

# ADVISORY FOR MANAGEMENT OF SOLID WASTE IN HILLY AREAS



**CENTRAL POLLUTION CONTROL BOARD**

East Arjun Nagar, Delhi – 110032

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## ADVISORY FOR MANAGEMENT OF SOLID WASTE IN HILLY AREAS

### 1. Introduction

Solid Waste Management (SWM) in hilly regions presents unique challenges due to difficult terrain, limited land availability, and seasonal tourism pressures. Indiscriminate disposal of solid waste tarnishes the pristine landscape but also poses environmental pollution. Most of the major rivers in India originate in the Mountains, yet solid waste is frequently observed to be dumped along their banks. The leachate generated from such dumping contaminates rivers, thus contaminating the primary source of water supply for regions located downstream. Inadequate treatment or disposal of solid waste in mountains not only creates risks for ecosystems and human health in mountain regions, but also for downstream areas. It is essential to protect the mountain eco-systems and prevent problems from migrating the downstream. This document outlines the challenges of solid waste management in hilly areas and highlights specific interventions required to address them effectively.

### 2. Key Challenges in SWM in Hilly Regions

The following are the key challenges faced in management of solid waste in hilly regions:

- a) **Terrain and Accessibility:** Hilly areas often have steep slopes, narrow roads, and difficult terrain make waste collection and transportation logistically complex and costly.
- b) **Land Availability:** Limited land and environmental sensitivity restrict the establishment of landfills or processing facilities.
- c) **Tourism Impact:** During tourist seasons, a significant quantity of solid waste is produced, which makes it hard for the existing facilities and resources to manage.
- d) **Climate:** Harsh weather conditions such as heavy rainfall, hinder waste management operations.
- e) **Remoteness of settlements:** Scattered and low-density population in the areas generates low volumes of waste, making centralised collection and treatment inefficient.
- f) **Lack of road networks:** Poor connectivity hampers access to remote areas, complicating waste collection and transport.
- g) **High cost for SWM:** Infrastructure and service provision costs are significantly higher compared to plains. The absence of dedicated budgetary allocations further obstructs effective implementation.

### **3. Rule Provisions of Solid Waste Management Rules, 2026**

The key rule provisions of Solid Waste Management (SWM) Rules, 2026 are as follow:

Rule 35 (2) (i): Department of Urban Development and Department responsible for municipal administration or local self-government in urban areas, including peri urban areas, in the States and Union Territories shall ensure implementation of these rules by all local authorities;

Rule 36 (3) (i): The Department of Rural Development and Department responsible for sanitation and solid waste management in rural areas in the States and Union territories shall ensure implementation of these rules by all local authorities;

Rule 41 (1): The State Pollution Control Board or Pollution Control Committee shall enforce these rules in their State and review the implementation of these rules at least twice a year in close coordination with concerned Department dealing with Municipal Administration or the local self-government or Secretary-in-charge of State Urban Development Department as well as Department of Rural Development or the Department dealing with solid waste management in rural areas;

Rule 12: In the hilly areas and island areas, the duties and responsibilities of the local authorities shall be as under:

- (i) may levy and collect fee from visitors or tourists (not permanent residents in the municipal limits) for handling and management of solid waste and may also take measures to regulate the number of visitors in accordance with the waste handling capacity of the local authority;
- (ii) construction of landfill on hilly and island areas shall be avoided. A transfer station at a suitable enclosed location shall be setup to collect residual waste from the processing facility and inert waste. A suitable land shall be identified in the plain areas down the hill, within 25 kilometres for setting up sanitary landfill. The residual waste from the transfer station shall be disposed of at this sanitary landfill;
- (iii) in case of non-availability of such land, efforts shall be made to set up regional sanitary landfill for the inert and residual waste;

- (iv) local body shall frame bye-laws and prohibit citizens from littering solid waste on the streets and give directions to the tourists not to dispose any waste such as paper, water bottles, liquor bottles, beverage containers including soft drink bottles, cans, tetra packs, any other plastic or paper waste in the hilly areas or down the hills and instead direct to deposit such solid waste in litter bins that shall be placed by the local body at all tourist destinations;
- (v) local body shall arrange to convey the provisions of solid waste management under the bye-laws to all tourists visiting the hilly areas at the entry point in the town as well as through the hotels, guest houses where they reside and by putting suitable hoardings at tourist destinations;
- (vi) local body may levy solid waste management charge from the tourist at the entry point to make the solid waste management services sustainable;
- (vii) the department in-charge of the allocation of land assignment shall identify and allot suitable space on the hills for setting up decentralised waste processing facilities. Local body shall set up such facilities. Step garden system may be adopted for optimum utilisation of hill space.

Schedule II (I): Criteria for special provisions for hilly areas, specifies that Cities and towns located on hills and islands shall have location-specific methods evolved for final disposal of solid waste by the local body with the approval of the concerned SPCB or the PCC. The local body shall set up processing facilities for utilisation of biodegradable organic waste. The non-biodegradable recyclable materials shall be stored and sent for recycling periodically. The inert and non-biodegradable waste (non-recyclable, non-energy recoverable) shall be used for building roads or filling-up of appropriate areas on hills. In case of constraints in finding adequate land in hilly areas, waste not suitable for road-laying or filling up shall be disposed of in regional landfills in plain areas.

#### **4. Preference on Processing Technologies**

The Urban local bodies shall, facilitate construction, operation and maintenance of solid waste processing facilities and associated infrastructure on their own or with private sector participation or through any agency for optimum utilisation of various components of solid waste adopting suitable technology including the following technologies and adhering to the guidelines and standards issued by the Ministry of Housing and Urban Affairs from time to time prescribed by the

Central Pollution Control Board. Preference shall be given to decentralised processing to minimize transportation cost and environmental impacts.

The processing technologies that can be adopted include:

- a) bio-methanation, microbial composting, vermi-composting, anaerobic digestion or any other appropriate processing for bio-stabilization of biodegradable wastes;
- b) waste to energy processes including refused derived fuel for combustible fraction of waste or supply as feedstock to solid waste based power plants or cement kilns or other industrial processes which use furnaces, after approval of such processes by Central Pollution Control Board and on adhering to standards prescribed in the rules.

The District Panchayats shall facilitate construction, operation and maintenance of solid waste processing facilities and associated infrastructure on their own or with private sector participation or through any agency for optimum utilisation of various components of solid waste adopting suitable technology and adhering to the guidelines and standards issued by the Department of Drinking Water and Sanitation and Central Pollution Control Board from time to time.

Preference shall be given to decentralised processing to minimize transportation cost and environmental impacts such as

- a) bio-methanation, microbial composting, vermi-composting, anaerobic digestion or any other appropriate processing for bio-stabilization of biodegradable waste;
- b) waste to energy processes including refused derived fuel for combustible fraction of waste or supply as feedstock to solid waste based power plants or cement kilns or other furnaces.

## **5. Criteria for Selection of Waste Processing Technology**

Multiple technologies can be selected for city for processing solid wastes in an integrated way depending upon the quantity and characteristics of waste. The options for integrated technologies based on the population and waste generation are tabulated below:

| Sl. No | Population range | Waste generation (TPD) | Composition              | Technology Options                                                                                    |
|--------|------------------|------------------------|--------------------------|-------------------------------------------------------------------------------------------------------|
| 1      | Above 2 Million  | > 1100                 | Biodegradables 35 to 50% | IWP comprising of BM, CC, RDF; WtE, RDF to Cement industry, and Plastic to fuel oil                   |
| 2      | 1 - 2 Million    | 550 to 1100            | Biodegradables 40 to 55% | IWP comprising of BM, CC, RDF; WtE ( > 500 TPD), RDF to Cement industry and Plastic to fuel oil       |
| 3      | 1-10 lac         | 30 to 550              | Biodegradables 40 to 55% | IWP comprising of BM, CC, RDF; as feed stock to power plant, cement industry, and Plastic to fuel oil |
| 4      | 0.5 - 1 Lac      | 10 to 30               | Biodegradables 45 to 60% | BM, VC or CC, RDF                                                                                     |
| 5      | < 50,000         | <10                    | Biodegradables 45 to 65% | BM, VC / CC, RDF                                                                                      |
| 6      | Hill Towns       | (50-200)               | Biodegradables 35 to 50% | BM, VC / CC, RDF as feed stock for Plastic to fuel oil                                                |

*Where,*

- ✓ BM: Biomethanation,
- ✓ CC: Composting,
- ✓ VC: Vermi composting
- ✓ RDF: Refuse derived fuel,
- ✓ IWP: Integrated Waste Management Plant,
- ✓ WtE: Waste to Energy Plant

The Integrated Waste Management Plant and Waste to Energy Plant are not a practical option for hilly regions because of the sparse population and low quantity of waste generated. The Hilly areas having land crisis, the technologies like biomethanation, vessel composting, static pile composting, RDF, etc. can be used.

For further information, the document on selection criteria for processing technology prepared by CPCB, in compliance with Hon'ble National Green

Tribunal order in the matter O.A. 199 of 2014, Almitra H. Patel Vs Union of India may be referred. the

## 6. Advisory for SWM in Hilly Region

For planning and designing a waste management plan in Hilly areas, a preliminary survey must first be conducted to decide the appropriate waste processing technology which may suit local requirements based on the key challenges. If the quantity of waste generated is below the threshold needed for efficient processing, a regional plan may be developed by clustering multiple towns together to achieve the desired volume. If excessive waste generation is observed, decentralized treatment methods such as vermicomposting or biogas production can be adopted in localized pockets – for example, within garden premises, large residential complexes, or community spaces. This approach ensures flexibility: smaller towns can collaborate to meet minimum requirements, while larger urban areas can reduce strain on centralized facilities by promoting sustainable, community-level waste treatment solutions.

### 6.1 The advisory for management of solid waste in the urban local bodies and district panchayats of Hilly regions are as follow:

- a. **Segregation of Waste:** Awareness campaigns shall be conducted to encourage effective segregation waste at the household level into wet waste, dry waste, sanitary waste and special care waste, in compliance with the SWM Rules, 2026.
- b. **Decentralized wet waste processing:** Wet waste shall be composted in decentralized, small scale facilities such as composting and biogas plants, thereby reducing transportation requirements and dependence on large landfills. These processing facilities shall not be located near water bodies, flood-prone zones, densely populated areas or sensitive sites such as schools, hospitals etc.
- c. **Material Recovery Facilities (MRF):** Material Recovery Facility shall be established for segregation, shredding and baling of recyclable plastics, Refused Derived Fuel (RDF), glass metals and other recyclables, ensuing systematic recycling.

- d. **Supply Chain Strengthening:** Recyclables and RDF shall be directed to the authorized waste processors or facilities with arrangements for onward transfer, in consultation and approval with the respective SPCB/PCC.
- e. **Inert waste Management:** Transfer stations shall be established at a suitable enclosed location to collect the inert waste. Suitable land within 25 kilometres shall be identified for sanitary landfills, in consultation with respective SPCB/PCC. Where the land is unavailable, regional sanitary landfill shall be developed. Utilization of inert waste in construction (road sub-bases, levelling) shall be explored, alongside zero-landfill strategies for mountainous regions.
- f. **Transfer stations:** Transfer stations shall not be located near water bodies, flood-prone zones, densely populated areas or sensitive sites such as schools, hospitals etc. Adequate land shall be allocated, fenced and equipped with signage boards displaying operational guidelines, segregation instructions, and grievance redressal contacts.
- g. **Clustering Municipalities:** Small municipalities may collaborate to share resources and establish common waste processing facilities. Cluster-based RDF aggregation hub shall be developed, with the concerned Dept. and SPCB/PCC facilitating agreements between the local bodies and RDF-utilizing entities (e.g. cement plants, Waste-to-Energy facilities).
- h. **Framing bye-laws:** Urban Local body/local authorities/Rural local bodies shall frame bye-laws prohibiting littering and directing citizens and tourists to deposit waste in designated bins. Penalty for non-compliance and user fees on the waste generator may be imposed to recover costs of collection, transportation, processing and disposal.
- i. **Tourists Awareness:** Urban Local body/local authorities/local Panchayats shall disseminate bye-laws provisions to tourists at the entry points, hotels, guest houses and tourist destinations through signage and hoardings.
- j. **SWM Charges on Tourists:** Tourist may be levied solid waste management services charges at entry points, with proceeds utilised for developing waste management infrastructure.
- k. **Land Identification:** Department in-charge of the allocation of land assignment shall identify and allot suitable and adequate hill spaces for

decentralised waste processing facilities. Step garden system may be adopted for optimum land utilisation.

- l. **Dumpsites near surface water bodies:** Sites near surface water bodies shall be prioritized for remediation. The measures include collection & treatment of leachate, barricades to prevent waste (leachate) inflow, bioremediation and management of wet waste, RDF and inert waste as per advisories.
- m. **Tourism Waste Management Plans:** Tourist areas shall have specific waste management plans, including decentralized composting units. Compost generated shall be linked with horticulture, agriculture, and forestry departments to promote resource recovery and circular economy.
- n. **Incentive-Based (Recovery and Recycling) Systems:** Urban Local body/Local authorities/ Rural local bodies may adopt buy-back, collect-back, or Deposit Refund System (DRS) for materials such as plastic bottles, PET containers, and other packaging. Consumers can return used items at designated points in exchange for a refund or incentive, reducing littering and ensuring a steady supply of recyclables to authorized facilities. Self-Help Groups (SHGs) and local entrepreneurs may be engaged to generate livelihoods, enhance community participation and support sustainable SWM in hilly regions.
- o. **Disaster preparedness**
  - i. **Pre-monsoon preparedness:** All drains, storm water channels, and waste-vulnerable points shall be cleared to prevent clogging and flooding. Vulnerable waste storage and transfer locations must be identified and secured in advance to minimize risks of leachate runoff and slope erosion.
  - ii. **Climate resilient infrastructure:** Composting units, MRFs, and transfer stations shall be designed with adequate storm water management systems, retaining walls, protective sheds and waterproofing measures to withstand heavy rainfall conditions. During the monsoon season, it must be ensured that waste is transported and stored under covered conditions to prevent spillage, leachate generation, and subsequent contamination of the surrounding environment.

## 6.2 Bulk Waste Generators

As per rule 3(i) of the SWM Rules, 2026, the bulk waste generator covers the entities, given below, if they satisfy at least one of the following criterion;

- (i) buildings with floor area of 20,000 sq.m. or above; or
  - (ii) water consumption of 40000 litres per day; or
  - (iii) solid waste generation of 100 kg per day, namely: -
- (a) Institutional users including buildings occupied by the, -
- (i) Central Government departments or undertakings, State government departments or undertakings;
  - (ii) local bodies;
  - (iii) public sector undertakings or private companies;
  - (iv) schools, colleges, universities, other educational institutions; and
  - (v) community places or like;
- (b) Commercial users including, -
- (i) commercial establishments including railways, bus stations or depots,
  - (ii) airports, ports;
  - (iii) industrial units and industrial areas;
  - (iv) malls, multiplexes;
  - (v) hotels;
  - (vi) hospitals, nursing homes;
  - (vii) hostels;
  - (viii) wholesale markets, including “Mandis”, for agricultural and horticultural produce, fish and meat;
  - (ix) Stadium, sports complexes;
  - (x) Community halls, convention halls, auditorium;
  - (xi) Marriage or banquet halls;
  - (xii) conference centres, Expo centres, exhibition areas; and
  - (xiii) tourist spots.
- (c) Residential societies.

Further, rule 6 of the SWM Rules, 2026 stipulates the responsibilities of the Bulk Waste Generators as: Every bulk waste generator shall register themselves with the concerned local body through the centralised online portal. The certificate of registration shall specify conditions required to be fulfilled for registration to remain valid.

The advisory for management of solid waste by the Bulk Waste Generators in Hilly regions are as follow:

## **A. Waste Collection and Processing**

- i. Every Bulk Waste Generator shall make necessary arrangements for collecting and handing over of dry waste, sanitary waste, special care waste, to the local body or agency authorised by it.
- ii. Arrangements shall be made to collect and process wet waste or horticulture waste, wherever
- iii. applicable, in a decentralised manner through composting, biomethanation or any other technology approved.

## **B. Residual Waste Management:**

- i. The residual solid waste or inerts generated during waste processing in decentralised facilities shall be handed over to authorised waste collectors or an agency designated by local body.

## **7. Roles and responsibilities of Stakeholders under SWM Rules, 2026**

- a) The Department of Urban Development and Department responsible for municipal administration or local self-government in urban areas including peri urban areas, the Department of Rural Development and the Department responsible for sanitation and solid waste management in rural areas, along with respective SPCB/PCC in the State / UT, shall ensure implementation of this advisory in the hilly regions.
- b) The provisions w.r.t. preparation of State policy and strategy on solid waste management, setting up material recovery facilities (MRFs) or secondary storage facilities, etc. and enforcement of the provisions of the rules are also laid down under SWM, Rules, 2026 and are collective responsibility of the State's agency - UDDs, ULBs and concerned SPCB/PCC under Rule 35,39 & 41 of SWM, Rules, 2026.
- c) The District Magistrate or District Collector or Deputy Commissioner shall review the performance of local bodies, at least once in a quarter on waste segregation, collection, sorting, processing, treatment and disposal and take corrective measures in consultation with Department of Urban Development and Department responsible for local self-government in urban areas as well as Department of Rural Development and Department responsible for solid waste management in rural areas and to undertake inspection or audit of solid waste processing or recycling facilities, ensure

operation of sanitary landfill & any other common waste management facility in their jurisdiction under Rule 37 of SWM, Rules, 2026.

## 8. Best Practices adopted in Hilly Regions

Solid Waste Management in hilly areas has been implemented through a combination of policy enforcement, community participation, financial sustainability, decentralized infrastructure, and innovative technologies across the States of Sikkim, West Bengal, Uttarakhand, Kerala, Mizoram, Tamil Nadu, Maharashtra, Arunachal Pradesh, Himachal Pradesh, and Goa. The best practices adopted in these regions range from plastic ban and deposit-refund systems to eco bricks, SHG-led operations, and tourism-linked waste governance, yielding the following lessons:

- a) Strong local governance accelerate compliance.
- b) Community mobilization (SHGs, Gram Sabhas, NGOs) ensures sustainability.
- c) User fees and recycling revenue reduce dependency on grants.
- d) Low-cost, decentralized technologies (eco bricks, bamboo bins, compost pits) are effective in difficult hilly terrains.
- e) Linking SWM with tourism and ecology builds stronger ownership (heritage villages, pilgrims zones) generated revenue and strengthen compliance.
- f) Circular Economy practices (reuse, recycle, RDF) reduce landfill dependency.

The brief details of the best practices adopted in the States are detailed as **Appendix. I to XI**. The comparative matrix of best practices in the hilly regions of aforementioned states and with their possibility of replication depending on their suitability in the respective hilly region, is summarised below:

### Comparative matrix of best practices adopted in the hilly regions of States

| Location / Case                | Key Initiatives                                                                     | Waste Management System                                                                                              | Impact                                                                        | Lessons Learned                                 | Replicability                                      |
|--------------------------------|-------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------|-------------------------------------------------|----------------------------------------------------|
| Gangtok, Sikkim                | Plastic ban (bags, bottles, thermocol); Awareness campaigns; Enforcement with fines | 226 workers, 30 vehicles; 90% door-to-door segregated collection; 50 TPD plant at Martam; Material Recovery Facility | Reduced single-use plastic; Compost sold to tea gardens; Lower disposal costs | Citizen participation + govt leadership crucial | Replicable in other hilly tourist towns            |
| Gerethang, Sikkim              | Ban on SUPs; Promotion of leaf plates; Penalties; User fee collection               | Segregation centre built; User-fee based collection                                                                  | Reduced SUPs in social functions; Financial sustainability                    | Gram Sabha resolutions + penalties effective    | Rural Gram Panchayats with strong local governance |
| Mangam Nagar Panchayat, Sikkim | Digital awareness; Home composting; SHG/NGO mobilization                            | Only segregated waste collected; Wet waste to manure                                                                 | Behaviour change; Increased manure; Less landfill waste                       | “No Segregation, No Collection” works           | Urban local bodies                                 |
| Padamchen Village, Sikkim      | User charges; Resource Recovery Vehicle; WWF partnership; “Garbage Mela”            | Dedicated RRV; 4R approach; Zero landfill goal                                                                       | Wildlife conservation; Financial sustainability; High ownership               | Community events strengthen compliance          | Eco-sensitive villages near forests                |
| Yuksam Dubdi GP, Sikkim        | Dedicated SWM fund; Bye-laws; Vermicomposting; LED repair                           | Waste register; Composting; Reuse clothes; Soak pits                                                                 | Reduced landfill waste; Circular economy practices                            | Corpus fund ensures continuity                  | Tourist-heavy villages, small settlements          |
| Darjeeling, West Bengal        | SWM units; Plastic segregation; SHG collectors; Digital fee app                     | Household composting; Plastic booths; Centralized sorting                                                            | Better segregation; Livelihoods for SHGs; Transparent fees                    | SHG involvement + digital systems effective     | Semi-urban/rural hilly blocks                      |

| Location / Case                      | Key Initiatives                                                      | Waste Management System                                 | Impact                                                                 | Lessons Learned                         | Replicability                        |
|--------------------------------------|----------------------------------------------------------------------|---------------------------------------------------------|------------------------------------------------------------------------|-----------------------------------------|--------------------------------------|
| Kalimpong, (Lava Block), West Bengal | Eco brick model; SHG mobilization; Ban on SUPs; Women-led governance | Plastic to eco bricks; User fees; Rotational collection | Reduced litter; Revenue from eco bricks; Women empowerment             | Low-cost tech + decentralized ops work  | Remote hilly regions, tourism blocks |
| Char Dham, Uttarakhand               | QR-based deposit refund system; Reverse vending machines             | Refund via UPI; 45 centers; AI-enabled machines         | 20 lakh bottles recovered; 66 MT CO <sub>2</sub> avoided; Jobs created | Incentives drive compliance             | Pilgrimage/tourist hotspots          |
| Wayanad, En Ooru, Kerala             | Strict segregation; Plastic-free zone; Tourism-funded                | 25 bins; Composting; Bottle booths; Shuttle service     | Financial sustainability; Eco-tourism appeal                           | Tourism revenue sustains SWM            | Heritage villages, eco-tourism sites |
| Mizoram (ULBs)                       | Dustbin campaign; Swap & Save; Cloth banners; SHG cotton bags        | Compost pits; Buy-back schemes; Door-to-door collection | 80% plastic reduction; Livelihoods; Strong youth engagement            | Youth clubs + SHGs effective            | Small towns, village councils        |
| Coonoor, Tamil Nadu                  | Plastic ban; NGO partnership; Dumpsite → RRC                         | 7 TPD dry waste; 10 TPD wet waste; Compost + AFR        | Compost production; Circular economy                                   | NGO partnerships strengthen SWM         | Hill towns with NGOs                 |
| Panchgani, Maharashtra               | Door-to-door segregation; Digital dashboards; Biomethanation         | 6 TPD biomethanation; Compost pits; Plastic upcycling   | 20 MT plastic diverted; Real-time monitoring                           | Tech integration improves efficiency    | Urban hill stations                  |
| Sangti Village, Arunachal            | Source segregation; SHG-led recycling; Penalties                     | Compost locally; Dry waste → MRF; Monthly clean-ups     | 183 tonnes diverted; Revenue from recyclables                          | Traditional governance + SHGs effective | Remote mountain villages             |
| Mansari, Himachal Pradesh            | Community-led dry waste management; MRF                              | Segregation by type; E-waste storage; RDF processing    | Local employment; Circular economy                                     | Detailed segregation improves recycling | Villages with community hubs         |

| Location / Case                | Key Initiatives                                        | Waste Management System              | Impact                                      | Lessons Learned                         | Replicability                             |
|--------------------------------|--------------------------------------------------------|--------------------------------------|---------------------------------------------|-----------------------------------------|-------------------------------------------|
| Mawlynnong, Rongram, Meghalaya | Bamboo dustbins; Pig farm composting; Task force raids | Weekly collection; Segregation sheds | Plastic reduction; Community composting     | Traditional eco-practices effective     | Rural eco-tourism villages                |
| South Goa Panchayats, Goa      | Local MRFs; RDF → cement plants                        | Composting; Regional hub at Cacora   | Reduced landfill waste; Sustainable RDF use | Regional hubs + co-processing effective | Hilly talukas with cement industry access |

**BEST PRACTICES ADOPTED IN THE STATE OF SIKKIM****1. Gangtok**

Gangtok generates about 50 tonnes of municipal solid waste per day. To safeguard its hilly ecosystem, the city has adopted a plastic-free initiative supported by an organized collection and processing system. Sikkim pioneered this effort by banning disposable plastic bags in 1998, and Gangtok further strengthened it with additional measures such as prohibiting packaged drinking water in government offices and thermocol plates and cutlery.

Solid Waste collection is carried out through door-to-door collection covering about 90% of households, handled by 226 sanitation workers and 30 vehicles. Segregation of waste is practised in most wards, ensuring effective downstream processing. At the 50 TPD waste processing plant at Martam, waste is segregated into biodegradable and recyclable fractions. The biodegradable waste is converted into compost, which is sold to tea gardens, while recyclable materials are sent to recycling facilities. Enforcement is strengthened through fines and awareness campaigns involving schools, taxi drivers, and market associations.

These initiatives have significantly reduced single-use plastic, lowered waste disposal costs, and minimized the land required for dumping an important advantage in hilly regions with limited land availability and high landslide risk. Gangtok's model demonstrates the effectiveness of combining plastic bans, citizen participation, segregation, and decentralized processing. It offers a replicable approach for other hill towns grappling with similar solid waste management challenges.

**2. Gerethang Labing GPU, Gyalshing District,**

Gerethang Labing Gram Panchayat has adopted an eco-friendly solid waste management approach aimed at achieving zero waste and a clean rural environment. A Segregation Centre has been established on about 0.5-acre land, supported by Resource Recovery Centre caretaker and user fee contributions. A major initiative is the ban on thermocol plates, plastic cups, spoons, and bottles. In their place, biodegradable alternatives such as leaf plates promoted during social gatherings and public events. Violations of the ban are penalized with a fine of ₹500 to ensure compliance.

This initiative has resulted to a reduction in single-use plastic waste in rural and hilly areas, thereby minimizing environmental pollution in fragile mountain ecosystems. At the same time, it has revived the use of traditional biodegradable materials such as leaf plates, which are eco-friendly and well-suited to local conditions.

Additionally, the establishment of local waste segregation infrastructure, combined with financing through fees, ensures systematic waste management and provides a mechanism for operation and maintenance of waste management services at the community level.

### **3. Mangan Nagar Panchayat, North Sikkim**

Mangan Nagar Panchayat has implemented a source segregation-based waste management system, ensuring that households segregate waste into wet and dry fractions. To build awareness, extensive campaigns were conducted through videos, social media, and direct community engagement, educating residents on segregation practices and home composting of kitchen waste.

Garbage vehicles collect only segregated waste, with wet waste transported to an Organic Waste Converter (OWC) for processing into manure. The Panchayat actively involves Self-Help Groups (SHGs), NGOs, and community associations to drive behavioural change and strengthen participation.

The initiatives have resulted in (i) better waste segregation at the source, which significantly reduces the waste sent to landfills; (ii) Processing of organic waste into compost / manure using OWC technology, promoting resource recovery and sustainable utilization; and (iii) Community participation, with behavioural change among residents ensuring long-term success of solid waste management systems in remote and hilly towns.

### **4. Padamchen Village, Pakyong District, Sikkim**

Padamchen village, situated at an altitude of about 8,440 ft, has developed an innovative community-based solid waste management system through strong institutional and public participation. To ensure financial sustainability, the Gram Panchayat introduced user charges ₹100 for households and ₹200 for shops / homestays and procured a Resource Recovery Vehicle (RRV) under the Swachh Bharat Mission (Grameen) for waste collection and transportation.

Strict penalties against burning or indiscriminate dumping of waste were enforced through Gram Sabha resolutions. The village partnered with World Wide Fund for Nature to strengthen waste management initiatives and formed a 16-member “Swachhata Sahayogi” team to support operations. An awareness programme, the “Garbage Mela” was introduced to promote waste segregation, discourage open dumping, and reduce human–wildlife conflicts, particularly to protect the endangered red panda habitat.

These initiatives have created a sustainable financing model for waste management through user fees and strong local governance, ensuring regular collection and systematic services. The community awareness, enforcement measures, and institutional partnerships, which enhance public participation and compliance. By promoting the 4R

principles (Reduce, Refuse, Reuse, and Recycle) the initiative helps protect fragile mountain biodiversity and ecosystems through environmentally responsible waste management practices.

## **5. Yuksam Dubdi Gram Panchayat, Sikkim**

Yuksam, a major tourist destination and gateway to the Kanchenjunga National Park, has established a community-driven solid waste management system to address the growing challenge of waste generation from tourism. To sustain operations, a corpus fund of ₹50,000 annually from each Gram Panchayat and ₹2,500 per month for worker wages was created to support waste management activities.

A Resource Recovery Centre (RRC) was set up to manage waste collection, segregation, storage, and recycling. The facility maintains waste registers, organizes storage systematically, and promotes community vermicomposting for wet waste. Innovative practices include repairing discarded LED bulbs for redistribution to schools and underprivileged households, reusing old clothes, and constructing over 200 soak pits for greywater management.

These initiatives promote decentralized waste processing and recycling through RRCs, enabling efficient local-level handling of waste. They also encourage circular economy practices such as repair, reuse, and composting, which reduce waste generation and recover valuable resources. Importantly, strong citizen participation and financial cooperation ensure the sustainability of waste management systems in tourism-intensive hilly regions, where waste generation is high and infrastructure is limited.

## BEST PRACTICES ADOPTED IN THE STATE OF WEST BENGAL

### 1. Rangli–Rangliot Development Block, Darjeeling

Rangli–Rangliot Development Block in Darjeeling district, West Bengal, has implemented a decentralized Solid Waste Management (SWM) and Plastic Waste Management (PWM) system to address waste challenges in its hilly terrain. Waste is segregated at the household level into biodegradable and non-biodegradable fractions, with households encouraged to compost biodegradable waste within their premises. Trained waste collectors from Self-Help Groups (SHGs) visit households twice a month to collect non-biodegradable waste and spread awareness about cleaning and drying plastic before disposal. In market areas, shopkeepers store biodegradable and dry waste separately, and waste collectors visit two to three times a week for collection.

Plastic waste is further processed through SWM Units, while a dedicated Plastic Waste Management Unit at Takdah functions as a micro-level segregation booth. Plastics such as PET, LDPE, HDPE, and multilayered varieties are segregated and stored before being transported to Sonada for recycling. Waste from households and markets is moved through local vehicles to SWM units, and plastic waste is subsequently transferred to the central PWM unit for processing.

To strengthen financial transparency, the initiative introduced digital user-fee collection via a mobile application with QR-based payments, enabling accurate record keeping even in areas with poor connectivity. This system has improved plastic waste segregation, recycling, and scientific disposal, while fostering community participation and reducing plastic pollution in the fragile mountain ecosystem of Darjeeling.

### 2. Lava Development Block, Kalimpong

Lava Development Block in Kalimpong district, a tourism-intensive hilly region with a population of about 45,000, has implemented an innovative Plastic Waste Management initiative under the Swachh Bharat Mission (Grameen). Given the scattered settlements and difficult terrain, conventional waste collection systems such as e-carts were not feasible. To overcome this challenge, the block administration mobilized Self-Help Groups (SHGs) and formed a workforce known as “Swachhata Sathis”, who conduct door-to-door awareness campaigns and collect plastic waste from households.

The collected plastic waste is transported to a centralized Plastic Waste Management Unit, where it is processed into Ecobricks—a simple, cost-effective technology in which plastic waste is compacted into bottles and reused as building material. These ecobricks are utilized for constructing benches, compost pits, and decorative structures at tourist locations, and are also sold at ₹5 per piece, generating revenue for the Panchayat Samiti

and incentives for SHG workers. Waste collection is organized through a route-mapped vehicle system covering seven Gram Panchayats on a fortnightly cycle, reducing transportation costs and improving efficiency in the hilly terrain.

The initiative operates on a community-managed, user-fee based financing model, ensuring sustainability without relying solely on government funding. It also promotes gender-inclusive participation, with more than 250 SHG women engaged in waste collection, segregation, ecobrick production, and manufacturing of cloth and paper bags as alternatives to plastic. Additionally, the block has introduced low-cost greywater filtration units for reuse in irrigation, helping conserve water in the hills.

Together, these measures have significantly reduced plastic litter, improved cleanliness in this tourist destination, generated livelihood opportunities, and created a replicable model of sustainable waste management for rural and hilly regions.

## BEST PRACTICES ADOPTED IN THE STATE OF UTTARAKHAND

### 1. Char Dham Yatra routes

The Government of Uttarakhand, through the Uttarakhand Pollution Control Board, launched QR-based Digital Deposit Refund System (DDRS) in partnership with Recykal to tackle plastic waste pollution along the ecologically fragile Char Dham Yatra routes i.e. Badrinath, Kedarnath, Gangotri, and Yamunotri. Under this innovative system, pilgrims and tourists pay a refundable deposit of ₹10 on packaged beverages, which is returned via UPI-based digital payment when empty bottles are deposited at designated collection points or AI-enabled reverse vending machines. The initiative incentivizes responsible disposal of plastic bottles while strengthening recycling and waste collection in high-altitude pilgrimage regions.

During the 2024 pilgrimage season, a robust infrastructure was established, including 45 collection centres along the routes and four AI-enabled reverse vending machines (Reclaim Pro) for instant refund processing. The system integrates pilgrims, shopkeepers, transporters, and sanitation workers, ensuring plastic waste is collected, tracked, and recycled through a transparent digital mechanism even in remote mountainous terrain.

The initiative channelized over 40,754 kg of plastic waste, recovered over 20 lakh bottles, and issued over four lakh digital refunds. It further helped avoid nearly 66 MT of CO<sub>2</sub> emissions, generated over 110 seasonal jobs annually, and improved the income of local waste workers by nearly 37.5%. Overall, the program boosted plastic recovery rates by 300% compared to the baseline, while saving the government approximately ₹3.73 crore in waste management costs.

The initiative has delivered environmental, economic, and social benefits reducing litter along pilgrimage routes and rivers, improving recycling efficiency, and strengthening stakeholder participation including pilgrims, priests, retailers, mule operators, and sanitation workers. Integration of QR-based traceability, digital refunds, and AI-enabled vending machines has ensured transparency, accountability, and operational efficiency, with the application maintaining 99.9% uptime despite challenging terrain.

The success of the program led to the Char Dham Yatra 2024 being declared a Plastic Regulated Zone, demonstrating the effectiveness of combining technology with behavioural incentives. The model is now under consideration for replication in other pilgrimage destinations, tourist towns, and urban areas across India, highlighting its scalability and potential to transform plastic waste management in environmentally sensitive regions.

## 2. Kedarnath (Rudraprayag), Gangotri (Uttarkashi), and Badrinath (Chamoli)

In the pilgrimage towns namely Kedarnath, Gangotri, and Badrinath, the Digital Deposit Refund System (DDRS) initiative has encouraged responsible waste disposal by offering monetary rewards for recycling plastic bottles. The program successfully collected and recycled 13.8 lakh PET bottles i.e. about 69% out of 20.12 lakh issued, thereby reducing plastic pollution and preventing the use of nearly 20 sq km of landfill space. It has also generated economic opportunities for local stakeholders and strengthened community engagement through technology-driven participation.

- i. **Nagar Panchayat Gangotri:** An initiative addressed the issue of discarded clothes traditionally thrown by pilgrims into the Ganga River. Around 22 tonnes of clothing waste were collected and redistributed to local weavers, who used them to produce mats and rugs. This practice not only protected the fragile river ecosystem but also promoted recycling and created livelihood opportunities for local artisans.
- ii. **Nagar Palika Parishad Bageshwar:** Since 2017, women Self-Help Groups (SHGs) have played important role in door-to-door waste collection, user charge collection, and community awareness campaigns. Their active involvement has significantly improved sanitation in 11 municipal wards, while also generating sustainable livelihoods and promoting gender inclusion in waste management activities.
- iii. **Nagar Palika Parishad Joshimath, Chamoli:** Joshimath has adopted an effective system for managing dry waste through compaction and segregation at Material Recovery Facilities. Since 2011–12, the municipality has compacted and sold over 13,24,793 kg of inorganic waste, generating revenue while ensuring environmentally safe disposal and reducing dependence on landfills.
- iv. **Nagar Palika Parishad Mussoorie, Dehradun:** Mussoorie has adopted source segregation at households and commercial establishments. Established 20 TPD Material Recovery Facility (MRF), where dry waste is sorted into categories such as plastic, paper, glass, metal, and cloth before being sent to authorized recyclers. In addition, introduced QR-code-based household tracking and GPS monitoring of waste collection vehicles, enabling real-time route tracking. Mussoorie generates 20–35 TPD of waste depending on the tourist season, all of which is processed systematically. Regular IEC campaigns, plantation drives, and RRR awareness programs further encourage community participation and promote sustainable waste management practices.

**BEST PRACTICES ADOPTED IN THE STATE OF KERALA****1. En Ooru Tribal Heritage Village, Wayanad**

En Ooru Tribal Heritage Village, located in Pookode, Wayanad district, is the state's first tribal heritage village showcasing the culture, lifestyle, art, and traditions of indigenous tribal communities. To maintain environmental sustainability in this eco-sensitive tourist area, the village has implemented a structured solid waste management system integrated with tourism management and community participation.

Waste is segregated at source, with 25 bins placed across the premises to separate biodegradable, non-biodegradable, and recyclable waste. The collected waste is temporarily stored in designated waste management sheds for sorting prior to processing. Organic waste from kitchens and gardens is processed through composting and reused for landscaping and maintaining green spaces within the village. For handling specific waste streams, 11 sanitary napkin incinerators have been installed to ensure safe disposal of sanitary waste, while five booths have been set up to collect glass and plastic bottles for recycling. The village has been declared a plastic-free zone, with visitors encouraged to use reusable bottles and bags.

The initiative operates through a self-sustaining financial model supported by tourism revenue, including a ₹50 entry fee and ₹40 jeep shuttle fee per visitor, which contributes to waste management and operational costs. Supporting infrastructure includes warehouses for storage of equipment, awareness signage promoting responsible waste disposal, and a trained cleaning team for daily waste segregation and sanitation. Eco-friendly mobility measures, such as electric autos within the premises, help reduce pollution and vehicle traffic. The village also conducts cleanliness drives with NSS volunteers and students, while recyclable materials are handed over to Haritha Karma Sena of Vythiri Panchayat for recycling. These measures ensure effective waste management, environmental protection, and sustainable tourism practices in the ecologically sensitive Wayanad region.

**BEST PRACTICES ADOPTED IN THE STATE OF MIZORAM**

**1. Aizawl**

The Dustbin Campaign was launched on World Environment Day 2025, in Aizawl by the Hon'ble Minister of Urban Development & Poverty Alleviation (UD&PA), as a community-driven initiative to promote cleanliness in urban areas. The campaign encourages individuals, institutions, and organizations to actively participate in maintaining public hygiene by ensuring proper use and maintenance of dustbins, timely waste disposal, and prevention of littering in public spaces.

Through volunteer participation and awareness activities, the initiative promotes responsible waste disposal behaviour among citizens and strengthens public involvement in sanitation management. This approach has helped reduce open littering, improve waste collection efficiency, and contribute to the development of a cleaner and more sustainable urban environment.

**2. Saitual ULB**

The Saitual ULB has adopted environmentally responsible practices through awareness campaigns and community engagement programmes. A key initiative is the avoidance of flex banners, which are non-biodegradable. Since 2023, the ULB has replaced them with cloth banners, thereby reducing plastic waste generation and promoting environmentally friendly alternatives during public events and campaigns.

Another innovative initiative is the establishment of Children Sanitation Clubs in various Village Council areas. These clubs, comprising children aged 5–15 years, voluntarily participate in cleanliness drives and sanitation awareness activities within their localities. This initiative promotes early environmental education and encourages young citizens to actively participate in maintaining a clean and healthy environment.

**3. Phullen ULB**

In Phullen town, the Town Sanitation Committee initiated a programme to reduce the use of SUP bags in local markets. A circular was issued restricting the use of SUP bags, and reusable cotton carry bags were introduced as a sustainable alternative. Cotton cloth was procured using committee funds, and local Women SHGs were engaged to stitch the bags, thereby creating livelihood opportunities.

Awareness campaigns were conducted through face-to-face communication, local newspapers, and social media platforms to educate shopkeepers and consumers about the harmful effects of plastic. Within the first month, more than 500 cotton bags were sold,

and within three months, the use of plastic bags in the market had reduced by approx.. 80%, demonstrating the effectiveness of community-driven plastic reduction initiatives.

#### **4. Khawzawl ULB**

In Khawzawl district, the Urban Local Body implemented a decentralized waste management initiative through the installation of more than 700 home compost pits in collaboration with the Rural Development Department. Village Councils facilitated the construction of compost pits in households with adequate space for organic waste management.

The initiative significantly reduced wet waste generation at the household level, with wet waste collection reduced by more than half. By converting organic waste into compost at source, the programme promotes sustainable waste management, lowers transportation costs, and minimizes pressure on municipal waste collection systems.

#### **5. Siaha ULB**

The Local Administration Department of the Mara Autonomous District Council launched a Plastic Buyback Project in Siaha town on 1 July 2025 to address the plastic pollution. Under this initiative, residents are encouraged to segregate and sell plastic waste to the authorities at predetermined rates, thereby creating a financial incentive for proper waste disposal and recycling.

Plastic items such as bottles, polythene bags, sachets, and thermoset plastics are purchased at rates ranging from ₹10 to ₹30 per kg, depending on type and processing. This incentive-based system encourages residents to collect and segregate plastic waste instead of dumping it in open areas, thereby improving recycling rates and reducing environmental pollution.

#### **6. Biate Town**

Biate town has implemented an organized, community-driven solid waste management system under the Mizoram Urban Sanitation and Solid Waste Management Policy, 2011. Separate bins for plastic waste have been installed in 14 localities, and an e-waste collection centre has also been established where hazardous and electronic waste on weekly basis. Plastic waste is reused for town beautification projects, adding aesthetic value while reducing landfill disposal.

The town has established a Biate Town Sanitation Task Force and Area Sanitation Committees to oversee sanitation activities and organize regular mass cleaning drives. A 100% door-to-door waste collection is practiced with a monthly user fee of ₹50, while households segregate waste into wet and dry fractions. Organic waste is processed in a vermicomposting plant, while recyclable dry waste is sent to recycling agencies. This

strong community ownership and decentralized waste management approach has significantly improved sanitation and waste handling in the town.

**BEST PRACTICES ADOPTED IN THE STATE OF TAMIL NADU****1. Coonoor Municipality**

Coonoor Municipality, located in the Nilgiris district of Tamil Nadu, has implemented a comprehensive solid waste management system suited to its environmentally sensitive hill ecosystem. The district administration banned 19 single-use plastic items in 2018, including plastic cups, straws, and carry bags. The municipality reinforced this through a resolution imposing penalties for violations, including ₹1,000 for retail vendors, ₹5,000 for wholesale vendors, and ₹20,000 for marriage halls found using banned plastic items. Regular awareness programmes under Swachh Bharat Mission (U) 2.0, monthly plastic collection drives, and campaigns by Tamil Nadu Pollution Control Board e-bikers have further strengthened compliance and promoted alternatives to single-use plastics.

Coonoor adopted the innovative concept of a “Bin-Free Town” in 2016, removing public waste bins to discourage open dumping and animal scavenging. Instead, the municipality strengthened door-to-door waste collection and encouraged households to practice source segregation into wet and dry waste. Community participation has been promoted through the People’s Movement for Clean Cities initiative, along with regular awareness programmes and cleanliness drives.

Coonoor’s public-private partnership with the NGO “Clean Coonoor” converted the former Ottupattarai dump yard into a waste recovery centre and garden, showcasing an effective decentralized waste processing model. The facility processes 7 TPD of dry waste and 10 TPD of wet waste, producing nearly 50 tonnes of compost monthly for farmers and horticulture departments. The Municipality gratefully acknowledges the sustained efforts of “Clean Coonoor” and community stakeholders in transforming a legacy dumpsite into a productive facility.

At the facility, waste is sorted to recover recyclables like aluminium, steel, and glass for authorized recyclers, while non-recyclable combustible waste is baled and sent to cement industries as Alternate Fuel Resource. Through decentralized processing, recycling, composting, and community engagement, Coonoor has reduced landfill dependence and advanced a circular economy model.

**BEST PRACTICES ADOPTED IN THE STATE OF MAHARASHTRA****1. Panchgani City, Maharashtra – Sustainable Solid Waste Management in a Hill Station**

Panchgani, a hill station in Satara district of Maharashtra at an altitude of 1,334 m, has developed a sustainable solid waste management system under the Swachh Bharat Mission (Urban) and Swachh Survekshan. The municipality has introduced innovative practices in sanitation, waste segregation, plastic waste management, and decentralized processing, making it a model for other hill towns.

The municipality ensures 100% door-to-door collection of segregated waste from 2,824 households and 227 commercial establishments, generating about 6.21 tonnes of waste per day (5.01 TPD wet waste and 1.2 TPD dry waste). Waste is transported to a centralized Swachh Bharat Point for further processing. Organic waste is treated through a 6 TPD biomethanation plant, converting wet waste into biogas used for in-house SWM operations, while additional organic waste is processed in 7 TPD composting pits to produce compost. Dry waste is segregated and recycled, ensuring minimal landfill disposal.

Panchgani has adopted innovative circular economy practices, including converting multi-layered plastic waste into benches and interlocking tiles used in tourist areas, thereby diverting nearly 20 tonnes of plastic from landfills. Community participation is strengthened through Swachhagrahis (trained SHG members) conducting awareness campaigns and behaviour change campaigns. The municipality has further introduced digital waste intelligence technology (Recity platform) for real-time monitoring of waste segregation and collection, along with digital profiling of sanitation workers to track welfare measures and training. Through community engagement, technological integration, decentralized processing, and plastic upcycling.

**BEST PRACTICES ADOPTED IN THE STATE OF ARUNACHAL PRADESH**

**1. Sangti Village, West Kameng District**

Sangti Village in West Kameng district has developed a community-driven waste management system rooted in local participation and traditional governance. All waste generators, including households, shops, monasteries, schools, and homestays, practice source segregation. Wet waste is composted locally, while dry waste is stored in sacks and collected periodically by male villagers on a rotational basis, transported to the Material Recovery Facility using a community-provided vehicle.

Over 100 SHG members under Sangti Valley PLF and Namdoling PLF carry out secondary segregation of dry waste into nearly 20 recyclable categories on culturally significant Monpa holy days. Recyclables are sold to scrap dealers in Dirang, entering recycling chains in Assam, with revenues transferred to PLFs, thereby sustaining participation and strengthening women's leadership.

The system is supported by strong governance through the Village Water and Sanitation Committee, which oversees monthly clean-up drives and enforces compliance via user fees and penalties. Households contribute ₹50 per month and commercial establishments ₹100, while strict fines of ₹500 for minor violations and ₹5,000 for serious offences maintain discipline. As of July 2025, over 183 tonnes of waste have been diverted from open dumping and burning.

With support from the Deputy Commissioner and partner foundations, infrastructure is being strengthened through baling machines and plans for a Waste-to-Resource Centre, making Sangti a replicable model for remote mountain villages.

**BEST PRACTICES ADOPTED IN THE STATE OF HIMACHAL PRADESH**

**1. Mansari Village, Kangra District – Community-Based Dry Waste Management**

Mansari Village in Kangra district has established a community-based dry waste management system that reduces landfill pressure, supports recycling industries, and generates local employment. The Material Recovery Facility (MRF) serves as the central hub, with a vehicle collecting segregated dry waste from around 100 commercial establishments and three Gram Panchayat namely Gojra, Karjan, and Soyal for daily transport to the facility.

At the MRF, trained workers conduct detailed secondary segregation. Plastics are divided into five categories, metals into three, and paper into cardboard and mixed paper. Glass is sorted by colour and brand, while e-waste is safely stored for authorized recyclers. Textile waste is reused or upcycled, including as filling material for mattresses and pillows, promoting circular economy practices.

The facility is equipped with a shredder, generator, and baling machine to improve efficiency and reduce transport costs. Single-use plastics are compacted and sent to Baddi for conversion into Refuse-Derived Fuel. Through structured collection, efficient segregation, and resource recovery, the Mansari model demonstrates how community participation and decentralized infrastructure can deliver a sustainable dry waste management system in rural areas.

**BEST PRACTICES ADOPTED IN THE STATE OF MEGHALAYA**

The Government of Meghalaya has undertaken measures to eliminate single-use plastics through coordinated enforcement and awareness initiatives. District Level Task Forces comprising officials from the Deputy Commissioner's office, Meghalaya State Pollution Control Board, Municipal Boards, Khasi Hills Autonomous District Council, Police Department, and other members conduct regular inspections, raids, and seizure drives across markets and commercial areas to ensure compliance with plastic waste management regulations.

Further, enforcement, awareness campaigns are carried out during inspection drives to educate shopkeepers and vendors on the hazards of single-use plastics. Traders are advised against stocking or selling banned items and encouraged to adopt eco-friendly alternatives such as cloth bags and reusable packaging. This combined approach of strict enforcement and behavioural change communication has strengthened public participation and improved compliance.

Community-driven practices further highlight Meghalaya's approach. In Rongram (West Garo Hills), municipal authorities manage systematic waste collection from markets and households, with additional collection during the weekly Friday market. In Mawlynnong (East Khasi Hills), recognized for its cleanliness, traditional methods are used i.e. bamboo cones serve as dustbins, biodegradable waste is composted or fed to pig farms, and non-biodegradable waste is stored until designated collection days.

These examples demonstrate how community participation and traditional knowledge contribute to effective waste management in rural areas.

**BEST PRACTICES ADOPTED IN THE STATE OF GOA**

**1. Dry Waste Management in Hilly Panchayats of South Goa**

In the hilly Panchayats of South Goa, a structured dry waste management system has been established through decentralized Material Recovery Facilities (MRFs) and a centralized hub at Cacora. Dry waste collected from households and commercial establishments is first segregated at local MRFs and then transported to the Cacora facility, where recyclables are further sorted and sent to authorized vendors, ensuring systematic resource recovery.

The non-recyclable fraction is processed as Refuse Derived Fuel (RDF). At Cacora, this waste is compacted and baled before being transported to cement industries in Karnataka for co-processing in kilns. This approach prevents landfill disposal and supports energy recovery through industrial utilization.

Best practices include decentralized MRFs that promote segregation and reduce transport costs, household composting to manage wet waste at source, and the role of Cacora as a regional hub for dry waste. Co-processing of RDF in cement plants provides an environmentally sound solution, minimizing landfill dependency and advancing circular waste management practices.