2
Narmada Middle	134	1	3	4

Sub Basin				
Narmada Upper Sub Basin	121	1	1	3

Source: IWRIS, Narmada Basin 2014

Table 13: Hydroelectric Projects in Lower Narmada Basin

S.No.	Project Name	Location	Installed Capacity (MW)	Powerhouses	Turbine/Unit Details	Power Sharing
1	Sardar Sarovar Hydroelectric Project	Narmada district, Gujarat	1450	2	50 MW x 5, 200 MW x 6	Gujarat (16%), MP (57%), Maharashtra (27%)

Table 14: Dams, Barrages, and Water Resources Structures in Lower Narmada Basin

S.No.	Structure Type	Name / Location	Total Number	Used for Irrigation	Capacity (MCM)	Other Functions
1	Dams	Various (22 in Lower Narmada Basin)	22	Yes	Varies	Hydropower, Irrigation
2	Barrages	None in Lower Narmada Basin	0	-	-	-
3	Weirs	None in Lower Narmada Basin	0	-	-	-
4	Lifts	2 (Lift Projects in Lower Basin)	2	Yes	Varies	Irrigation
5	Powerhouses	Sardar Sarovar Hydroelectric Project	2	-	1450 MW	Power Generation

Projects Undertaken by the Narmada Valley Development Authority

The Narmada Valley Development Authority has undertaken various completed and ongoing projects related to Irrigation, Power Generation, and Environment Protection. Some of the major projects that have been completed, under construction, and proposed are discussed in the tables in the report.

Narmada Shipra Link Project in Middle Basin

The Narmada - Kshipra Link Multipurpose Project aims to provide irrigation facilities to water-scarce areas in the upper reaches of the Chambal Basin, aiming to catter water to about 30000 ha. of Central Calibration Area (CCA) in Ujjain and Shajapur districts of Malwa region. The project will benefit 162 villages in three Tehsils and is spread across two regions of Madhya Pradesh. The supply source i.e. Omkareshwar Project reservoir, lifting point, pump houses and rising main lie in Khandwa District while the linking river Kshipra & Piped Canal System

(command area) lie in Ujjain and Shajapur districts of Malwa region. Here is Table 15 summarizing the details of the Narmada Kshipra Sinhastha Link Project.

Table 15: Details of the Narmada Kshipra Sinhastha link Project. Source: NVDA.

Aspect	Details
Region Affected	Malwa region, Madhya Pradesh
Issue	Acute water scarcity for 3 decades, rapidly depleting groundwater levels, and adverse effects on industries
Primary Challenge	Lifting Narmada water to the Malwa plateau, which is approximately 400 meters higher than the Narmada River valley
Concerned Authority	Department of Narmada Valley Development
Proposed Solution	Narmada Kshipra Simhastha Link Project
Project Objective	Lift 5 cumecs of water from Narmada to feed the Malwa plateau
Approval Details	- Approval by CM Shri Shivraj Singh Chouhan: August 8, 2012 - Official sanction for ₹432 Crore: October 12, 2012
Foundation Stone Laid By	Former Deputy PM Mr. L. K. Advani
Foundation Stone Date	November 29, 2012
Project Completion Time	14 months (record period)
Project Completion Date	February 6, 2014 (on Narmada Jayanti, water joined Kshipra River at Ujjaini, district Indore)
Dedication to Public	February 25, 2014
Key Features	- Water lifted from the nearest point of the Narmada River - Lifeline for the Malwa region to prevent desertification and revitalize industries
Budget	₹432 Crore
Strategic Impact	Addressed water scarcity, supported industries, and ensured sustainable water supply to the Malwa region

Table 16: Technical Details of the Narmada Kshipra Sinhastha link Project. Source: NVDA.

Discharge of water to be lifted	5 cumecs
Source of water	: Sisaliya Tank
Initial level of Sisaliya tank	: 228 M
Top level of Ujjaini	: 576 M

Total head of lifting	: 348 M
Total length of transportation of water	: 47 KM
Lifting stages	: 3
Pumps	: 6 Nos (2 standby) of 2250 KW each
Stage 1	: 6 Nos (2 standby) of 2250 KW each
Stage 2	: 6 Nos (2 standby) of 2550 KW each
Stage 3	: MS pipe 1800 mm Dia
Pipes	: Ujjaini
Point of confluence	: 27.5 MW approx.
Power	:
Benefits	• Drinking water supply to Dewas, Ujjain and More than 250 villages along Kshipra River • Supply of water to industries at Dewas, Ujjain and Pithampur • Sufficient flow of water in Kshipra River during "Simhastha- 2016" • Increasing agriculture benefits.

Table 17: Completed Major Projects in Upper Narmada Basin. Source: NVDA.

S.No.	Name of Project	Potential	
		Irrigation (L Ha)	Power generation (MW)
1.	Barna Project	0.548	-

Table 18: Completed Major Projects in Middle Narmada Basin. Source: NVDA.

S.No.	Name of Project	Potential	
		Irrigation (L Ha)	Power generation (MW)
1.	Tawa Project	2.469	13.50
3.	Kolar Project	0.451	-
4.	Sukta Project	0.166	-
6.	Man Project	0.150	-
7.	Shaheed Chandra Shekhar Azad (Jobat) Project	0.098	-
	Total	3.3	13.50

Table 19: Completed Major Projects in Lower Narmada Basin

S.No.	Project Name	Irrigation Potential (L Ha)	Power Generation (MW)
1	Sardar Sarovar Project	2120	1450 (Operational)

Table 20: Under construction projects in Upper Narmada Basin. Source: NVDA

S.No.	Name of Project	Estimate cost (Rs. Crore)	Proposed Potential	
	-		Irrigation (L Ha)	Power generation (MW)
1.(A)	Rani Awanti Bai Lodhi Sagar Project	2260.40	1.57	(i) 90-From Riverbed PH (Completed) (ii) 10-From Left Bank Canal Head PH (Completed)
(B)	Bargi Diversion Project (Bargi Right Bank Canal)	4281.55	2.45	
2.	Upper Narmada	684.00	0.186	-
3.	Halon	412.00	0.13	-
	Total	7637	4.33	2461.5 (Completed), 404.5 (Under Construction/Proposed)

Table 21: Under construction projects in Middle Narmada Basin. Source: NVDA

S.No.	Name of Project	Estimate cost (Rs. Crore)	Proposed Potential	
			Irrigation (L Ha)	Power generation (MW)
1.	Indira Sagar Project	5877.57	1.23	(i) 1000-From Riverbed PH (Completed) (ii) 15-From Canal Head PH (Completed)
2.	Omkareshwar Project	3539.16	1.47	(i) 520-From Riverbed PH (Completed) (ii) 4.5-From Canal Head PH (Proposed)
3.	Upper Beda Project	185.37	0.099	-
4.	Shaheed Bhima Nayak Sagar Project (Lower Goi)	360.37	0.137	-

5.	Punasa Lift	488.06	0.350	-
6.	Maheshwar Hydro Power Project under construction by private firm under Energy Department	-	-	400 (Under Construction)
	Total	21224.48	7.622	2461.5 (Completed), 404.5 (Under Construction/Proposed)

Table 22: Under construction projects in Lower Narmada Basin. Source: NVDA.

No.	Name of Project	Estimate cost (Rs. Crore)	Proposed Potential
Sardar-Sarovar Inter State Project	3136.00	-	57% Share 826.5 MW (Completed)

Table 23: Proposed Major Projects in Upper Narmada Basin. Source: NVDA.

S.No.	Name of Project	Estimate cost (Rs. Crore)	Proposed Potential	
			Irrigation (Ha)	Power (MW)
1.	Raghawpur	439.55	4000	17
2.	Rosara	715.74	-	25
3.	Singarpur (Basaniya)	462.57	6000	16
4.	Upper Budner	549.04	9800	-
5.	Atariya	208.00	1973	-
6.	Chinki U	1415.35	73929	15
7.	Sher, Machharewa-Shakkar Composite Project	1684.48	64800	-
8.	Sitarewa	171.29	-	15
11.	Minor and Micro Minor Hydrel Projects	944.00	-	28
16.	Boras	635.76	-	60
	Total	10737.39	2,63,302	301

Table 24: Proposed Major Projects in Middle Narmada Basin. Source: NVDA.

S.No.	Name of Project	Estimate cost (Rs. Crore)	Proposed Potential

				Irrigation (Ha)	Power (MW)
1.	Dudhi		506.00	50600	-
2.	Morand-Ganjal Project	Composite	1434.37	52200	-
3.	Hoshangabad		669.34	-	45
4.	Handia		699.60	-	55

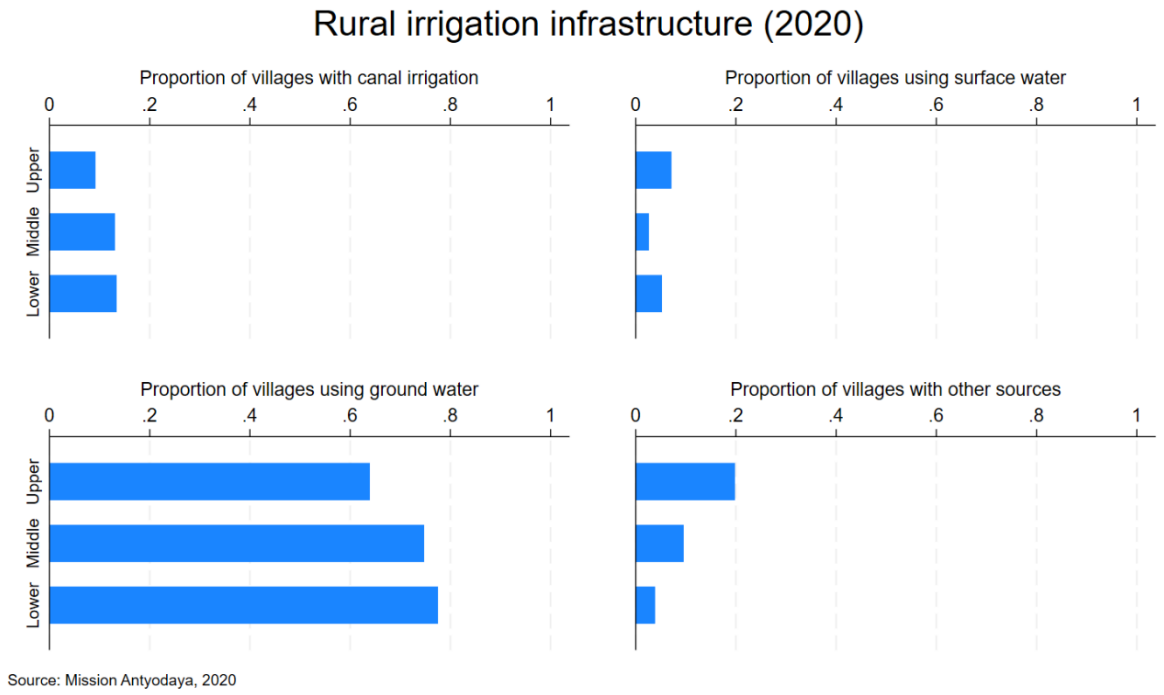

Figure 8: Rural irrigation infrastructure as reported by villages in basin areas

Environment Protection

Catchment Area Treatment

Treatment of critically degraded, directly draining sub-watersheds (Phase-I) within the catchment of Sardar Sarovar and Indira Sagar Projects is in the advanced stage of completion. Against a target of 1,25,725 ha of SSP catchment, an area of 1,10,997 ha was treated until the end of March 2005. Similarly, for the Indira Sagar Project (ISP) against a target of 62,975 ha. works were completed on an area of 53,581 ha.

For treating the balance of the directly draining critically degraded (Phase –II) areas in Madhya Pradesh, schemes within the framework of guidelines by RVP/NAEB are undertaken.

The government of Madhya Pradesh has undertaken schemes covering 1,07,136 ha of the

catchment as RVP schemes, of which 107136 ha area was proposed to be treated at the cost of Rs. 4523.02 lacs against which by the end of March 2006, an area of 66,907 ha was treated.

For the Indira Sagar Project, NVDA, the Government of Madhya Pradesh has submitted five schemes for 40 sub-watersheds covering an area of 53,709 ha of forestland to the National Afforestation & Eco-Development Board.

Compensatory Afforestation

Many of the projects coming up on the Narmada River and its tributaries involve the submergence of forest land. To compensate for the loss of forests Compensatory Afforestation, works are being carried out on revenue and degraded forest lands under various projects. The progress of afforestation and the felling of trees under these projects is given in the table.

Table 25: Progress of compensatory afforestation in lower Narmada basin. Source: NVDA

Project	**Compensatory Afforestation**	
	Target (ha.)	Achievement (ha.)
Sardar Sarovar	8737	8737

Table 26: Progress of compensatory afforestation in middle Narmada basin. Source: NVDA

Project	**Compensatory Afforestation**	
	Target (ha.)	Achievement (ha.)
Indira Sagar	81,444	81,435
Omkareshwar	11,660	11,660
Man	4	4.593
Jobat	384	385.577

Water Supply Network Status

Population and Infrastructure Variations

The urban local bodies (ULBs) along the Narmada River Basin have a significant population inequality, directly impacting the size and adequacy of their water and sewage treatment infrastructure. On the one hand, large cities like Jabalpur, with a population of about 1.5 million,

have huge water treatment plant facilities to fulfil their high-water demands. Jabalpur alone has a water treatment capacity of 298 MLD, which is supported by a wide water distribution pipeline network and a large number of water connection points. Lesser ULBs, such as Bhedaghat and Amarkantak, with populations of less than 10,000, have significantly fewer treatment facilities. For example, Amarkantak has a small capacity of about 2.09 MLD, reflecting the low water consumption of its small population. This gap highlights a basic difficulty in infrastructure planning. Whereas major cities are often well-equipped to meet the needs of their populations, smaller towns frequently have infrastructure deficits due to restricted resources and poorer economies of scale. As a result, smaller ULBs may fall behind in obtaining equitable access to water and sewage services, affecting the quality of life and public health in these communities. Addressing these inequalities necessitates targeted actions to guarantee that infrastructure development is proportional to the demands of all ULBs, regardless of size.

Status of Water Treatment Projects

The progress of water treatment infrastructure across the ULBs shows a positive trend, with most projects marked as "completed." This suggests that great efforts have been undertaken to secure the availability of treated water to urban populations along the Narmada River. For example, cities like as Jabalpur have made significant investments in large-scale water treatment plants, allowing them to meet the water needs of their vast populations. Similarly, medium-sized ULBs like Mandla and Dindori have completed essential water treatment projects, ensuring citizens' access to safe drinking water (see Table 27 and sTable 28).

Table 29 provides an overview of the status of water treatment projects in the Lower Basin, covering five Urban Local Bodies (ULBs): Ankleshwar, Bharuch, Chhota Udaipur, Broach (Vadodara), and Rajpipla. The table lists each ULB's district, population, water distribution project, source of water, water treatment plant capacity in Million Liters per Day (MLD), and water distribution pipeline length in kilometers. The status of each project is also provided, indicating whether it is in the planning stage, ongoing operations, completed, or undergoing expansion. As per the table, Bharuch and Rajpipla have completed their projects, with water treatment plant capacities of 70.4 MLD and 6.0 MLD, respectively. Ankleshwar's project is in ongoing operations, while Broach (Vadodara) is undergoing expansion. Chhota Udaipur's project is still in the planning stage.

However, some ULBs are recorded as "Under Construction" for their water treatment projects, indicating continuous efforts to fill existing gaps. This could be due to various issues, including

project finance delays, technical obstacles, or administrative impediments. Smaller ULBs, in particular, frequently experience resource constraints, which might delay the implementation of infrastructure initiatives.

The dependency on the Narmada River highlights its critical role in sustaining the urban populations along its banks. This reliance also brings to the fore the importance of managing this resource sustainably to prevent over-extraction and ensure its continued ability to serve as a lifeline for these cities. Future infrastructure planning must incorporate measures to diversify water sources and implement advanced technologies to optimize water usage and reduce wastage. A sole water source emphasizes the need to complete these projects, as any supply disruption might have far-reaching effects on the affected population.

Table 27: Status of Water treatment projects in Upper Basin. Source: Hamari Jeewan Rekha Narmada by https://mpurban.gov.in/

Name of the ULB	District	Population	Water Distribution Project			
			Source of water	Water treatment plant capacity (MLD)	Water distribution pipeline length (KM)	Status of project
Amarkantak	Anuppur	8416	Narmada	2.09	59	Under Construction
Dindori	Dindori	21323	Narmada	4.9	35.2	Completed
Mandla	Mandla	55133	Narmada	2.09	59	Under Construction
Jabalpur	Jabalpur	1498000	Narmada	298	1870	Completed
Bhedaghat	Jabalpur	6657	Narmada	1.2	24	Completed
Narshingpur	Narshingpur	105000	Narmada	13.1	120	Completed
Saikheda	Narshingpur	9602	Narmada	3	33.127	Under Construction

Table 28: Status of Water treatment projects in Middle Basin. Source: Hamari Jeewan Rekha Narmada by https://mpurban.gov.in/

Name of the ULB	District	Population	Water Distribution Project			
			Source of water	Water treatment plant capacity (MLD)	Water distribution ppeiline length (KM)	Status of project

Narmadapuram	Narmadapuram	117988	Narmada	24	225	Completed
Budhni	Sehore	16808	Narmada	4.5	40	Completed
Bherunda (Nasrullaganj)	Sehore	23788	Narmada	13.68	196	Under Construction
Nemawar	Dewas	5975	Narmada	2.21	45.33	Under Construction
Omkareshwar	Khargone	10063	Narmada	5.62	23	Completed
Barwah	Khargone	26459	Narmada	4	50	Under Construction
Sanawad	Khargone	38740	Narmada	7.5	55	Completed
Mandleshwar	Khargone	12346	Narmada	3.74	22	Completed
Maheshwar	Khargone	24411	Narmada	6	32	Completed
Dhamnod	Dhar	32098	Narmada	5.1	79	Completed
Dharampuri	Dhar	16363	Narmada	3.4	46	Completed
Anjad	Khargone	26289	Narmada	4	28.5	Completed
Barwani	Barwani	55504	Narmada	12	150	Completed
Sendhwa	Barwani	56485	Goyi	9	91.25	Under Construction

Table 29: Status of Water treatment projects in Lower Basin

Name of the ULB	District	Population	Water Distribution Project	Source of Water	Water Treatment Plant Capacity (MLD)	Water Distribution Pipeline Length (KM)	Status of Project
Ankleshwar	Bharuch	114,200	Narmada Canal	Narmada	Not Available	Not Available	Ongoing Operations
Bharuch	Bharuch	172,300	Narmada Canal	Narmada	70.4	510	Completed

Chhota Udaipur	Vadodara	25,800	Narmada Canal	Narmada	Not Available	Not Available	Planning Stage
Broach (Vadodara)	Vadodara	1,634,336	Narmada Canal	Narmada	180	Not Available	Ongoing Expansion
Rajpipla	Narmada	34,800	Narmada Canal	Narmada	6.0	42	Completed

Connection Coverage for Water Supply

The Narmada River Basin encompasses a diverse set of Urban Local Bodies (ULBs), each exhibiting significant variations in water distribution infrastructure and the number of water connections provided to residents. These disparities highlight the challenges and priorities in ensuring equitable access to water resources across the basin.

Jabalpur, the largest ULB in the basin, has provided a substantial 171,228 water connections, reflecting its role as a significant urban center and a hub for economic and social activities. In stark contrast, smaller towns like Bhedaghat, Amarkantak, and Nemawar have only managed 1,167, 2,100, and 1,198 connections, respectively. This disparity underlines smaller ULBs' challenges in scaling their water distribution networks due to limited resources, geographical constraints, or lower population densities.

Medium-sized towns such as Narmadapuram and Sendhwa have made considerable progress, with 24,000 and 12,000 water connections, respectively, showcasing efforts to address the growing demand for water in these rapidly urbanizing regions. Similarly, Mandla and Narshingpur have achieved 2,100 and 7,500 connections, indicating steady progress, albeit on a smaller scale than larger ULBs.

ULBs with religious and cultural significance, such as Omkareshwar (1,400 connections) and Maheshwar (5,400 connections), have comparatively fewer water connections. Despite their prominence, these towns may face unique challenges, such as fluctuating populations due to tourism and pilgrimage, which strain water distribution systems during peak seasons.

Smaller ULBs like Barwah (5,082), Dhamnod (6,417), and Dharmapuri (3,300) exhibit modest water distribution networks, reflecting limited infrastructural capacity and resource allocation. On the other hand, towns such as Anjad (5,000) and Sanawad (8,000) demonstrate moderate levels of connectivity, suggesting room for improvement to cater to the needs of growing populations.

Barwani, with 11,232 connections, stands out among similar-sized ULBs, indicating commendable efforts to expand water distribution services in a region often characterized by water scarcity. However, neighbouring ULBs such as Budhni (1,756) and Saikheda (2,478) highlighting the uneven distribution of resources and infrastructure within the basin. In conclusion, the disparities in water connections across the Narmada River Basin emphasize the need for targeted interventions to address inequities. While larger cities like Jabalpur lead in water distribution infrastructure, smaller and medium-sized towns require strategic planning, resource allocation, and infrastructural upgrades to ensure equitable access to water for all residents. Bridging these gaps is crucial for fostering sustainable development and improving the quality of life across the basin.

Table 32 presents the connection coverage of water supply in the Lower Basin, providing insights into the number of water supply connections across various Urban Local Bodies (ULBs). According to the table, Bharuch has the highest number of water supply connections at 45,000, followed by Khambhat with 35,000 connections, and Godhra with 30,000 connections. Ankleshwar, Rajpipla, and Chhota Udepur have 22,000, 10,000, and 15,000 connections, respectively.

Table 30: Connection coverage of water supply in Upper Basin. Source: Hamari Jeewan Rekha Narmada by https://mpurban.gov.in/

Name of the ULB	District	Number of Water Supply connection in ULBs
Amarkantak	Anuppur	2100
Dindori	Dindori	3112
Mandla	Mandla	2100
Jabalpur	Jabalpur	171228
Bhedaghat	Jabalpur	1167
Narshingpur	Narshingpur	7500
Saikheda	Narshingpur	2478

Table 31: Connection coverage of water supply in Middle Basin. Source: Hamari Jeewan Rekha Narmada by https://mpurban.gov.in/

Name of the ULB	District	Number of Water Supply connection in ULBs
Narmadapuram	Narmadapuram	24000
Budhni	Sehore	1756
Bherunda (Nasrullaganj)	Sehore	6236

Nemawar	Dewas	1198
Omkareshwar	Khargone	1400
Barwah	Khargone	5082
Sanawad	Khargone	8000
Mandleshwar	Khargone	3340
Maheshwar	Khargone	5400
Dhamnod	Dhar	6417
Dharampuri	Dhar	3300
Anjad	Khargone	5000
Barwani	Barwani	11232
Sendhwa	Barwani	12000

Table 32: Connection coverage of water supply in Lower Basin.

Name of the ULB	District	Number of Water Supply Connections
Ankleshwar	Bharuch	22,000
Bharuch	Bharuch	45,000
Rajpipla	Narmada	10,000
Khambhat	Anand	35,000
Godhra	Panchmahal	30,000
Chhota Udepur	Chhota Udepur	15,000

Ghar Ghar Nal Jal Scheme Status

The Ghar Ghar Nal Jal initiative in the Narmada River Basin reveals a mixed picture of progress across the Upper, Middle, and Lower regions.

In the Upper Basin, districts like Sehore and Dindori demonstrate significant achievements, with Sehore providing tap water to 84% of its 215,227 households and Dindori achieving 100% coverage. Hoshangabad also performs well with 74% coverage, but disparities exist in districts like Jabalpur and Mandla, where only 45% and 56% of households have access to tap water, respectively (Table 33).

In the Middle Basin, Harda leads with 83% of its households connected, followed by West Nimar (Khargone) with 75%, Barwani leading at 66% coverage, followed by Jhabua with 78%, However, districts like Sagar lag far behind, with just 29% of its 60,801 households covered. Other districts like Betul and Katni show moderate progress, with 76% and 68% coverage, respectively (Table 34).

The Lower Basin part of Madhya Pradesh faces notable challenges, with Alirajpur struggles with only 35% of households connected. Additionally, data gaps for Burhanpur and Umaria highlight the need for better monitoring. While the Upper Basin generally outperforms other regions in Madhya Pradesh, targeted interventions are required in the Middle and Lower Basins to bridge gaps and ensure equitable access to tap water for all households in the basin.

Table 35 presents the progress of the Ghar Ghar Nal Jal scheme in the Lower Basin of Gujarat, highlighting the number of households and tap connections established in various districts. Notably, all districts listed, including Bharuch, Narmada, Panchmahal, Chhota Udepur, and Vadodara, have achieved 100% saturation, with the number of households matching the number of tap connections.

Table 33: Tap connections under Ghar Ghar Nal Jal scheme in Upper Basin. Source: *https://mpjalnigam.mp.gov.in/report* and *https://ejalshakti.gov.in*.

Districts	Blocks	No. of households	No of tap connections
Anuppur	Pushprajgarh	24333	16379
Balaghat	Baihar	25498	17453
Betul	Amla, Multai	59028	51625
Chhindwara	Amarwara, Junnardev (Jamai), Tamiya	40719	20393
Damoh	Jabera, Tendukheda	62024	32251
Dindori	Dindori, Shahpura	63079	33359
Hoshangabad	Babai	22476	17662
Jabalpur	Jabalpur, Kundam, Majholi, Patan, Shahpura, Shihora,	211339	95755
Katni	Bahuriband, Dhimarkhera, Rathi	107630	73568
Mandla	Bichhiya, Mandla, Nainpur, Niwas	102095	57702
Narshimapur	Gadarwara, Gotegaon, Kareli, Narshimapur, Tendukheda	71309	58315
Raisen	Bareli, Begamganj, Gairatganj, Silvani, Udaipura	62174	39771
Sagar	Deori, Kesli	62174	39771
Seoni	Ghansaur, Lakhnadon	57571	17370

Table 34: Tap connections under Ghar Ghar Nal Jal scheme in Middle Basin. Source: https://mpjalnigam.mp.gov.in/report and https://ejalshakti.gov.in .

Districts	Blocks	No. of	No of tap

		households	connections
Alirajpur	Alirajpur, jobat	45761	13136
Barwani	Barwani, Niwali, Pansemal, Rajpur, Sendhwa, Thikri	177220	116390
Betul	Betul, Bhainsdehi, Shahpur	62163	40989
Bhopal	Huzar		
Burhanpur	Nepanagar		
Dewas	Bagli, Dewas, Kannod, Khategaon,	107081	57710
Dhar	Dhar, Dharampuri, Gandhwani, Kukshi, Manawar, Sardarpur	67675	33246
Harda	Harda, Khirkiya, Timurni	97082	80889
Hoshangabad	Bankheri, Hoshangabad, Itarsi, Piparia, Seonimalwa, Sohagpur	110976	81254
Indore	Mhow	56615	56515
Jhabua	Jhabua, Ranapur	50433	39204
Khandwa	Harsud, Khandwa, Pandhana	49929	37905
Khargone	Barwah, Bhagwanpura, Bhikangaon, Jhirniya, Kasrawad, Khargone, Maheshwar, Seagon	109947	82419
Raisen	Goharganj, Raisen		
Sehore	Ashta, Budhni, Ichhawar, Nasrullaganj, Sehore	215227	180873

Table 35: Tap connections under Ghar Ghar Nal Jal scheme in Lower Basin. Source: https://mpjalnigam.mp.gov.in/report and https://ejalshakti.gov.in.

Districts	Blocks	No. of households	No of tap connections
Alirajpur	Bhavara	17958	9360
Bharuch	Ankleshwar, Bharuch, Jhagadia, Netrang	2,19,437	2,19,437
Narmada	Garudeshwar, Tilakwada, Nandod, Dediyapada, Sagbara	1,50,861	1,50,861
Panchmahal	Godhra, Halol, Kalol	1,07,374	1,07,374
Chhota Udepur	Chhota Udepur, Jetpur Pavi	81,960	81,960
Vadodara	Waghodia, Karjan, Padra	1,18,920	1,18,920

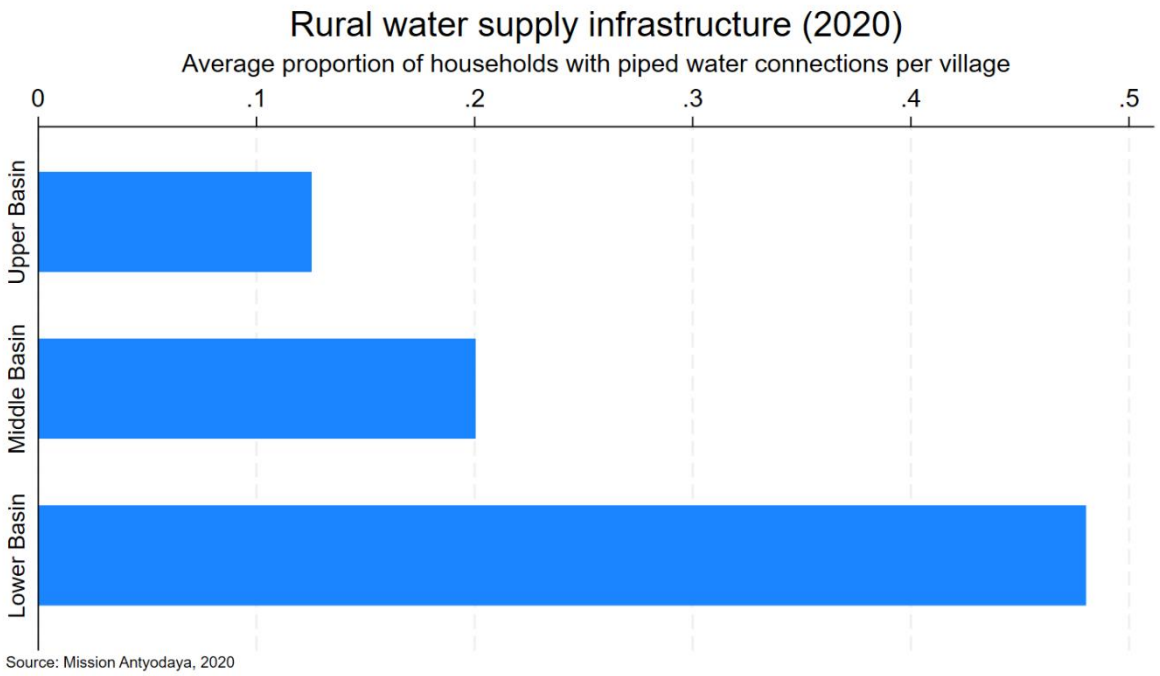

Figure 9: Rural water supply infrastructure as reported by villages in basin areas

According to alternative survey data available only for the basin's rural areas, we find that rural supply connections are not uniform across the sub-basins. According to Figure 9, the lower basin is better served than the middle and upper basins. The figure shows the average proportion of piped connections per village.

Sewerage and Drainage Network Plan

Domestic and Industrial Sewage generation: The Narmada River basin shows significant disparities in domestic and industrial wastewater generation. The Upper Basin has the highest domestic sewage generation, with major contributions from Jabalpur and Damoh. Narshingpur dominates industrial wastewater, accounting for over 84% of the total. The Middle Basin has moderate domestic sewage generation, with Khandwa and Khargone as key hotspots. Alirajpur, the only lower basin, has negligible sewage generation. The Upper Basin faces severe wastewater challenges due to Narsinghpur's high industrial wastewater and increasing domestic sewage in urban centres. The Middle Basin shows a balanced pattern with localized industrial wastewater hotspots. This analysis calls for region-specific interventions to sustain the current condition. Details of all districts are provided in

Table 36, Table 37, and Table 38.

Table 36: Domestic and Industrial Sewage Generation in upper basin. Source: https://www.mppcb.mp.gov.in/District-Environment-Plans.aspx.

Districts	Domestic Sewage in MLD	Industrial Sewage in MLD
Anuppur	20	3.9
Balaghat	20	16
Betul	100	51.99
Chhindwara	100	46.33
Damoh	136	0
Dindori	3.49	0
Hoshangabad	28	25
Jabalpur	230	8
Katni	23	0.14
Mandla	10.25	0.9
Narshimapur	30	1006
Raisen	39	13.8
Sagar	40	15.3
Seoni	17.5	9.5

Table 37: Domestic and Industrial Sewage generation in Middle Basin. Source: https://www.mppcb.mp.gov.in/District-Environment-Plans.aspx.

Districts	Domestic Sewage in MLD	Industrial Sewage in MLD
Alirajpur	1.8	0
Barwani	12.312	1.004
Betul	100	51.99
Burhanpur	27.76	1.07
Dewas	22	4.5
Dhar	47.4	18.6

Harda	11.8	0.11
Hoshangabad	28	25
Jhabua	7.64	0.72
Khandwa	3.64	39.961
Khargone	26	22
Raisen	39	13.8
Sehore	38	22

Table 38: Domestic and Industrial Sewage Generation in Lower Basin

Districts/City	Domestic Sewage in MLD	Industrial Sewage in MLD
Alirajpur	1.8	0
Bharuch	~60	~500
Ankleshwar (Bharuch)	~30	~450
Narmada (District)	~20	~15

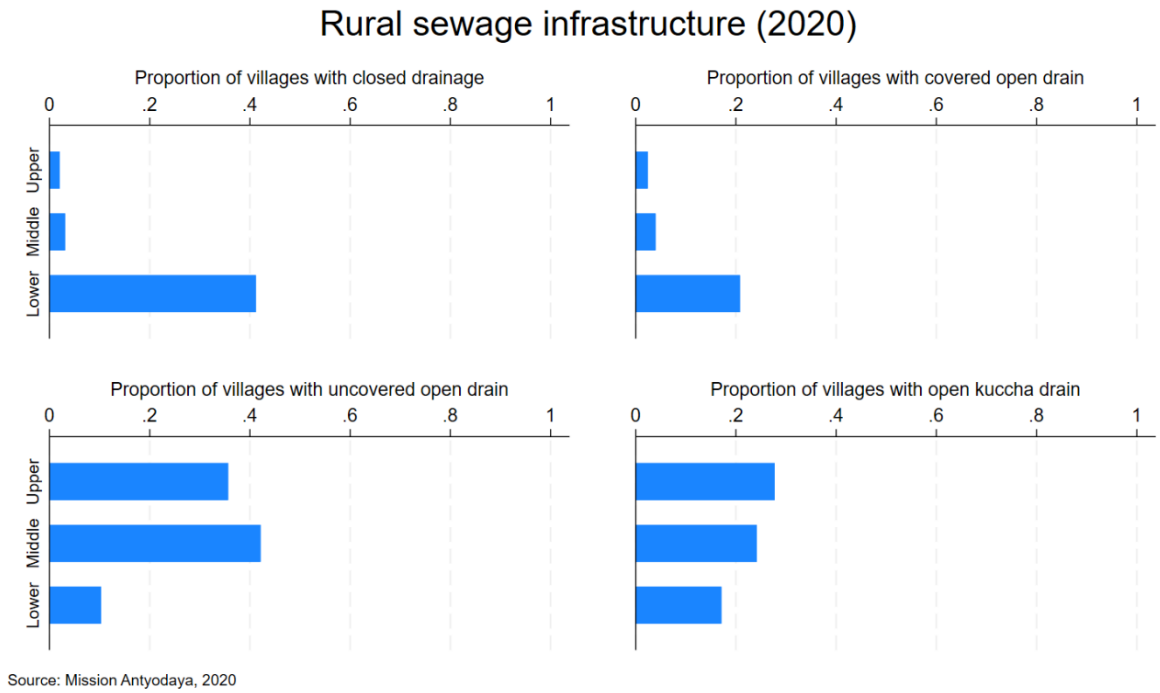

Figure 10: Rural sewage infrastructure as reported in villages in basin areas

According to Figure 10, rural sewage infrastructure is reportedly better in the lower Narmada basin regions. The survey finds that the proportion of closed and covered drains is higher in the

lower basin. Uncovered and kuccha drains are reportedly more in the middle and upper basin. This indicates that rural sewage infrastructure is better developed in the lower basin.

Status of Sewage Treatment Projects

In contrast to water treatment infrastructure, the development of sewage treatment facilities lags significantly behind. Many ULBs report their sewage treatment projects as still being "Under Construction," pointing to delays and inefficiencies in addressing wastewater management needs. For instance, while Jabalpur boasts a substantial sewage treatment capacity of over 160 MLD, much of its infrastructure, such as sewerage networks, remains incomplete. This imbalance raises concerns about the effective wastewater management and its potential impact on the Narmada River's water quality.

The situation is more pronounced in smaller towns, with minimal sewage treatment plant capacities and underdeveloped sewerage networks. For example, Dindori and Amarkantak have less than 5 MLD capacities, which are inadequate to manage even their modest populations. The lack of comprehensive sewerage networks in these towns further compounds the issue, as untreated or partially treated sewage may find its way into the river, posing significant environmental and health risks.

The delays in sewage treatment infrastructure development could result from a combination of factors, including insufficient funding, lack of technical expertise, and administrative inefficiencies. To address these challenges, it is imperative to prioritize the completion of sewage treatment projects and allocate adequate resources to ensure timely implementation. This will not only help mitigate the adverse impacts of untreated wastewater but also contribute to the overall health and sustainability of the river ecosystem.

Table 39: Status of Sewage treatment projects in Upper Basin. Source: Hamari Jeewan Rekha Narmada by https://mpurban.gov.in/

Name of the ULB	District	Sewerage Projects			
		Sewage treatment plant capacity (MLD)	Sewerage network length (KM)	Number of connections provided	Status of project
Amarkantak	Anuppur	1.2	32	1518	Completed
Dindori	Dindori	3.84	17.35	4500	Under Construction
Mandla	Mandla	9.5	125	13200	Under Construction
Jabalpur	Jabalpur	160.38	472.93	103942	Under

					Construction
Bhedaghat	Jabalpur	0.89	8.77	1084	Completed
Narshingpur	Narshingpur	9	123	15000	Under Construction
Saikheda	Narshingpur	2.6	29	2478	Under Construction

Table 40: Status of Sewage treatment projects in Middle Basin. Source: Hamari Jeewan Rekha Narmada by https://mpurban.gov.in/

Name of the ULB	District	Sewerage Projects			
		Sewage treatment plant capacity (MLD)	Sewerage network lenghth (KM)	Number of connections provided	Status of project
Narmadapuram	Narmadapuram	21	144.086	30350	Under Construction
Budhni	Sehore	3.28	32	2804	Completed
Bherunda (Nasrullaganj)	Sehore	4.2	47	4274	Under Construction
Nemawar	Dewas	1	13.68	1800	Under Construction
Omkareshwar	Khargone	2.65	12.78	2400	Under Construction
Barwah	Khargone	3.75	29	5082	Under Construction
Sanawad	Khargone	7.02	68.77	8257	Under Construction
Mandleshwar	Khargone	3	18.92	2460	Under Construction
Maheshwar	Khargone	4.91	32.92	4577	Under Construction
Dhamnod	Dhar	6.68	80.67	6500	Under Construction
Dharampuri	Dhar	2	19.27	2300	Completed
Anjad	Khargone	3.66	32.6	5488	Under Construction
Barwani	Barwani	9	128.87	10380	Under Construction
Sendhwa	Barwani	9	91.25	12000	Under Construction

Table 41: Status of Sewage treatment projects in Lower Basin.

Name of the ULB	District	Sewage Treatment Plant Capacity (MLD)	Sewage Network Length (KM)	Number of Connections Provided	Status of Project
Bharuch	Bharuch	60	~300	30,000	Completed
Ankleshwar	Bharuch	30	~150	25,000	Completed
Narmada	Narmada	20	~150	Not available	Under Construction

Operational STPs in the Narmada Basin

The Narmada River Basin has 26 operational Sewage Treatment Plants (STPs), of which 6 were constructed under the AMRUT scheme. Significant disparities exist across the upper and middle basin regions regarding capacity, utilization, and reuse.

The upper basin includes Anuppur, Mandla, and Jabalpur. Anuppur and Mandla operate STPs with minimal capacities of 1.2 MLD and 0.5 MLD, respectively, achieving low utilization and limited or no reuse. Jabalpur, the largest center, has 146.94 MLD capacity, but only 34.5 MLD is utilized, with 6.78 MLD reused. Despite 11 operational STPs, including 3 under AMRUT, Jabalpur's infrastructure remains underutilized.

The middle basin features towns like Dewas, Burhanpur, and Sehore. Dewas, with 48 MLD capacity, utilizes 14.17 MLD and reuses 2.83 MLD. Burhanpur has a single AMRUT STP with 25.5 MLD capacity, utilizing 14.38 MLD and reusing 2.98 MLD. Sehore has a balanced system with 15.28 MLD capacity, 8.99 MLD utilization, and 1.7 MLD reuse, supported by three STPs, one under AMRUT. Smaller towns like Khandwa and Dhar struggle with low capacities and utilization.

The data reveals that there are a total of six operational STPs across four locations in the lower Narmada basin: Ankleshwar, Bharuch, Rajpipla, and Chhota Udepur. Bharuch has the highest total capacity of 60 MLD, followed by Ankleshwar with 30 MLD. However, the average total capacity being utilized is significantly lower, ranging from 3 MLD in Rajpipla to 35 MLD in Bharuch. Additionally, the table highlights the reuse of treated wastewater, with Bharuch reusing 12 MLD and Ankleshwar reusing 5 MLD. Two STPs in Bharuch are operational under the AMRUT scheme.

Table 42: Status of operational STPs in Upper Basin. Source: Solid waste action plan

for state by NGT

Location	Existing STPs total Capacity (MLD)	Average total Capacity Being Utilized (MLD)	Total Reuse (MLD)	Operational STP under AMRUT Scheme	Total Operational STPs
Anuppur	1.2	0.6		0	1
Mandla	0.5	0.4	0.12	0	1
Jabalpur	146.94	34.5	6.78	3	11

Table 43: Status of operational STPs in Middle Basin. Source: Solid waste action plan for state by NGT

Location	Existing STPs total Capacity (MLD)	Average total Capacity Being Utilized (MLD)	Total Reuse (MLD)	Operational STP under AMRUT Scheme	Total Operational STPs
Amarkantak	48	14.17	2.83	0	3
Burhanpur	25.5	14.38	2.98	1	1
Dhar	2	1.63	0.33	0	1
Khargone	17.6	6.1	1.22	1	3
Khandwa	1	0.3		0	2
Sehore	15.28	8.99	1.7	1	3

Table 44: Status of Operational STPs in Lower Narmada Basin (Gujarat)

Location	Existing STPs Total Capacity (MLD)	Average Total Capacity Being Utilized (MLD)	Total Reuse (MLD)	Operational STPs under AMRUT Scheme	Total Operational STPs
Ankleshwar	30	18	5	0	1
Bharuch	60	35	12	2	2
Rajpipla	10	3	1	0	1
Chhota Udepur	10	4	1	0	1

Methods adopted by STPs in the basin

The STPs Narmada River Basin utilizes diverse sewage treatment technologies tailored to urban and rural needs. The Sequential Batch Reactor (SBR), adopted in 13 STPs, is efficient and compact, ideal for urban areas, and requires skilled operation. Oxidation Ponds, used in 2 STPs, provide a low-cost, natural solution for rural areas with ample land, while UASB technology, in 2 STPs, treats high organic loads and generates biogas. Phytorid systems, implemented in 7 STPs,

offer eco-friendly, low-energy treatment for decentralized systems, and. The Devorts system, applied in 1 STP, focuses on efficient industrial wastewater treatment using electrochemical methods. This mix of technologies reflects the basin's commitment to sustainable wastewater management, balancing urban efficiency with rural eco-friendly approaches while integrating energy recovery and industrial solutions.

Table 45: Methods adopted in STPs. Source: Solid waste action plan for state by NGT

Technology	No. of STPs based in this technology	Procedure	Key Features
SBR (Sequential Batch Reactor)	13	Operates in cycles: Fill, React (aeration), Settle, Decant, and Idle. Treats wastewater in batches with aeration and sedimentation.	Batch process; high efficiency; small footprint; requires skilled operation.
Oxidation Pond	2	Large shallow basins where sunlight, algae, and microorganisms work together to degrade organic matter.	Simple; low-cost; effective in sunny climates; requires large land area.
UASB (Up flow Anaerobic Sludge Blanket)	2	Anaerobic process where wastewater flows upwards through a sludge blanket, allowing anaerobic microbes to break down organic matter.	Energy-efficient; biogas generation; suitable for high organic loads.
Phytorid	7	Constructed wetland system using specific aquatic plants and soil media to naturally treat wastewater.	Eco-friendly; low energy; enhances biodiversity; suitable for decentralized systems.
Devorts	1	Uses electrolysis or electrochemical methods for pollutant removal, often in industrial wastewater.	Chemical-free; high removal efficiency for specific pollutants; cost-effective for industrial use.

Source: Solid waste action plan for state by NGT

Connection Coverage Disparities in Sewage Projects

The Narmada River Basin exhibits significant disparities in the provision of sewerage connections among its Urban Local Bodies (ULBs), reflecting varying levels of infrastructural development and investment in sanitation systems. These differences highlight the challenges of achieving equitable access to essential sanitation services across the region.

As a major urban center, Jabalpur leads the basin with 103,942 sewerage connections, showcasing a well-established sewerage infrastructure that caters to its large and growing

population. This figure far exceeds that of smaller ULBs such as Amarkantak, Bhedaghat, and Dharmapuri, which have only 1,518, 1,084, and 2,300 connections, respectively. These smaller towns face constraints in scaling their sanitation networks, often due to limited financial resources, geographical challenges, and smaller populations.

Mid-sized ULBs, such as Narmadapuram and Narshingpur, have made significant strides with 30,350 and 15,000 sewerage connections, respectively. These numbers reflect ongoing efforts to expand sewerage networks in regions experiencing urban growth and increased demand for sanitation services. Similarly, Mandla has achieved 13,200 connections, demonstrating commendable progress in providing sewerage infrastructure.

ULBs with cultural and religious significance, such as Omkareshwar (2,400 connections) and Maheshwar (4,577 connections), exhibit relatively modest sewerage networks. These towns may face unique challenges related to fluctuating populations due to seasonal tourism and pilgrimage, which can strain existing sanitation systems and complicate infrastructure planning.

Smaller towns, including Budhni (2,804 connections), Nemawar (1,800 connections), and Bherunda (4,274 connections), show moderate levels of connectivity. While these numbers reflect some progress, they underscore the need for additional investment and planning to meet future demands. In contrast, towns like Anjad (5,488 connections), Barwah (5,082 connections), and Sanawad (8,257 connections) demonstrate higher levels of sewerage infrastructure relative to their size, indicating more robust development efforts in these areas.
Barwani and Sendhwa stand out among similar-sized ULBs with 10,380 and 12,000 sewerage connections, respectively, showcasing their commitment to improving sanitation services for their populations. However, smaller ULBs such as Dindori (4,500 connections) and Dharampuri (2,300 connections) continue to lag behind, emphasizing the uneven development within the basin.

Table 46: Households connected to Sewerage system in Upper basin ULBs. Source: Hamari Jeewan Rekha Narmada by https://mpurban.gov.in/

Name of the ULB	District	Households connected to Sewerage system in ULBs
Amarkantak	Anuppur	1518
Dindori	Dindori	4500
Mandla	Mandla	13200
Jabalpur	Jabalpur	103942

Bhedaghat	Jabalpur	1084
Narshingpur	Narshingpur	15000
Saikheda	Narshingpur	2478

Table 47: Households connected to Sewerage system in Middle basin ULBs. Source: Hamari Jeewan Rekha Narmada by https://mpurban.gov.in/

Name of the ULB	District	Households connected to Sewerage system in ULBs
Narmadapuram	Narmadapuram	30350
Budhni	Sehore	2804
Bherunda (Nasrullaganj)	Sehore	4274
Nemawar	Dewas	1800
Omkareshwar	Khargone	2400
Barwah	Khargone	5082
Sanawad	Khargone	8257
Mandleshwar	Khargone	2460
Maheshwar	Khargone	4577
Dhamnod	Dhar	6500
Dharmapuri	Dhar	2300
Anjad	Khargone	5488
Barwani	Barwani	10380
Sendhwa	Barwani	12000

Table 48: Households Connected to Sewerage System in Lower basin ULBs. Source: Municipality data.

Name of the ULB	District	Households Connected to Sewerage System	Source
Ankleshwar	Bharuch	8,500	Bharuch Municipal Corporation
Bharuch	Bharuch	45,000	Bharuch Municipal Corporation
Rajpipla	Narmada	1,800	Narmada District Official Website
Khambhat	Anand	5,600	Khambhat Municipal Corporation
Godhra	Panchmahal	4,200	Godhra Municipal Corporation
Chhota Udepur	Chhota Udepur	2,200	Chhota Udepur District Official Website

Reliance on the Narmada River

The Narmada River is the primary water source for all 21 ULBs in the basin, underscoring its critical importance to the region. This reliance makes the river a lifeline for urban populations and a symbol of the region's ecological and cultural heritage. However, the heavy dependence on a single water source raises concerns about sustainability, particularly in the context of growing populations and the increasing impacts of climate change. Over-extraction of water from the river could lead to ecological imbalances, reduced water quality, and long-term scarcity, jeopardizing the livelihoods and well-being of the dependent populations.

Managing the Narmada River sustainably requires a multifaceted approach that includes reducing wastage, improving water efficiency, and implementing advanced treatment technologies to recycle and reuse wastewater. Additionally, efforts must be made to preserve the river's natural ecosystems and address the impacts of pollution and sedimentation, which can degrade its quality and capacity to support human and ecological needs.

Proposed Sewage Network Plan

The planned sewage network plans for the Urban Local Bodies (ULBs) of Basin (Barwani, Narmadapuram, Mandla, Narshingpur, and Sendhwa) are aimed at improving wastewater management systems and building strong sanitation infrastructure to satisfy the needs of their rising populations. Barwani, with a population of 64,100 and a town area of 27 square kilometres, proposes the construction of 220 kilometres of sewer pipelines to connect 3,400 dwelling chambers to a single sewage treatment plant (STP). This system is designed to manage the town's wastewater while maintaining future scalability adequately.

Narmadapuram with a population of 152,856 and a town area of 54 square kilometres, proposes to build a 196-kilometer sewage network and 13,974 housing chambers, all serviced by a centralized STP, to ensure comprehensive wastewater treatment for its approximately 28,000 houses. Similarly, Mandla, with a population of 80,000 and a smaller town area of 10.83 square kilometres, intends to build a 149-kilometer sewer network connecting 4,400 dwelling chambers to two sewage treatment plants. The dual STP system is designed to efficiently handle the town's wastewater needs while preventing environmental damage.

Narshingpur, with a population of 65,100 and a town size of 14.71 square kilometres, proposes a 168-kilometer sewer that will connect 4,667 house chambers to two sewage treatment plants,

providing a sustainable solution for wastewater management and assuring optimal resource usage. Meanwhile, Sendhwa, with a population of 62,100 and a town area of 18 square kilometres, will build a 118-kilometer sewer network containing 4,000 dwelling chambers, all served by a single sewage treatment plant. This system is designed to handle the town's sanitary needs while planning for future growth. These suggested plans aim to update the sewage infrastructure in these ULBs, resulting in better public health outcomes, lower environmental pollution, and more sustainable urban development. These projects, which include adequately scaled sewer lengths, house chambers, and treatment facilities, reflect a forward-thinking strategy for solving the fundamental difficulties of wastewater management in rapidly urbanizing regions.

Table 49: Proposed STP projects in the basin. Source: https://mpurban.gov.in/ and Gujarat Pollution Control Board (GPCB)

ULB Name	Population	Household	Sewer length (Km)	Sewerage treatment plant	STP capacity (MLD)
Barwani	64100	10380	220	1	9
Narmadapuram	152856	27948	196	1	21
Mandla	80000	13200	149	2	nil
Narsinghpur's	65100	14000	168	2	nil
Sendhwa	62100	12000	118	1	nil
Ankleshwar	124,000	23,000	120	1	15
Bharuch	215,000	45,000	180	1	35
Rajpipla	50,000	10,000	85	1	5
Khambhat	180,000	40,000	150	2	20
Godhra	180,000	40,000	140	1	10
Chhota Udepur	80,000	16,000	70	1	8

Solid Waste Generation

The functional elements of the Solid Waste Management (SWM) system in the Narmada River Basin include several key processes. It begins with waste generation, followed by waste handling and separation at the source, ensuring the proper waste categorization for further processing. The next step is collection, where waste is gathered efficiently for treatment. This is followed by separation, processing, and transformation, wherein the waste is treated or converted into usable forms. After processing, waste undergoes transfer and transport to designated facilities for final treatment or disposal. Lastly, disposal involves various methods such as discarding, destroying, processing, recycling, reusing, or controlling wastes to minimize environmental impact.

The types and sources of waste in the Narmada River Basin include

- Municipal Solid waste
- Plastic Waste
- Industrial Hazardous waste
- Biomedical Waste
- E-waste
- Construction and Demolition waste

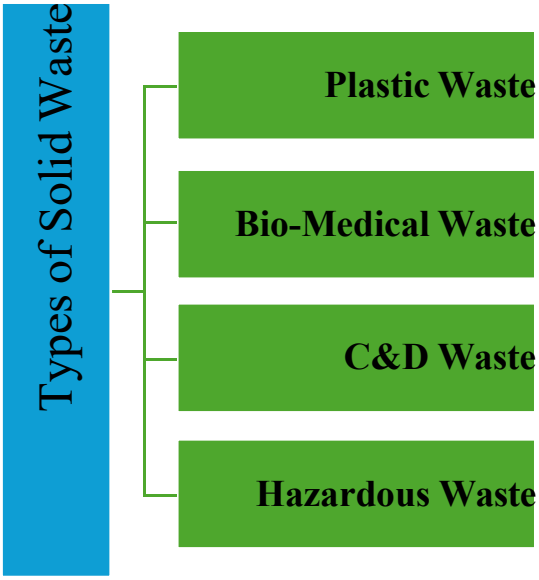

Figure 11: Types of solid waste

These waste categories require specific handling and management strategies to ensure the sustainability of the waste management system in the region.

In recent times, India's Municipal Solid Waste Management (MSWM) crisis has remained unsolved due to the country's rapidly expanding population, densely populated metropolitan regions, different cultures, shifting dietary preferences, and changing lifestyles. As a result, the towns have been dealing with a wide range of additional problems with the disposal, handling, and collection of solid waste. This section provides a thorough overview of the current state of SWM, identifies related difficulties, and suggests possible solutions for MSWM in the Narmada Basin environment.

As per the annual report of CPCB for the year 2020-21, a total quantity of 160038.9 Tons per day (TPD) of Solid waste was generated in India, out of which 152749.5 TPD of waste is collected at a collection efficiency of 95.4 percent. Further, per the report, 79956.3 TPD (50%)

of waste is treated, and 29427.2 (18.4 percent) TPD is landfilled. A total of 50655.4 TPD, 31.7 percent of the total waste generated, remains unaccounted for. The total Solid Waste Generation of Madhya Pradesh is 6853.5 TPD, of which districts under Narmada Basin contribute 1470.5 Tons per day daily.

The data in the table represents the amount of solid waste generated in tons per day across the different districts of Narmada Basin. The values vary significantly, indicating diverse waste management challenges.

In the Upper Narmada Basin, solid waste generation is dominated by urban centers, with Jabalpur contributing significantly at 800 TPD, making it the highest in the basin. Other notable contributors include Kesli tehsil in Sagar at 32 TPD and Tamiya in Chhindwara at 14.27 TPD. Smaller towns like Annupur, Balaghat, and Mandla produce much less waste, often below 5 TPD, indicating lower population, lesser urbanization, and lower consumption patterns.

In the Middle Basin, waste generation is higher due to increased urban and industrial activities. Dewas leads with 114 TPD, followed by Dhar (40 TPD) and Khargone (39.4) TPD. Additional districts like Harda, Hoshangabad, and Betul contribute moderate amounts between 21-30 TPD. The middle Basin also has smaller contributors, such as Jhabua, Alirajpur, and Burhanpur, generating between 5-9 TPD.

Solid waste generation in the lower Narmada Basin is minimal and limited to the Alirajpur district. Bhavara tehsil records the highest waste generation at 4.9 TPD, reflecting this basin's rural nature and smaller population base.

Table 50: Municipal solid waste generated in the Upper Narmada Basin. Source: https://www.mppcb.mp.gov.in/District-Environment-Plans.aspx

District	Tehsils	Waste generation (TPD)
Anuppur	Pushprajgarh	0.90
Balaghat	Baihar	5
Betul	Amla	5
	Multai	3.5
Chhindwara	Amarewara	3.5
	Junnardev (Jamai)	1.1
	Tamiya	14.2
Damoh	Jabera	NA
	Tendukheda	4.05
Dindori	Dindori	3.9
	Shahpura	3.2
Hoshangabad	Babai	4
Jabalpur	Jabalpur	800

Katni	Bahuriband Dhimarkhera Rathi	105 (district data)
Mandla	Bichhiya	0.00
	Mandla	0.02
	Nainpur	0.29
	Niwas	0.00
Narshimapur	Gadarwara Gotegaon Kareli Narshimapur Saikheda	48 (district data)
Raisen	Bareli	9
	Begamganj	9
	Gairatganj	5
	Silvani	5
	Udaipura	5
Sagar	Deori	9
	Kesli	32
Seoni	Ghansaur Lakhnadon	94 (district data)

Table 51: Municipal solid waste generated in the Middle Narmada Basin. Source: https://www.mppcb.mp.gov.in/District-Environment-Plans.aspx

District	Tehsils	Waste Generation (TPD)
Alirajpur	Alirajpur	9
	Jobat	2.5
Barwani	Barwani	27.5
	Niwali	4
	Pansemal	3.3
	Rajpur	7.5
	Sendhwa	21
	Thikri	4.3
Betul	Betul	30
	Bhainsdehi	1.2
Burhanpur	Nepanagar	8.05
Dewas	Bagli	4
	Dewas	114
	Kannod	4.1
	Khategaon	3.6
Dhar	Dhar	40
	Dharampuri	8.2
	Kukshi	9.34
	Manawar	10.5

	Sardarpur	1.9
Harda	Harda	21
	Khirkiya	2.1
	Timurni	1.5
Hoshangabad	Bankheri	5
	Hoshangabad	42
	Itarsi	21
	Piparia	3
	Seonimalwa	5.5
	Sohagpur	3.5
Jhabua	Jhabua	5.5
	Ranapur	4.5
Khandwa	Harsud	4.26
	Khandwa	49.2
	Pandhana	3.755
Khargone	Barwah	7.9
	Bhagwanpura	4.2
	Bhikangaon	4.2
	Jhirniya	3.7
	Kasrawad	8.8
	Khargone	39.9
	Maheshwar	5.1
	Seagon	1.1
Raisen	Goharganj	2.6
	Raisen	11
Sehore	Ashta	12.5
	Budhni	4.5
	Ichhawar	3.5
	Nasrullaganj	4
	Sehore	46.3

Table 52: Municipal solid waste generated in the Lower Narmada Basin. Source: https://www.mppcb.mp.gov.in/District-Environment-Plans.aspx

District	Tehsils	Waste Generation (TPD)
Alirajpur	Bhavara	4.9

Plastic Waste

Plastic pollution is a worldwide issue. Lakes, rivers, and oceans are contaminated annually by the 19–23 million tons of plastic garbage that seep into aquatic environments. The analysis of

plastic waste generation across various districts reveals significant disparities in environmental challenges to plastic management.

Plastic waste generation in the Upper Narmada Basin shows significant variation. Jabalpur leads with 21.5 MT/day and Raisen (1.4 MT/day). Districts like Anuppur, Damoh, and Dindori generate less than 1 MT/day, indicating lower plastic use in less urbanized areas.

In the Middle Narmada Basin, Dewas records the highest plastic waste generation at 15.4 MT/day, followed by Khargone (5 MT/day) and Khandwa (5.16 MT/day). Dhar, Barwani, and Sehore also contribute 1–6 MT/day, reflecting a higher dependence on plastic in urban and semi-urban areas.

Alirajpur generates only 0.34 MT/day of plastic waste for the Lower Narmada Basin, showcasing minimal plastic usage compared to the other basins.

The increase in plastic waste generation indicates increasing urbanization and plastic consumption. The dramatic increase in plastic waste generation in some of the districts of the Narmada basin raises serious concerns about improving management services, promoting education, and recycling initiatives to reduce the harmful impact on the environment and public health.

Biomedical waste (BMW)

According to the data from MPPCB, the bar chart visually represents the biomedical waste generated by different districts. In the Upper Narmada Basin, bio-medical waste generation is concentrated in Jabalpur, which produces 1215 Kg/day, followed by Sagar (400 Kg/day) and Hoshangabad (372 Kg/day). Districts like Katni (332.1Kg/day) and Betul (192.1Kg/day) also contribute significantly. Smaller towns such as Dindori and Mandla generate much less, below 50 Kg/day, due to limited healthcare infrastructure.

The Middle Narmada Basin exhibits extreme values in bio-medical waste. Burhanpur records the highest at 92,266 Kg/day, followed by Khargone (195,984 Kg/day), reflecting a significant healthcare presence. Other districts, such as Dewas (273.7 Kg/day) and Dhar (311 Kg/day), also show moderate bio-medical waste production. In contrast, Harda and Alirajpur generate minimal amounts, highlighting disparities in healthcare facilities across regions.

In the Lower Narmada Basin, Alirajpur district generates 84.2 Kg/day of bio-medical waste, maintaining a consistently low trend like other waste types in this basin. This stark contrast in bio-medical waste production reflects varying levels of healthcare infrastructure,

population density, and medical activities across the regions, with West Nimar and East Nimar dominating major healthcare centers.

Hazardous Waste

As per the data available from MPPCB, it's visible that in Narmada Basin, ten cities generate very low industry hazardous waste, 6 generate moderate amounts of hazardous waste, and the rest of the towns produce high hazardous waste. There is significant variation in the hazardous waste generation among the districts, as Dindori, part of the upper Narmada Basin, has Zero waste generation. In contrast, Dhar, part of the Middle Narmada Basin, is exceptionally highvalues of 160,203.54 MT/Year indicate substantial differences in industrial activity and waste production.

The Upper Narmada Basin sees high hazardous waste generation in Raisen (4637.051 MT/year) and Sagar (6168.51 MT/year), indicating the presence of industrial activities in these areas. Jabalpur also contributes significantly at 3154.86 MT/year, while smaller contributions come from Betul, Chhindwara, and Damoh. Several districts like Dindori report negligible amounts.

In the Middle Narmada Basin, hazardous waste generation peaks in Dhar at 160,203.53 MT/year, followed by Khargone (3744.426 MT/year) and Burhanpur (1752.711 MT/year). These numbers reflect extensive industrial and agricultural activities. Moderate contributions come from Dewas and Jhabua, whereas Harda produces a negligible 0.0391 MT/year.

The Lower Narmada Basin records 121 MT/year of hazardous waste in Alirajpur, indicating minimal industrial activities in this region.

This data reveals substantial differences in hazardous waste generation across districts, with some high regions like Dewas Dhar and Jabalpur.

E-Waste

This is one of the fastest-growing waste streams due to the intense application of digital resources and the short life of many electronic gadgets.

The above data on E-waste generation across various districts highlights a significant disparity in the volume produced among the 27 districts of E-waste, followed by Barwani, East Nimar, West Nimar, and Burhanpur, which collectively produce over 5000 MT/ year. These 5 districts alone account for more than 85% of the total E-waste in the region, suggesting a concentration of E-waste generation in a few key areas.

In the Upper Narmada Basin, e-waste generation is led by Raisen at 20.3539 MT/year,

followed by Katni (9.018 MT/year) and Jabalpur (2.15 MT/year). Districts like Anuppur, Damoh, and Dindori generate minimal or negligible quantities, reflecting lower levels of electronic usage.

The Middle Narmada Basin exhibits high e-waste generation in Khargone (8857.42 MT/year) and Burhanpur (8709.64 MT/year), indicating significant urbanization and electronic consumption. Dewas, Khandwa and Dhar contribute moderately, while districts like Harda and Jhabua generate negligible quantities.

In the Lower Narmada Basin, e-waste generation is negligible, with Alirajpur recording no substantial contributions.

Construction and Demolition Waste

Construction and Demolition Waste Construction and demolition (C&D) waste is generated from the construction, renovation, repair, and demolition of houses, large structures, roads, bridges, piers, and dams. C&D waste comprises wood, steel, concrete, gypsum, masonry, plaster, metal, and asphalt. C&D waste is notable because it can contain hazardous materials such as asbestos and lead. Estimates vary, but a commonly accepted estimate is that between 15 and 20 percent of municipal solid waste comes from construction and demolition projects.

In the Upper Narmada Basin, construction and demolition (C&D) waste generation remains low, with notable figures from Jabalpur (50 MT/day) and Chhindwara (354 MT/day). Districts like Damoh, Katni, and Raisen contribute minimal amounts, reflecting lower construction activity.

The Middle Narmada Basin generates C&D waste, with Betul (195 MT/day) and Dewas (9.7 MT/ day) as major contributors. Smaller districts like Harda and Khandwa generate 1–2 MT/year, while Dhar reports no significant C&D waste.

Alirajpur generates only 0.4 MT/year in the Lower Narmada Basin, maintaining a low trend consistent with other waste categories.

This analysis reflects that the Middle Narmada Basin has the highest waste generation across all types, followed by the Upper Basin. At the same time, the Lower Basin remains the least contributor to waste generation due to its rural and less industrialized profile. Details of all types of waste generation are provided in the table below.

Table 53: Different types of waste generation status in Upper Narmada Basin. Source: https://www.mppcb.mp.gov.in/District-Environment-Plans.aspx

Districts	Plastic Waste MT/Day	C&D waste MT/Day	Bio-Medical Waste Kg/Day	Hazardous Waste MT/Year	E-Waste MT/Year
Anuppur	0.22	12.6	73	588	1.1
Balaghat	9.16	5	180	9.5	5
Betul	0.93 •	120•	192.2	34.5	4.1
Chhindwara	0.8 •	354•	239.2	2610.4	2.09
Damoh	0.16 •	0.3 •	97	24.8	nil
Dindori	0.1	265.1	38	nil	nil
Hoshangabad	1.7 •	0.16•	372	102.3	nil
Jabalpur	21.5	50	1215	3154.8	2.15
Katni	2	2.7	332.1	346.1	9.01
Mandla	0.33	4.4	115	18.7	nil
Narshimapur	6.5	2	282	19.2	1.5
Raisen	1.4 •	1.7	95.1	4637.05	20.3
Sagar	0.25•	0.6	400	6168.5	1.8
Seoni	2	15.4	128	18.1	2.5

**Basin data*

Table 54: Different types of waste generation status in Middle Narmada Basin. Source: https://www.mppcb.mp.gov.in/District-Environment-Plans.aspx

Districts	Plastic Waste MT/Day	C&D waste MT/Day	Bio-Medical Waste Kg/Day	Hazardous Waste MT/Year	E-Waste MT/Year
Alirajpur	0.34 •	0.4 •	84	121	nil
Barwani	1.01 •	1.2•	300	82.851	8709
Betul	0.7 •	195 •	192.19	34.568	4
Burhanpur	0.36 •	1.1	92266	1752	5925
Dewas	15.4	9.7	273.74	23256	8.4
Dhar	2.2 •	N/A	311	160203	27.21
Harda	1.72 •	1.3 •	85	0.0391	nil
Hoshangabad	20.7 •	6.5 •	372	102.379	nil
Jhabua	0.76 •	0.8 •	207.3	5866.22	nil
Khandwa	5.16	1.8	124383	82.8	8709
Khargone	5	3	195984	3744.4	8857
Raisen	0.89•	1.7	95.1	4637.0	20.3
Sehore	6.1 •	5	185.3	10.1	2.4

**Basin data*

Table 55: Different types of waste generation status in Lower Narmada Basin. Source: https://www.mppcb.mp.gov.in/District-Environment-Plans.aspx

Districts	Plastic Waste MT/Day	C&D waste MT/day	Bio-Medical Waste Kg/day	Hazardous Waste MT/Year	E-Waste MT/year
Alirajpur	0.34	0.4	84.23	121	0

Segregation of Solid Waste in Narmada Basin Districts

The SWM Rules, 2016 defines segregation as sorting and separate storage of various components of solid waste, namely biodegradable wastes, including agriculture and dairy waste; non-biodegradable wastes, including recyclable waste, non-recyclable combustible waste, sanitary waste, and non-recyclable inert waste, domestic hazardous wastes, and construction and demolition wastes.

This section provides an in-depth analysis of waste segregation at the source in various districts and blocks of the Narmada Basin within Madhya Pradesh. Waste segregation, the practice of separating dry and wet waste at the source, is crucial in efficient waste management, reducing environmental pollution, and improving waste disposal practices. Madhya Pradesh, a large state with urban and rural areas, shows significant variability in segregation levels across its districts. This report discusses the level of segregation achieved, identifies patterns and challenges, and suggests places that require improvement.

High Segregation Districts: Upper Narmada Basin districts like Jabalpur, Narshingpur Balaghat, Mandla, Damoh, Sagar, and Raisen consistently report 100% segregation. Middle Basin districts like Harda, Dewas, and Khargone consistently report 100% segregation. This indicates substantial compliance with waste segregation practices, potentially due to robust waste management policies, active local authorities, and public awareness.

Partial Segregation Districts: Upper Narmada Basin Districts such as Betul, Chhindwara, Dindori Katni, Jhabua, and Middle Narmada Basin districts, including Dhar and Khandwa, indicate partial segregation across their blocks. A complete segregation rate in these districts has not yet been achieved, possibly due to less awareness or challenges in infrastructure and waste management practices.

Moderate Segregation Districts: Districts like Alirajpur, which is the only district of Lower Narmada Basin, and Barwani, Hoshangabad, and Sehore, which are the districts of Middle Narmada Basin, demonstrate moderate segregation levels, with some blocks achieving as high as 80-100% while others lag at 50% or less like Khandwa, Burhanpur. This variability suggests that some blocks within these districts might be urban or better equipped, while others may lack the necessary infrastructure.

Details of all Upper, Middle, and Lower Basin districts are provided in Table 56, Table 57, and Table 58.

Table 56: Segregation Data of Upper Narmada Basin. Source: MPPCB

Districts	Block (ULB)	Segregation (Dry and wet) At Source
Balaghat	Baihar	100%
Betul	Amla	Partially (district data)
	Multai	
Chhindwara	Amarwara	Partially (district data)
	Junnardev	
	Tamiya	
Damoh	Jabera	N/A
	Tendukheda	100%
Dindori	Dindori	Partial (district data)
	Shahpura	
Hoshangabad	Babai	80%
Jabalpur	Jabalpur	100%
	Kundam	100%
	Majholi	100%
	Patan	100%
	Shahpura	100%
	Shihora	100%
Katni	Bahuriband	Partially (district data)
	Dhimarkhera Rathi	
Mandla	Bichhiya	100%
	Mandla	100%
	Nainpur	100%
	Niwas	100%

Narshingpur	Gadarwara	100%
	Gotegaon	100%
	Kareli	100%
	Narshingpur	100%
	Tendukheda	100%
Raisen	Bareli	100%
	Begamganj	100%
	Gairatganj	100%
	Silvani	100%
	Udaipura	100%
Sagar	Deori Kesli	100% (district data)

Table 57: Segregation Data of Middle Narmada Basin. Source: MPPCB

Districts	Block (ULB)	Segregation (Dry and wet) At Source
Alirajpur	Alirajpur	89%
	Jobat	70%
Barwani	Barwani	90%
	Niwali	50%
	Pansemal	50%
	Rajpur	50%
	Sendhwa	90%
	Thikiri	50%
Burhanpur	Nepanagar	50%
Dewas	Bagli	50%
	Dewas	100%
	Kannod	50%
	Khategaon	50%
Dhar	Dhar Dharampuri Gandhwani Kukshi Manawar Sardarpur	Partial Segregation (District data)
Khandwa	Harsud	50%
	Khandwa	Partial segregation
	Pandhana	50%
Harda	Harda	100%
	Khirkiya	100%
	Timurni	100%
Hoshangabad	Bankheri	80%
	Hoshangabad	88%
	Itarsi	85%

	Piparia	85%
	Seonimalwa	85%
	Sohagpur	70%
Indore	Mhow	75%
Jhabua	Jhabua	Partially (district data)
	Ranapur	
Raisen	Goharganj	N/A
	Raisen	90%
Sagar	Deori	100% (district data)
	Kesli	
Sehore	Ashta	80%
	Budhni	100%
	Ichhawar	YES
	Nasrullaganj	80%
	Sehore	70%
West Nimar	Barwah	50%
	Bhagwanpura	NA
	Bhikangaon	50%
	Jhirniya	NA
	Kasrawad	50%
	Khargone	100%
	Maheshwar	50%
	Seagon	NA

Table: Segregation data of the **Lower Narmada Basin**

Table 58: Segregation Data of Lower Narmada Basin. Source: MPPCB

Districts	**Block (ULB)**	**Segregation** (Dry and wet) At Source
Alirajpur	Bhavara	100%

Challenges Identified

*Infrastructure Deficits***:** Many rural blocks and smaller towns like Thikri, Pansemal, Pandhana, Khategaon, Ghansor, etc., lack the necessary infrastructure for efficient waste segregation. Urban Local Bodies (ULBs) in these areas may not have sufficient waste collection systems, leading to low segregation rates.

Public Awareness and Engagement: Districts with partial or low segregation rates often

correlate with areas where public awareness of segregation benefits is minimal. This gap in public knowledge hinders efforts toward consistent waste management.

Policy Enforcement: Inconsistent segregation percentages across blocks of Narmada Basin suggest that enforcement of waste segregation policies varies by region. Some districts might benefit from stronger local government intervention and more rigorous monitoring.

Resource Allocation: Urban areas generally report higher segregation rates than rural areas, which may be due to better funding and resources available for waste management in urban regions.

Status of Waste collection

Comparative Analysis of Waste Collection Resources and Gaps Across Districts of Narmada Basin

Districts with Sufficient Resources and No Gaps

- In the Upper Narmada Basin Jabalpur, Katni, Mandla, Sagar, and several blocks in Narshingpur and Raisen, as well as in the Middle Narmada Basin, covering Mhow (Indore) and Sehore, sufficient waste collection trolleys and mini collection trucks are reported, with no identified gaps. These areas are comparatively well-equipped to meet waste collection requirements.
- Sufficient Waste Collection Infrastructure: In these districts, the resources available meet current needs, suggesting that waste management strategies and equipment distribution are effective.

Districts with insufficient Mini Collection Trucks

In the Lower Narmada Basin, Alirajpur and Bhavara blocks report needing additional mini collection trucks (3 in Alirajpur, 2 in Bhavara and Jobat).

In the middle Narmada Basin, Alirajpur (Jobat), and in Barwani (Barwani, Niwali, Pansemal, Rajpur, Sendhwa, and Thikiri) are significant gaps in mini collection trucks, with 6-9 trucks needed across various blocks. Hoshangabad (Babai, Bankheri, Piparia, Seoni Malwa) also faces a shortfall, requiring 1-5 more mini trucks in each block. Khandwa (Harsud, Khandwa, Pandhana) and West Nimar (Barwah and Bhikangaon) report similar shortages.

Districts facing mini truck shortages may struggle with efficient collection and timely transportation of waste, potentially impacting waste management effectiveness and urban

cleanliness.

Districts Needing Additional Waste Collection Trolleys

Upper Narmada Basin Raisen (Bareli, Begam Ganj, Raisen) requires additional trolleys, particularly with compartments, to enhance waste separation and transportation. Upper Narmada Basin Damoh (Tendukheda)) has smaller gaps, but the need is still significant for local waste collection.

Middle Narmada basin Dewas (Dewas block) and Piparia (Hoshangabad) have high population areas that demand an increase in trolleys by 10-15 units. West Nimar (Barwah and Bhikangaon) has smaller gaps, but the need for local waste collection is still significant.

These areas' lack of collection trolleys could lead to waste segregation and transfer inefficiencies. Adding compartmentalized trolleys would likely improve waste handling at the source.

Districts In the Upper Narmada Basin with Specific Operational Challenges

Betul reports that smaller vehicles are required to make multiple trips, suggesting inefficiency in waste transfer. Additionally, there is a need to develop at least two waste transfer points in Betul Municipal Corporation. Chhindwara has complied with the need for mini collection trucks with separate compartments designed to handle bio-medical, sanitary, and hazardous waste. This approach could be a model for other districts. Details of Upper (Table 59), Middle (Table 60), and Lower Narmada Basin (Table 61) districts are provided in the tables below.

Table 62 provides an overview of the collection infrastructure for waste management in the Lower Basin of Gujarat, highlighting the availability of waste collection trolleys and mini collection trucks with separate compartments across various cities. The data reveals varying levels of preparedness, with some cities like Bharuch and Nadiad having a relatively adequate number of collection trolleys and mini trucks. However, others like Rajpipla, Kevadia, and Garudeshwar face gaps in infrastructure, including insufficient collection trolleys and mini trucks. Additionally, some cities like Ankleshwar, Amod, and Jambusar experience challenges such as limited coverage in rural areas, insufficient mini trucks during peak hours, and inadequate infrastructure.

Table 59: Status of collection infrastructure of Upper Narmada Basin. Source:

MPPCB

Districts	Block (ULB)	Collection of solid waste		
		Waste Collection trolleys with separate Compartments	Mini Collection Trucks with separate compartments	Gaps and Challenges
Anuppur	District	NA	NA	More Collection trolleys are required
Balaghat	Baihar	22	sufficient	No Gap
Betul	Amla Betul Bhainsdehi Multai Shahpur	No Information	No Information	Smaller vehicles available with the ULBs' are required to make several trips for the transportation of waste, and At least 02 Waste transfer points are to be developed in Betul Municipal Corporation
Chhindwara	Amarwara Junnardev Tamiya	Sufficient in ULBs	Sufficient in ULBs	Mini Collection Trucks with separate compartments to be procured with 60:40 ratio along with 03 additional compartments for bio-medical, sanitary waste and domestic hazardous wastes. - Complied
Damoh	Jabera	-	-	-
	Tendukheda	1	2	10 Collection trolleys and 1 mini truck i s required.
Dindori	Dindori Shahpura	Required	Required	More collection trolleys with compartments and mini collection trucks are required.
Jabalpur	Jabalpur	Sufficient	Sufficient	No Gap
	Kundam	N/A	N/A	N/A
	Majholi	Sufficient	Sufficient	No Gap
	Patan	Sufficient	Sufficient	No Gap
	Shahpura	Sufficient	Sufficient	No Gap
	Shihora	Sufficient	Sufficient	No Gap

Katni	Bahuriband Dhimarkhera Rathi	Sufficient in all ULBs	50 Light motor vehicles	No Gap
Mandla	Bichhiya	Sufficient	Sufficient	No Gap
	Mandla	Sufficient	Sufficient	No Gap
	Nainpur	Sufficient	Sufficient	No Gap
	Niwas	Sufficient	Sufficient	No Gap
Narshimpura	Gadarwara	8	Sufficient	No Gap
	Gotegaon	7 WC trolleys and 21 Tricycle	Sufficient	No Gap
	Kareli	Sufficient	Sufficient	No Gap
	Narshingpur	11 WC trolleys and 50no Tricycle	Sufficient	No Gap
	Tendukheda	3 WC trolleys and 2 no Tricycle	Sufficient	02 no. of Waste Collection Trolleys and 05Tricycle/Handcart are required.
Raisen	Bareli	3	6	No Gap
	Begamganj	0	9	2 collection trolleys with compartments are required.
	Gairatganj	6	2	No Gap
	Goharganj	-	-	-
	Silvani	4	3	No Gap
	Udaipura	5	3	No Gap
Sagar	Deori Kesli	Sufficient	Sufficient	No Gap
Seoni	Ghansaur	20%	10%	Enough vehicles are required
	Lakhnadon	Sufficient	Sufficient	No Gap

Table 60: Status of collection infrastructure of Middle Narmada Basin. Source: MPPCB

Districts middle	**Block (ULB)**	**Collection of solid waste**		
		Waste Collection trolleys with separate Compartments	**Mini Collection Trucks with separate compartments**	**Gaps and Challenges**
Alirajpur	Alirajpur	3	6	Required 3 more mini collection trucks.

	Jobat	1	1	2 More mini-collection trucks are required.
Barwani	Barwani	Sufficient	9	6 more no of mini collection trucks are required
	Niwali	2	3	4 more collection trolleys and 3 mini collection trucks are required.
	Pansemal	4	3	4 more collection trolleys and 3 mini collection trucks are required.
	Rajpur	2	3	4 more collection trolleys and 2 mini collection trucks are required.
	Sendhwa	Sufficient	9	6 more no of mini collection trucks are required
	Thikiri	2	3	4 more collection trolleys and 3 mini collection trucks are required.
Burhanpur	Nepanagar	8	1	8 Collection trolleys and 1 mini truck are required.
Dewas	Bagli	Sufficient	2	No Gap
	Dewas	180	56	15 Collection trolleys and 10 mini trucks are required.
	Kannod	Sufficient	3	No Gap
	Khategaon	Sufficient	5	No Gap

Dhar	Dhar Dharampuri Gandhwani Kukshi Manawar Sardarpur	Yes available (district data)	Yes available (district data)	No Gap
Khandwa	Harsud	2	3	8 Collection trolleys and 7 mini trucks are required.
	Khandwa	50	1	8 collection trolleys with compartments and 6 mini collection trucks are required.
	Pandhana	2	3	8 collection trolleys with compartments and 3 mini collection trucks are required.
Harda	Harda	34 DTDC vehicles	5	No Gap
	Khirkiya	2 DTDC vehicles	5	No Gap
	Timurni	2 DTDC vehicles	5	No Gap
Narmadapura m	Babai	2	3	1collection trolleys with compartments and 2 mini collection trucks are required.
	Bankheri	1	5	3 collection trolleys with compartments and 5 mini collection trucks are required.
	Narmadapura m	40	7	No Gap
	Itarsi	5	1	4 collection trolleys with compartments and 1 mini collection trucks are required.

	Piparia	3	5	5 more no of mini collection trucks and 3 more waste collection trolleys are required
	Seonimalwa	3	5	3 collection trolleys with compartments and 5 mini collection trucks are required.
	Sohagpur	3	15	No Gap
Indore	Mhow	Sufficient	Sufficient	No Gap
Jhabua	Jhabua	Sufficient	Sufficient	No gap
	Ranapur	-	-	
	Kesli	-	-	-
Sehore	Ashta	Sufficient	Sufficient	No Gap
	Budhni	Sufficient	Sufficient	No Gap
	Ichhawar	Yes	YES	
	Nasrullaganj	1	5	3 collection trolleys with compartments and 5 mini-collection trucks are required.
	Sehore	5	1	6 collection trolleys with compartments and 4 mini collection trucks are required.
West Nimar	Barwah	2	1	2 collections trolleys and 2 mini-collection trucks are required
	Bhagwanpura	-	-	-
	Bhikangaon	1	0	2 collections trolleys and 1 mini collection trucks are required
	Jhirniya	-	-	-
	Kasrawad	2	Not required	No Gap
	Khargone	Sufficient	4	No Gap
	Maheshwar	2	Not required	No Gap
	Seagon			

Table 61: Status of collection infrastructure of Lower Narmada Basin. Source: MPPCB

Districts	Block (ULB)	Collection of solid waste		
		Waste Collection trolleys with separate Compartments	Mini Collection Trucks with separate compartments	Gaps and Challenges
Alirajpur	Bhavara	1	1	2 More mini collection trucks are required.

Table 62: Collection Infrastructure of Lower Basin (Gujarat) . Source: Gujarat Pollution Control Board (GPCB) reports, local municipality data

District	City	Waste Collection Trolleys with Separate Compartments	Mini Collection Trucks with Separate Compartments	Gaps and Challenges
Bharuch	Bharuch	15	5	No significant gap
Bharuch	Ankleshwar	10	4	Insufficient mini trucks for peak hours
Narmada	Rajpipla	5	2	Need for more collection trolleys
Narmada	Kevadia	3	2	Lack of mini collection trucks
Narmada	Garudeshwar	2	1	Need for adequate infrastructure
Narmada	Amod	4	3	Limited mini trucks available
Kheda	Nadiad	12	6	Insufficient waste collection trolleys
Kheda	Mahemdabad	8	4	Need for more mini collection trucks
Vadodara	Karjan	6	4	Need for more collection trolleys

District	City	Waste Collection Trolleys with Separate Compartments	Mini Collection Trucks with Separate Compartments	Gaps and Challenges
Bharuch	Jambusar	7	3	Limited coverage in rural areas

Emerging Trends and Recommendations

The trend of insufficiency in Peripheral Districts: Districts further from central urban areas, like Alirajpur, Dindori, Barwani, and Umaria, display significant gaps, particularly in collection trucks and trolleys. This highlights a potential gap in resource allocation or logistical challenges in reaching these areas.

Integration of Compartmentalized Trolleys: Districts with sufficient resources, such as Chhindwara and Dewas, have adopted compartmentalized waste collection methods, which may lead to more efficient waste management. Expanding this practice across other districts could improve waste separation and reduce landfill pressures.

Need for Waste Transfer Points: Betul's requirement for additional waste transfer points suggests that areas with dense populations or limited transportation resources would benefit from strategically placed waste transfer stations to reduce transportation times and increase efficiency.

Some districts are well-equipped to handle current waste management needs; several peripheral and rural districts show resource gaps that could impact waste collection efficiency and environmental outcomes. Implementing compartmentalized waste collection trolleys across more districts, adding mini collection trucks in high-need areas, and developing waste transfer points in larger districts could provide substantial improvements. These upgrades would streamline operations, reduce travel time for collection vehicles, and support better waste segregation and disposal practices. Table summarizing the major requirements of the towns in the Narmada basin.

Table 63: Summary of requirements (Madhya Pradesh). Source: MPPCB

Resource Gap	Key Districts
Additional Mini Collection Trucks	Alirajpur, Barwani, Burhanpur, Dewas, Dindori, Hoshangabad, Khandwa, West Nimar
Additional Waste collection trolleys	Annupur, Barwani, Burhanpur, Damoh, Dewas, Narshingpur, Raisen, Sehore, Umaria

Operational Upgrades (Smaller vehicles and Transfer Points, etc.)	Betul, Narshingpur
Expanded Use of Compartmentalized Trolleys	Recommended for all districts, especially those with higher population density

Table 64: Summary of requirements (Gujarat). Source: GPCB reports and municipal data

Resource Gap	Key Districts / Cities
Additional Mini Collection Trucks	Bharuch, Narmada (Kevadia, Rajpipla), Kheda (Nadiad, Mahemdabad), Anand, Vadodara (Karjan)
Additional Waste Collection Trolleys	Bharuch, Narmada (Garudeshwar, Rajpipla), Kheda (Nadiad, Mahemdabad), Anand, Vadodara, West Nimar (Barwah, Bhikangaon)
Operational Upgrades (Smaller vehicles, Transfer Points, etc.)	Bharuch, Narmada (Kevadia, Amod), Anand, Vadodara, Kheda
Expanded Use of Compartmentalized Trolleys	Recommended for all districts, especially those with urban populations like Vadodara, Anand, Nadiad, and Bharuch

Waste Processing, Treatment and Disposal.

The data presented highlights the adoption of various waste management practices in multiple towns, explicitly composting, vermicomposting, biogas, and RDF/Palletization. This analysis aims to summarize the data, identify trends, and provide insights for improved waste management strategies. Details of solid waste processing, including wet-waste processing and dry-waste processing facilities in different towns of Narmada Basin, are provided in the table.

Analysis of Wet Waste Processing Facilities (Districts and Tehsil-wise)

Waste Processing Methods:

- Pit-based/Vermicomposting is the most common waste processing method across districts, indicating a preference for simpler and cost-effective systems.
- Aerobic Composting (with or without RDF) is implemented in several districts but is less prevalent than pit-based systems.
- Anaerobic Composting is present but limited to a few locations, such as Bhopal and East Nimar.

District-wide Overview:

- High Adoption Districts: Districts of Upper Narmada Basin like Betul, as well as of Middle Narmada Basin like Barwani and Dhar, have implemented diverse waste

processing methods, reflecting robust waste management strategies.

- Data Gaps: Some tehsils of Middle Narmada Basin, such as Huzar in Bhopal, Nepanagar in Burhanpur, and Kesli in Sagar of Upper Narmada Basin, lack complete data, making it challenging to evaluate their current waste processing status.

Geographic Trends:

- Urban Centers (e.g., Bhopal, Indore): Prefer aerobic composting due to higher population density and waste generation.
- Rural Areas: Selected for pit-based/vermi systems, leveraging available land and lower-cost setups.
- Integration of RDF (Refuse-Derived Fuel): RDF is integrated into selected districts, e.g., Dewas, Dhar (Middle Basin), Katni, and Mandla (Upper Basin), suggesting initiatives for energy recovery from waste.

Details of Upper, Middle, and Lower Narmada Basin districts/tehsils, plant type, and sub-category are provided in the table.

Table: Wet waste processing facility in the **Upper Narmada Basin. Source: MPPCB.**

Table 65: Wet waste processing facility in the Upper Narmada Basin. Source: MPPCB.

Districts	Tehsils	Plant Type	Subcategory
Annupur	Pushprajgarh (Amarkantak)	Waste to Compost	Pit Based/Vermi
Balaghat	Baihar	Waste to Compost	Pit Based/Vermi
Betul	Amla, Multai	Waste to Compost	Pit based/Vermi
Chhindwara	Amarwara	Waste to Compost	Pit Based/Vermi/Aerobic Compost
Damoh	Jabera	Waste to Compost	Pit based/Vermi
	Tendukheda		Pit based/Vermi
Dindori	Dindori	Waste to Compost	Pit Based/Vermi
	Shahpura		
Narmadapuram		Waste to Compost	Pit Based/Vermi
Jabalpur	Jabalpur	Waste to Compost	Aerobic Compost without RDF/Gasification/Pyrolysis
	Majholi	Waste to Compost	Pit Based/Vermi
	Patan		
	Shahpur		
Katni	Bahu riband	Waste to Compost	Aerobic Compost with RDF
	Dhimarkheda		
	Rathi		

Mandla	Bichhiya, Mandla, Niwas	Waste to Compost	Pit Based/Vermi
	Nainpur	Waste to Compost	Aerobic Compost with RDF
Narshimpura	Gadarwara, Kareli, Narshimpur, Tendukheda	Waste to Compost	Pit Based/Vermi
	Gotegaon		Aerobic compost without RDF
Raisen	Bareli, Begamganj, Gairatganj, Silvani	Waste to Compost	Pit Based/Vermi
	Udaipura		
Sagar	Deori, Kesli	Waste to Compost	Pit Based/Vermi, Aerobic Compost without/With RDF
Seoni	Lakhnadon	Waste to Compost	Pit Based /Vermi

Table 66: Wet waste processing facility in the Middle Narmada Basin. Source: MPPCB.

Tehsils	**Plant Type**	**Subcategory**
Alirajpur, Jobat	Waste to Compost	Aerobic Compost without RDF
Barwani, Raipur	Waste to Compost	Pit Based/Vermi/
Sendhwa		Aerobic Compost without RDF
Thikri, Niwali		Aerobic Compost with RDF
Huzar (No data), Bhopal M Corp.	Waste to Compost	Anaerobic without RDF
Nepanagar (No data) Burhanpur M Corp	Waste to Compost	Aerobic Compost without RDF
Bagli, Khategaon	Waste to Compost	Pit Based/Vermi
Dewas		Aerobic Compost without RDF
Kannod		Aerobic Compost with RDF
Dhar, Dharmapuri, Manawar	Waste to	Pit Based/Vermi

Kukshi	Compost	Aerobic compost with RDF
Sardarpur		Aerobic Compost without RDF
Khandwa	Waste to Compost	Anaerobic/Aerobic Compost without RDF
Pandhana		Pit Based/Vermi
Harda, Khikiya	Waste to Compost	Aerobic Compost without RDF
Timrani		Pit Based/Vermi
Hoshangabad Itarsi, Piparia Seoni-Malwa Sohagpur Vankheri.	Waste to Compost	Pit Based/Vermi
		Aerobic without RDF
Mhow CANTT	Waste to Compost	Aerobic Compost without RDF
Jhabua, Ranapur	Waste to Compost	Pit Based/Vermi
Ashta, Budhni, Ichhawar, Nasrullaganj	Waste to Compost	Pit Based /Vermicompost
Sehore		
Barwah, Maheshwar, Bhikangaon Khargone	Waste to Compost	Pit Based/Vermicompost
		Aerobic Compost without RDF

Table 67: Wet waste processing facility in the Lower Narmada Basin. Source: MPPCB, Local Municipal and District Reports, GPCB.

Districts	Tehsils	Plant Type	Subcategory
Alirajpur	Bhavara	Waste to compost	Pit Based/Vermi
Narmada	Garudeshwar, Rajpipla	Waste to Compost	Pit Based / Vermicompost
Vadodara	Vadodara, Karjan	Waste to Compost	Aerobic Compost with RDF
Chhota Udepur	Dabhoi, Chhota Udepur	Waste to Compost	Pit Based / Vermicompost

	Bharuch	Bharuch, Ankleshwar	Waste to Compost	Pit Based / Vermicompost

Solid Waste Management (Dry Waste Processing Plan)

The report provides data on solid dry waste management facilities, specifically Material Recovery Facilities (MRFs), in districts across the Narmada River. It also discusses the status of waste-to-energy plants. Waste-to-energy plants in Jabalpur have 11.5 MW capacity, with significant energy recovery potential. Details are provided in table- and table-

- *Automation vs Manual:* Districts like Dhar clearly push toward automation. Rural districts such as Harda, Annupur, and Dindori remain entirely dependent on manual systems. Mixed districts like Barwani and Chhindwara reflect transitional strategies.
- *Urban vs Rural:* Urban districts (e.g., Bhopal, Indore) utilize semi-automated systems, but Indore still has some manual facilities. Rural districts (e.g., Mandla, Jhabua) rely entirely on manual processes.

Dry Waste Processing Facilities (Districts and Tehsil-wise)

The Narmada Basin features a range of dry waste processing facilities categorized into the Upper, Middle, and Lower regions, each utilizing Material Recovery Facilities (MRFs) for efficient waste segregation and management. In the Upper Basin, districts such as Anuppur, Balaghat, Betul, Chhindwara, Damoh, Dindori, Jabalpur, Katni, Mandla, Narshingpur, Raisen, Sagar, and Seoni have established MRFs, with most employing manual and semi-automated methods. Katni and Narshingpur districts have semi-automated facilities to enhance efficiency.

In the **Middle Basin**, districts like Alirajpur, Barwani, Betul, Burhanpur, Dewas, Dhar, Harda, Hoshangabad, Jhabua, Khandwa, Khargone, Raisen, and Sehore utilize MRFs extensively. Notable setups include fully automated facilities in Dhar district and semi-automated plants in Barwani, Khandwa, and Khargone. Burhanpur and Dewas districts integrate both manual and semi-automated systems, reflecting a balanced approach toward resource recovery. Additionally, Hoshangabad district continues to play a pivotal role in the Middle Basin with its semi-automated and manual MRFs.

In the **Lower Basin**, the Alirajpur district is the sole representative, with tehsils such as Bhavara operating semi-automated and manual MRFs. Despite being a smaller region in terms of facility count, the focus on efficient segregation and recovery highlights the district's commitment to

sustainable waste management.

Table 68: Dry waste processing facility in Upper Narmada Basin. Source: MPPCB

Districts	Tehsils	Plant Type	Subcategory
Anuppur	Pushprajgarh (Amarkantak)	Material Recovery Facility (MRF)	Manual
Balaghat	Baihar	MRF	Manual
Betul	Amla, Bhainsdehi, Multai, Shahpur Betul	MRF	Manual
Chhindwara	Amarwara Junnardev Tamiya (No data)	MRF	Manual Semi Automated
Damoh	Jabera Tendukheda	MRF	Manual
Dindori	Dindori, Shahpura	MRF	Manual
Hoshangabad	Hoshangabad Babai, Itarsi, Piparia Seoni-Malwa Sohagpur Vankheri.	MRF	Semi - Automated Manual
Jabalpur	Jabalpur, Majholi, Patan, Shahpur	MRF	Manual
Katni	Bahuriband, Dhimarkhera, Rathi (no data)	MRF	Semi - Automated
Mandla	Bichhiya, Mandla, Niwas Nanipur	MRF	Manual
Narshimpura	Gadarwara , Narshimpur, Kareli, Tendukheda Gotegaon	MRF	Semi-Automated Manual
Raisen	Bareli, Begamganj, Gairatganj, Silvani Udaipura	Waste to Compost	Pit Based/Vermi
Sagar	Deori, Kesli	Waste to Compost	Pit Based/Vermi, Aerobic Compost without/With RDF
Seoni	Lakhnadon	Waste to Compost	Pit Based /Vermi

Table 69: Dry waste processing facility in Middle Narmada Basin. Source: MPPCB

Districts	Tehsils	Plant Type	Subcategory

Alirajpur	Alirajpur Jobat	Material Recovery Facility (MRF)	Semi-Automated Manual
Barwani	Barwani Rajpur, Sendhwa Thikri, Niwali	MRF	Semi-Automated Manual Manual
Betul	Bhainsdehi Shahpur Betul	MRF	Manual
Burhanpur	Nepanagar Burhanpur M Corp	MRF	Semi-automated Manual Manual
Dewas	Bagli, Khategaon, Kannod Dewas	MRF	Semi-Automated Manual
Dhar	Dhar, Kukshi Dharampuri, Manawar Sardarpur	MRF	Semi-Automated Manual Fully Automated
Harda	Harda, Khikiya Timrani	MRF	Manual
Hoshangabad	Hoshangabad Itarsi, Piparia Seoni-Malwa Sohagpur Vankheri.	MRF	Semi-Automated Manual
Jhabua	Jhabua, Ranapur	MRF	Manual
Khandwa	Khandwa Pandhana	MRF	Semi-Automated Manual
Khargone	Barwah Bhikangaon	MRF	Semi-Automated Manual
Raisen	Bareli, Begamganj, Gairatganj Goharganj Raisen, Silvani Udaipura	MRF	Manual
Sehore	Ashta, Budhni, Ichhawar, Nasrullaganj, Sehore	MRF	Semi-Automated Manual

Table 70: Dry waste processing facility in Lower Narmada Basin. Source: MPPCB. Local Municipal and District Reports, GPCB.

Districts	Tehsils	Plant Type	Subcategory
Alirajpur	Bhavara	Material Recovery Facility (MRF)	Semi-Automated, Manual
Narmada	Garudeshwar, Rajpipla	MRF	Semi-Automated, Manual

Districts	Tehsils	Plant Type	Subcategory
Anand	Anand, Sojitra	MRF	Semi-Automated, Manual
Vadodara	Vadodara, Karjan	MRF	Semi-Automated, Manual
Chhota Udepur	Dabhoi, Chhota Udepur	MRF	Manual
Bharuch	Bharuch, Ankleshwar	MRF	Manual

Table 71: Waste-to-energy plants in Narmada basin. Source: MPPCB

Plant Location	Status of operation	Power generation (MW)	Remarks
Jabalpur	Operational	11.5 MW	600 TPD

Disposal of waste

Disposing of solid waste across cities and towns in the Narmada Basin presents a mixed scenario with significant gaps in infrastructure and progress. 39 cities/towns have identified landfill sites, yet only five landfills have been constructed and are currently operational. These landfills are in Bhopal, Indore, Jabalpur, Katni, and Sagar, indicating that urban centers have prioritized landfill construction. However, no landfills are under construction, as shown in the table.

Table 72: Details of Landfill sites of the Narmada Basin. Source: MPPCB, CPCB

	No of Cities/Towns	Names of ULB
Landfill sites identified	39	
Landfill constructed in Upper Narmada Basin	05	Jabalpur Katni Sagar
Landfill constructed in the Middle Narmada Basin		Bhopal Indore
Landfills in Lower Narmada Basin	2	Bharuch Ankleshwar
Landfill under construction	Nil	
Landfill in operation in Upper Narmada Basin	05	Jabalpur Katni Sagar
Landfill in operation in Middle Narmada Basin		Bhopal Indore
Landfill in operation in Lower Narmada Basin	2	Bharuch Ankleshwar
Landfill exhausted	0	
Land filled capped	0	

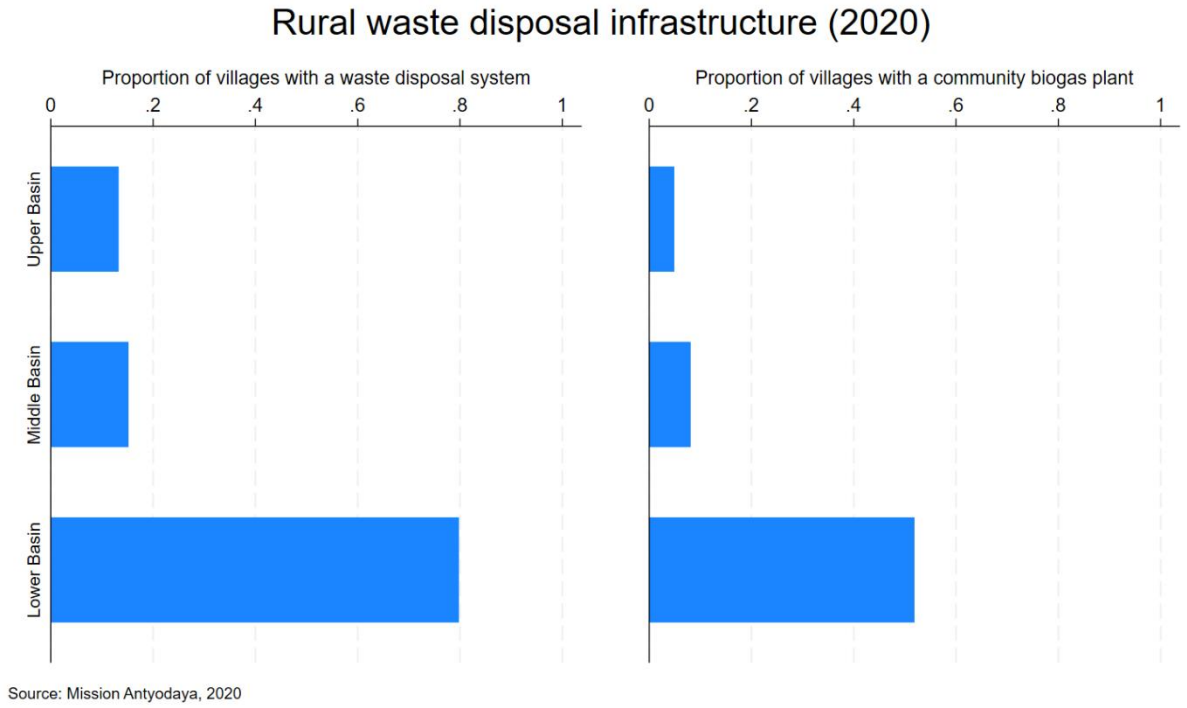

Figure 12: Rural waste disposal systems reported in villages in basin areas.

Mission Antyodaya data suggests that the lower basin reports more rural waste disposal systems and biogas plants than the middle and upper basins.

Community Sanitation Program

The progress in community sanitation programs in the basin under the ODF (Open Defecation Free) Plus Model across the Upper, Middle, and Lower Narmada Basin districts.

In the Upper Narmada Basin, significant progress has been observed across districts like Anuppur, Balaghat, Betul, Chhindwara, Damoh, Dindori, Hoshangabad, Jabalpur, Katni, Mandla, Narshingpur, Raisen, Sagar, and Seoni. Anuppur's Pushprajgarh tehsil leads the district, with all 266 villages declared under the ODF Plus Model and 93 villages verified. In Balaghat's Baihar tehsil, all 134 villages have been declared, but only 69 villages have achieved verification. Betul district's performance varies across tehsils; Amla and Multai have 282 combined declared villages, yet verification has reached only 46 and 32 villages, respectively. Chhindwara's tehsils, such as Amarewara and Junnardev, display a combined total of 415 declared villages, but verification numbers are much lower, at 92 verified villages. Damoh district shows exemplary progress in Jabera and Tendukheda tehsils, with 169 and 176 villages verified out of 180 and 179 declared villages, respectively, reflecting over 90% success.

Dindori's Dindori and Shahpura tehsils show a combined declaration of 374 villages but verification numbers of only 86 villages. In Hoshangabad's Babai tehsil, 119 villages are declared, with 61 verified. Jabalpur district's Shahpura, Kundam, and Shihora tehsils account for 562 declared villages, with 202 verified. Katni's Bahuriband and Dhimarkhera tehsils show 371 declared villages, with 154 verified. Mandla's Bichhiya and Nainpur tehsils have 350 declared villages and 159 verified, reflecting moderate progress. Narsinghpur's Gotegaon tehsil has 242 declared villages, with 166 verified. In Raisen, tehsils like Begamganj and Silvani have 444 declared villages, with only 117 verified. Sagar's Kesli and Dindori tehsils have 358 declared villages, with just 64 verified. Senoi's Ghansaur and Lakhnadon tehsils have progressed, with 517 declared villages and 240 verified.

The Middle Narmada Basin shows varied performance among districts such as Alirajpur, Barwani, Betul, Dewas, Dhar, Harda, Hoshangabad, Indore, Jhabua, Khandwa, Khargone, Raisen, and Sehore. Alirajpur and Jobat tehsils have achieved 148 declared villages, with 94 verified villages. Barwani district presents a significant challenge, with six tehsils accounting for 639 declared villages, but only 229 were verified. Dewas district performs well, with Bagli and Dewas tehsils achieving 278 verified villages out of 487 declared. Dhar district's tehsils, including Dhar, Dharampuri, and Manawar, collectively show 432 declared villages but exhibit poor verification rates, with Dharampuri verifying only seven villages out of 85 declared.

Harda district demonstrates substantial success with Harda, Khirkiya, and Timurni tehsils, achieving 271 verified villages out of 504 declared. Hoshangabad's Bankheri and Piparia tehsils have 235 declared villages and 129 verified. Indore's Mhow tehsil shows strong performance with 169 declared villages and 100 verified. Jhabua district, including Jhabua and Ranapur tehsils, has 222 declared villages, but only 38 have been verified. Khandwa's Harsud and Pandhana tehsils have 198 declared villages, with only 62 verified. Khargone's Barwah and Bhikangaon tehsils stand out, with 372 declared villages and 239 verified. Reisen's Goharganj tehsil shows low verification rates, while Sehore's Ashta and Sehore tehsils perform remarkably, with verification rates exceeding 90%.

In the Lower Narmada Basin, Alirajpur's Bhavara tehsil stands out, with all 50 villages declared and verified, achieving a 100% success rate. This performance highlights the potential for completing verification in other tehsils and districts. However, other tehsils in the region need substantial improvement to achieve similar success. According to Figure 13, across the basin the proportion of households reporting unsanitary toilets is quite low.

Table 73: The ODF status of the villages in Upper Narmada Basin. Source: SBM

District	Tehsils	Total villages	Total no of ODF plus model declared villages	Total no of ODF plus model verified village
Anuppur	Pushprajgarh	266	266	93
Balaghat	Baihar	134	134	69
Betul	Amla	152	152	46
	Multai	130	130	32
Chhindwara	Amarewara	150	150	58
	Junnardev (jamai)	265	265	34
	Tamiya	179	179	47
Damoh	Jabera	180	180	169
	Tendukheda	179	179	176
Dindori	Dindori	187	186	42
	Shahpura	190	188	44
Hoshangabad	Babai	119	119	61
Jabalpur	Jabalpur	181	179	60
	Kundam	192	192	64
	Majholi	206	206	72
	Patan	216	216	60
	Shahpura	226	224	65
	Shihora	149	149	77
Katni	Bahuriband	180	179	53

	Dhimarkhera	199	192	101
	Rathi	108	106	40
Mandla	Bichhiya	188	188	98
	Mandla	177	176	100
	Nainpur	162	153	61
	Niwas	93	93	51
Narshimpura	Gadarwara	N/A	N/A	N/A
	Gotegaon	245	242	166
	Kareli	139	131	N/A
	Narshimapur	200	184	N/A
	Saikheda	98	98	N/A
Raisen	Bareli	N/A	N/A	N/A
	Begamganj	211	206	38
	Gairatganj	158	157	34
	Silvani	240	238	45
	Udaipura	140	139	50
Sagar	Deori	218	193	32
	Kesli	172	165	32
Seoni	Ghansaur	230	230	140
	Lakhnadon	287	287	100

Table 74: ODF status of villages in the Middle Narmada Basin. Source: SBM.

District	Tehsils	Total Villages	Total No of ODF Plus Model Declared villages	Total No of ODF Plus Model verified village
Alirajpur	Alirajpur	86	86	49
	Jobat	62	62	45
Barwani	Barwani	94	94	28
	Niwali	62	62	37
	Pansemal	97	97	5
	Rajpur	97	97	23
	Sendhwa	134	134	59
	Thikri	94	94	28
Betul	Betul	189	189	56
	Bhainsdehi	134	134	25
	Shahpur	122	122	38
Bhopal	Huzar	N/A	N/A	N/A
Burhanpur	Nepanagar	N/A	N/A	N/A
Dewas	Bagli	269	266	144
	Dewas	221	221	134
	Kannod	158	158	107
	Khategaon	166	163	88
Dhar	Dhar	98	98	24
	Dharampuri	97	85	7
	Gandhwani	145	141	2

	Kukshi	48	48	20
	Manawar	95	95	5
	Sardarpur	192	192	29
Harda	Harda	169	169	84
	Khirkiya	176	176	117
	Timurni	159	159	70
Hoshangabad	Bankheri	114	114	69
	Hoshangabad	93	93	64
	Itarsi	N/A	N/A	N/A
	Piparia	128	128	60
	Seonimalwa	191	191	73
	Sohagpur	142	141	60
Indore	Mhow	170	169	100
Jhabua	Jhabua	127	127	9
	Ranapur	95	95	29
Khandwa	Harsud	73	72	33
	Khandwa	95	88	12
	Pandhana	123	110	29
Khargone	Barwah	244	243	110
	Bhagwanpura	101	101	12
	Bhikangaon	129	129	129
	Jhirniya	129	110	1

	Kasrawad	175	172	19
	Khargone	72	72	67
	Maheshwar	170	168	101
	Seagon	53	35	2
Raisen	Goharganj	N/A	N/A	N/A
	Raisen	N/A	N/A	N/A
Sehore	Ashta	282	276	275
	Budhni	139	136	1
	Ichhawar	139	139	138
	Nasrullaganj	169	169	108
	Sehore	297	294	270

Table 75: The ODF Status of the Villages in the Lower Narmada Basin. Source: SBM

District	Tehsils	Total Villages	Total No of ODF Plus Model Declared Villages	Total No of ODF Plus Model Verified Villages
Alirajpur	Bhavra	50	50	50
Anand	Anklav, Borsad, Khambhat	212	209	180
Baroda	Karjan, Savli	258	254	235
Chhota Udepur	Dabhoi, Chhota Udepur	140	139	128
Kheda	Nadiad, Matar, Kheda	156	153	139
Narmada	Rajpipla, Tilakwada	98	98	70
Vadodara	Waghodia, Sankheda	190	185	170

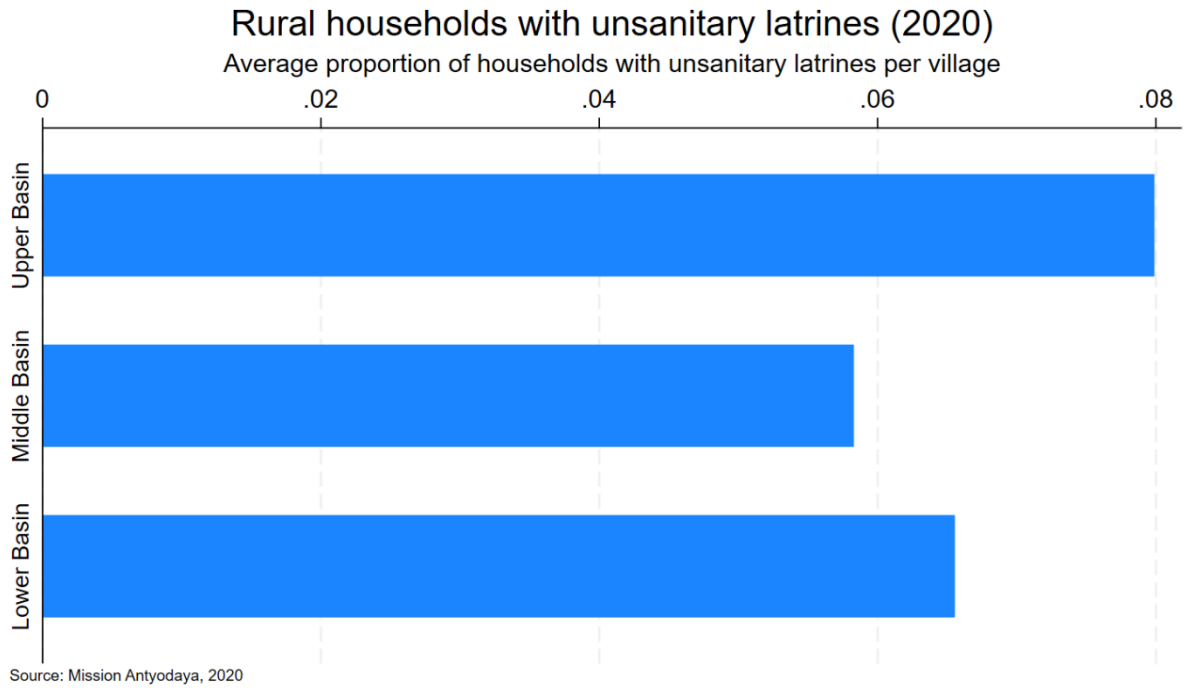

Figure 13: Rural households reporting unsanitary latrines in villages of basin areas

Conclusion

This report provides critical insights for policymakers to address infrastructure challenges and environmental sustainability. It enables informed decision-making by identifying gaps and offering a comprehensive understanding of the region's needs. Tailored strategies can be developed for each city, ensuring efficient resource allocation, prioritizing projects, and addressing local disparities in access to services like clean water and sanitation. This is essential for improving public health, reducing diseases, and promoting equitable development.

Including river infrastructure details in the report is of critical significance to policymakers, as it provides a comprehensive understanding of the existing structures, such as dams, barrages, and canals within the Narmada Basin. This data enables policymakers to assess the efficiency and capacity of these infrastructures in supporting water resource management, including irrigation, hydropower generation, and flood control. It helps identify areas where maintenance, modernization, or new construction is required to optimize the use of the river's resources while ensuring the resilience of the infrastructure to climate change impacts. Infrastructure data also facilitates regional planning and inter-state coordination, ensuring equitable water distribution and compliance with environmental regulations. By leveraging these insights, policymakers can create sustainable development policies that enhance economic growth, improve water security, and protect the Narmada River as a vital lifeline for the region.

It offers a data–driven foundation to design holistic and sustainable developmental strategies.

With granular data on waste management, including collection, treatment, and disposal details, policymakers can implement efficient disposal systems that mitigate environmental pollution, improve urban hygiene, and support the health of the Narmada River ecosystem.

The report provides actionable details on water supply networks, ensuring equitable and reliable access to clean drinking water across all cities. Sewerage network plans allow policymakers to address sanitation challenges, reduce waterborne disease prevalence, and improve public health. Including public toilet data further supports the promotion of hygiene, especially in urban and peri-urban areas, contributing to national goals such as “Swachh Bharat Abhiyan”. By integrating these plans into policy frameworks, leaders can ensure sustainable urbanization, improve residents' quality of life, and safeguard the environmental and economic health of the Narmada Basin for future generations.

These insights enable the development of innovative and sustainable cities tailored to the specific needs of each urban within the basin. Additionally, sharing the data across cities promotes regional collaboration, enabling the adoption of best practices and cohesive development strategies that balance urban and rural progress. This holistic approach benefits the environment and the livelihood and well-being of communities in the basin.

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Annexure1

A list of Legacy Waste Dumpsite remediation projects is attached (Annexure 1), which provides a comprehensive overview of these legacy waste dumpsites, including their projected timelines for complete processing.

Table 1: List of Legacy Waste Dumpsite Remediation Projects: - The attached list provides a comprehensive overview of these legacy waste dumpsites, including their projected timelines for complete processing is given below:

Division	District	ULB Name	Legacy waste Quantity/ MT	Current Status	TimeLine For Complete Processing
Indore	Dhar	Dhar	155065	Work Started	Nov-24
Indore	Khargone	Barwah	54268	Work Started	Jan-25
Indore	Khargone	Mandleshwar	13630	Work Started	Jan-25
Indore	Khandwa	Khandwa	126999	Work Started	Jan-25
Indore	Khargone	Maheshwar	42680	Work Started	Jan-25
Indore	Alirajpur	Alirajpur	24858	Work Started	Jan-25
Indore	Barwani	Barwani	37141	Work Started	Mar-25
Indore	Jhabua	Thandla	20583	Work Started	Mar-25
Indore	Alirajpur	Bhavara	11091	Work Started	Mar-25
Indore	Alirajpur	Jobat	18304	Work Started	Mar-25
Indore	Jhabua	Jhabua	63283	Work Started	Mar-25
Indore	Barwani	Raipur	27476	Work Started	Mar-25
Indore	Dhar	Kukshi	43830	Work Started	Mar-25
Indore	Dhar	Manawar	59292	Work Started	Mar-25
Indore	Burhanpur	Nepanagar	44249	Financial Evaluation Pending	May-25

Indore	Jhabua	Ranapur	36988	Financial Evaluation Pending	May-25
Indore	Khargone	Sanawad	25739	Financial Evaluation Pending	May-25
Indore	Dhar	Pithampur	35716	Received at State SLTC Pending	May-25
Indore	Indore	Mhowgaon	20383	Received at State SLTC Pending	May-25
Indore	Jhabua	Petlawad	31489	Received at State SLTC Pending	May-25
Indore	Khandwa	Chhanera	24172	Received at State SLTC Pending	May-25
Indore	Khargone	Bhikangaon	35332	Received at State SLTC Pending	May-25
Indore	Indore	Betma	28913	Received at State SLTC Pending	May-25
Indore	Khargone	Kasrawad	17641	Received at State SLTC Pending	May-25
Jabalpur	Balaghat	Wara Seoni	8342	Work Started	Nov-24
Jabalpur	Mandla	Mandla	60901	Work Started	Jan-25

Jabalpur	Mandla	Nainpur	17440	Work Started	Jan-25
Jabalpur	Chhindwara	Pandhurna	45739	Work Started	Mar-25
Jabalpur	Balaghat	Balaghat	65761	Work Started	Mar-25
Jabalpur	Dindori	Shahpura	3809	Work Started	Mar-25
Jabalpur	Chhindwara	Junnardev	8645	Received at State SLTC pending	May-25
Jabalpur	Seoni	Seoni	157664	Technical Pending	Jul-25
Narmadapuram	Harda	Harda	14678	Work Started	Nov-24
Narmadapuram	Betul	Multai	16405	Work Started	Nov-24
Narmadapuram	Narmadapuram	Seoni Malwa	21207	Work Started	Mar-25
Narmadapuram	Narmadapuram	Itarsi	31438	Work Started	Mar-25
Narmadapuram	Betul	Betul	133958	Work Started	Mar-25
Narmadapuram	Narmadapuram	Narmadapuram	62296	Work Started	Mar-25
Narmadapuram	Narmadapuram	Sohagpur	11730	Financial Evaluation Pending	May-25
Narmadapuram	Narmadapuram	Piparia	4379	Received at State SLTC pending	May-25
Narmadapuram	Harda	Timrani	4692	Received at State SLTC pending	May-25
Ujjain	Dewas	Dewas	90183	Work Started	Jan-25
Ujjain	Dewas	Khategaon	24889	Work Started	Jan-25

Source: *https://greentribunal.gov.in/sites/default/files/news_updates/SIX%20MONTHLY%20PROGRESS%20REPORT%20BY%20GOVT.%20OF%20MADHYA%20PRADESH%20IN%20OA%20NO.%20606%20of%202018%20FOR%20STATE%20OF%20MADHYA%20PRADESH%20(COMPLIANCE%20OF%20MSW%20MGT.%20RULES,%202016%20AND%20OTHER%20ENVIRONMENTAL%20ISSUES).pdf*