APPROACH NOTE

Developing a Model District Disaster Risk Reduction Strategy and Minimum Readiness Standards for Haryana

Submitted by

SDGCAC
SUSTAINABLE DEVELOPMENT GOALS
COORDINATION AND ACCELERATION CENTRE

OUTPUT- 2 : SDG Localization for Resilient Growth Centers

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1. Introduction

The state's risk profile is complex and multi-dimensional, encompassing riverine floods in the Yamuna/Ghaggar belts, severe heatwaves in the southern and western districts, seismic vulnerabilities (Zone IV), and significant industrial/chemical hazards in key economic hubs (Gurugram, Panipat, Manesar). While the Haryana State Disaster Management Authority (HSDMA) and the State Disaster Management Plan (HSDMP 2016) provide a robust institutional umbrella, operationalizing this at the district level requires standardized, actionable, and updated frameworks.[1,2]

This Approach Note outlines the methodology for delivering two critical operational instruments:

1. **The Model District Disaster Risk Reduction (DRR) Strategy Framework**
2. **The District Preparedness & Response Checklist (with Minimum Readiness Standards)**

2. Alignment with Sustainable Development Goals (SDGs) and International Frameworks

This DRR framework directly supports the localization of global goals at the district level, shifting the focus from reactive disaster response to proactive, sustainable risk mitigation. It is further aligned with the Sendai Framework for Disaster Risk Reduction 2015–2030, particularly Target E (substantially increase the number of countries/regions with local DRR strategies) and the four priorities of action: (i) Understanding disaster risk; (ii) Strengthening disaster risk governance; (iii) Investing in DRR for resilience; and (iv) Enhancing disaster preparedness for effective response.[3,4]

- **SDG 11 (Sustainable Cities and Communities):** Enhancing urban flood resilience and early warning systems in high-density growth hubs like Gurugram and Faridabad.

[1]Sendai Framework for Disaster Risk Reduction 2015-2030, UNDRR — https://www.undrr.org/publication/sendai-framework-disaster-risk-reduction-2015-2030

[2]Disaster Management (Amendment) Act, 2025 — https://prsindia.org/billtrack/the-disaster-management-amendment-bill-2024

[3]Monitoring the Sendai Framework, UNDRR — https://www.undrr.org/implementing-sendai-framework/monitoring-sendai-framework

[4]UNDRR Policy Brief: Gender-Responsive DRR — https://www.undrr.org/publication/policy-brief-gender-responsive-disaster-risk-reduction

- **SDG 13 (Climate Action):** Institutionalizing localized climate adaptation strategies, specifically addressing the rising frequency of extreme heatwaves and erratic monsoon patterns.
- **SDG 3 (Good Health and Well-being):** Mitigating the public health impacts associated with heat-stress and potential industrial chemical emergencies.
- **SDG 9 (Industry, Innovation, and Infrastructure):** Safeguarding critical economic zones (e.g., Panipat, Manesar) through rigorous off-site emergency planning and hazard mapping.
- **SDG 5 (Gender Equality):** Ensuring gender-responsive disaster risk reduction in line with the Sendai Framework Gender Action Plan, recognizing that women and girls face differentiated disaster impacts due to social norms and structural inequalities.

3. Baseline Assessment: The "As-Is" Scenario

A comprehensive desk review of the existing District Disaster Management Plans (DDMPs) across Haryana's 23 districts (detailed in the **Annexure — DDMP Baseline Assessment & Pan-India Best Practice Mapping**) reveals both foundational strengths and critical opportunities for enhancement:

- **DDMPs Availability:** While districts like Jhajjar (2025), Nuh (2025-26), and Sonipat (2022-23) possess recently updated plans, several districts rely on plans dated pre-2020. Furthermore, comprehensive DDMPs are not publicly accessible for seven districts (including newly notified Hansi, Bhiwani, and Sirsa), representing a priority area for capacity building.[5]
- **Framework Readiness:** Existing plans predominantly follow the NIDM/HIPA templates, incorporating Incident Response Systems (IRS) and basic resource inventories. However, they frequently lack localized, GIS-based Hazard, Risk, Vulnerability, and Capacity (HRVC) assessments.[6]
- **Standard Operating Procedures (SOPs):** While state-level SOPs exist (e.g., the 2019 Heat Wave Action Plan, annual Flood Control Orders), district-level calibration — such as ward-level urban flood SOPs or localized temperature-threshold alerts — remains an area for strategic intervention.[7]

[5]HSDMA Portal, Government of Haryana — https://hsdma.haryana.gov.in

[6]NDMA District Plans Repository — https://ndma.gov.in

[7]NDMA Annual Report 2024-2025 — https://ndma.gov.in/sites/default/files/PDF/Reports/Annual_Report_2024-25_English.pdf

Figure 1: DDMP Availability Status Across 23 Haryana Districts

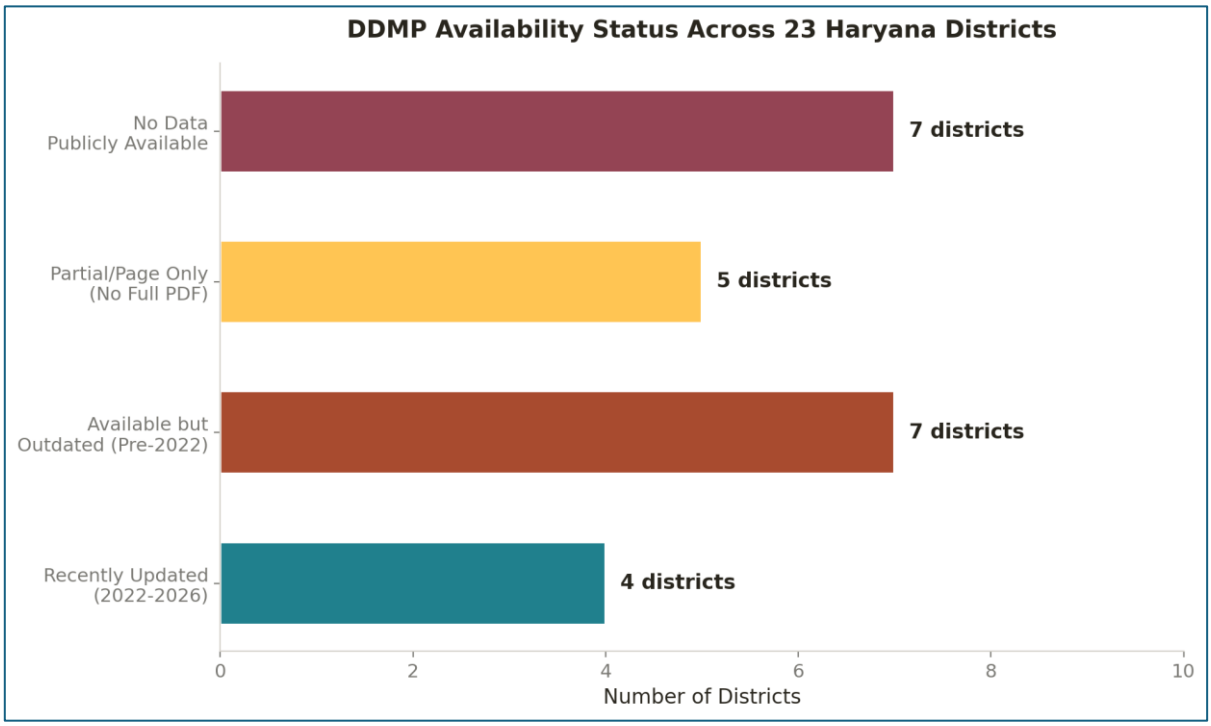
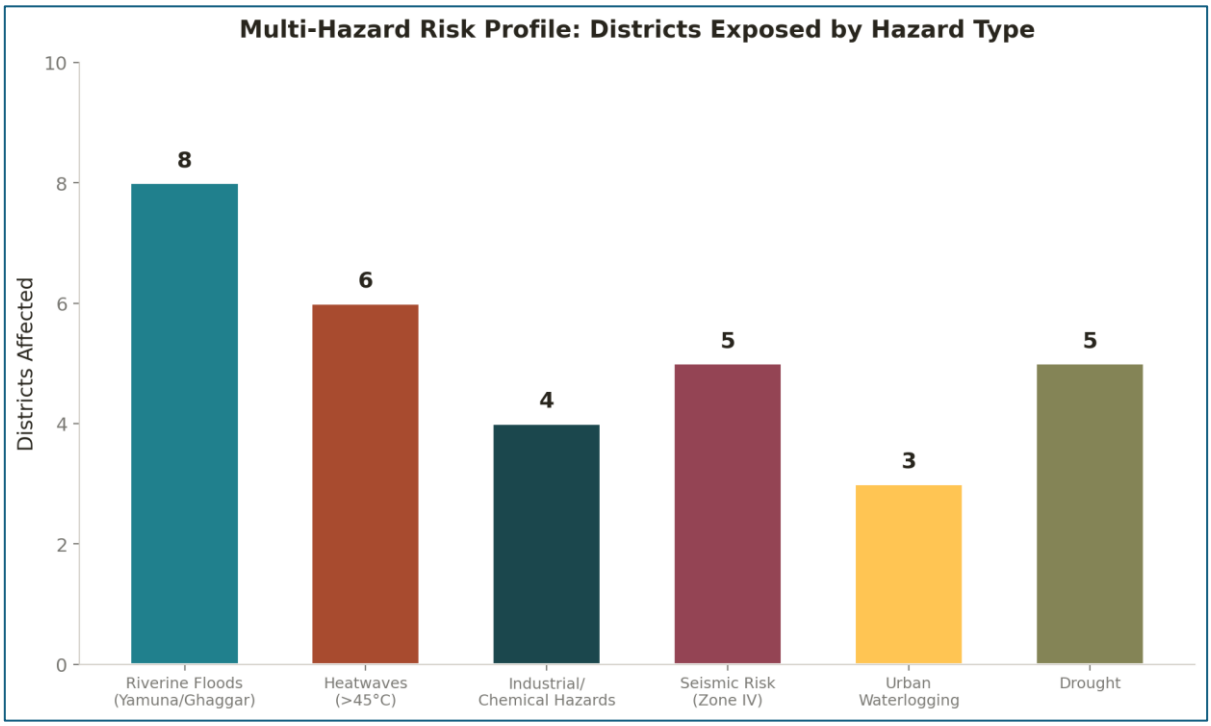


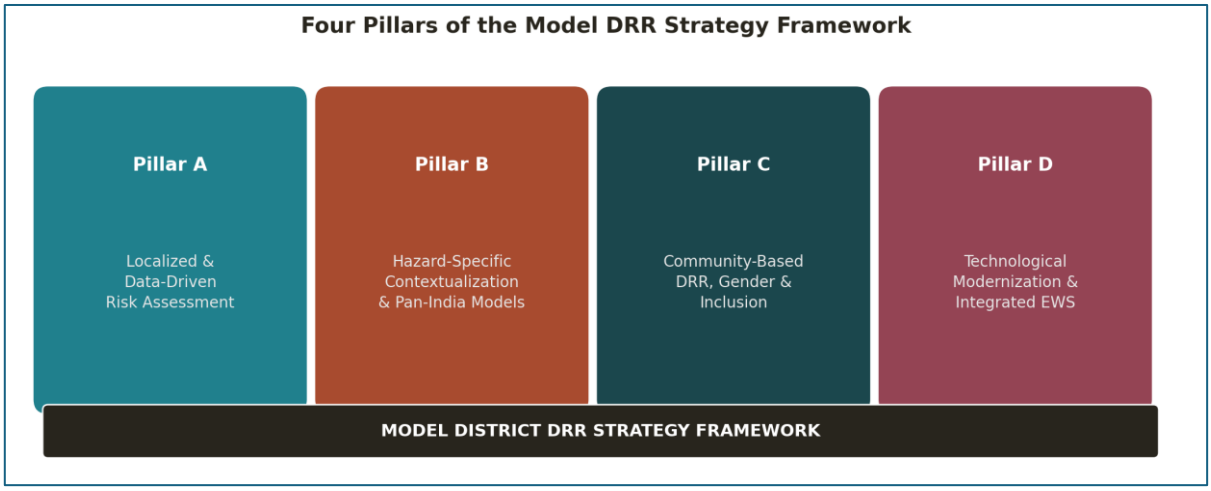
Figure 2: Multi-Hazard Risk Profile



4. Core Pillars of the Model District DRR Strategy Framework

To transition districts from reactive response to proactive risk reduction, the proposed Model DRR Strategy will be built on four foundational pillars, integrating proven Pan-India best practices.

Figure 3: Four Pillars of the DRR Strategy Framework



Pillar A: Localized & Data-Driven Risk Assessment

The framework will shift from generic hazard profiling to localized, quantitative vulnerability mapping.

- **Tech-Integration:** Leveraging NRSC/ISRO satellite-based flood inundation mapping and the Haryana Water Resources Atlas 2025 to create spatial hazard maps.[8]
- **Integrated Flood Monitoring System:** Given the temporal limitations of satellite platforms — Sentinel-1A (~6-day revisit with constellation; now effectively ~12 days after 1B failure) and RISAT-1A (~12-day CRS mode revisit, reducible with tasking) — the proposed flood monitoring system must be integrated with calibrated hydrological models to bridge observation gaps. The framework will specifically integrate real-time IMD rainfall data streams and CWC river discharge data to provide continuous situational awareness between satellite passes.[9,10,11]
- **Urban Flood Early Warning:** Adapting principles from the iFLOWS (Mumbai) system for high-density urban centres like Gurugram, focusing on densified rain gauge networks and real-time drain capacity monitoring.

Pillar B: Hazard-Specific Contextualization (Pan-India Model Integration)

The strategy will not use a "one-size-fits-all" approach. Instead, it will propose pilot frameworks tailored to district-specific risks:

[8]NRSC/ISRO Bhuvan Flood Mapping — https://bhuvan.nrsc.gov.in

[9]IMD District-wise Rainfall Distribution — https://mausam.imd.gov.in/imd_latest/contents/rainfall_statistics_3.php

[10]CWC Flood Forecasting Division — https://www.cwc.gov.in/en/flood-forecasting-hydrological-observation

[11]CWC Flood Forecast System — https://ffs.india-water.gov.in

- **Industrial & Chemical Hazards (Panipat, Manesar):** Adapting the Gujarat State Chemical Disaster Management Plan, standardizing cluster-specific 'Off-site Emergency Plans' with mandated buffer-zone mapping and inter-agency mock drills (involving DISH, GPCB, PESO).
- **Heatwave Resilience (Hisar, Sirsa, Narnaul):** Evolving the state's existing plans by adopting the Ahmedabad Heat Action Plan (HAP) model. This includes defining micro-level, colour-coded temperature thresholds (accounting for humidity) and deploying cool-roof protocols. Critically, the heatwave framework will also address the impact on informal sector workers and non-agricultural livelihoods — including street vendors, construction workers, rickshaw drivers, and gig workers — who face severe income loss during heat events but remain outside existing occupational health protections. Research indicates that informal workers experience up to 40% earnings loss during heatwaves, with women workers disproportionately affected.[12,13,14]

Pillar C: Community-Based DRR, Gender, and Social Inclusion

Resilience must be localized to the last mile.

- **Panchayat Integration:** Drawing from the Kerala Local Self-Government (LSGI) model post-2018 floods, the framework will advocate for incorporating DRR into Gram Panchayat annual development plans, specifically in flood-prone districts like Karnal and Kaithal.
- **Community Responders:** Adapting the Odisha Cyclone/Flood Shelter model by leveraging NDMA's upscaled Aapda Mitra scheme to train community volunteers in riverine belts (Yamunanagar, Ambala).
- **Gender & Social Parameters in DRR Planning:** In alignment with the Sendai Framework Gender Action Plan, the framework will mandate the integration of gender and social parameters — including social norms affecting women's mobility during emergencies, caregiving burdens, and access to early warnings — which are often not captured properly in existing databases but are critical when responding to or planning for recovery. Sex, age, and disability-disaggregated data (SADDD) will be incorporated into HRVC assessments.[15]
- **Critical Shelter & Health Infrastructure Assessment:** Beyond housing stock, the framework will assess the disaster resilience of infrastructure used as emergency shelters, health facilities (PHCs, CHCs, district hospitals), schools, and Anganwadi centres. This is particularly important as these facilities are often the first line of disaster response but their structural vulnerability is rarely assessed systematically.[16]

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[12] IndiaSpend, "How Extreme Heat Affects India's Informal Women Workers," Feb 2026 — https://www.indiaspend.com/earthcheckindia/how-extreme-heat-affects-indias-informal-women-workers-979259

[13] The Lancet Countdown 2024: India Policy Brief on Health and Climate Change

[14] Down to Earth, "Sweat for survival?," Feb 2026 — https://www.downtoearth.org.in/climate-change/sweat-for-survival-how-long-can-indias-informal-labour-bear-the-heat

[15] UNDRR Gender Inequality & DRR — https://www.undrr.org/implementing-sendai-framework/sendai-framework-action/gender

[16] CEEW, "Making India's Healthcare Infrastructure Climate Resilient," Oct 2024 — https://www.ceew.in/publications/climate-risk-assessment-for-critical-infrastructure-and-healthcare-resilience

Pillar D: Technological Modernization of Early Warning

- **Common Alerting Protocol (CAP):** Integrating the NDMA SACHET platform with all District Emergency Operation Centres (DEOCs) to enable geo-targeted, multi-lingual SMS/Cell Broadcast alerts.
- **Drone Integration:** Standardizing drone deployment protocols for pre-monsoon embankment surveys and rapid post-disaster damage assessment.
- **Integrated Real-Time Data Streams:** Establishing a unified dashboard at the DEOC level that integrates CWC flood forecasts (covering 325 stations nationally with 6–72 hour advance warnings), IMD district-wise rainfall data, and satellite imagery to provide continuous situational awareness for decision-makers.[17]

5. The District Preparedness & Response Checklist (Minimum Readiness Standards)

To operationalize the DRR strategy, a standardized "Ready Reckoner" will be developed for District Commissioners/Magistrates, Revenue Officers, and nodal departments. This checklist will establish Minimum Readiness Standards, including:

1. **Administrative Readiness:** Standardized IRS activation flowcharts, nodal officer directories, and updated District Disaster Management Resource Inventories (DDMRI).
2. **Infrastructure Readiness:** Pre-monsoon drain desilting protocols, pump operator rosters, evacuation shelter logistics, and structural assessment of designated shelters and health facilities.
3. **Community Protocols:** Vernacular (Hindi, Hariyanvi) "Do's and Don'ts" pocket-cards and ward-level communication trees.
4. **Gender & Inclusion Protocols:** Dedicated protocols for women, elderly, persons with disabilities, and informal sector workers, including provisions for safe shelters with gender-segregated facilities, communication channels accessible to marginalized groups, and post-disaster livelihood recovery support.

6. Responsibility Matrix: Key Actions Mapped to Nodal Agencies

The following responsibility matrix maps key strategic actions to nodal departments and supporting agencies to ensure clear accountability in implementation:

Strategic Action	Nodal Department / Agency	Supporting Agencies
Overall DRR Strategy Coordination	DDMA (chaired by DC/DM)	HSDMA, Revenue & DM Dept.
HRVC Assessment & Hazard Mapping	HSDMA / SDGCAC	NRSC/ISRO, Survey of India, NIDM

[17] CWC issues over 7,000 flood forecasts annually covering 197 towns and 128 reservoirs; services available May–December. Source: CWC Flood Forecasting Division — https://www.cwc.gov.in/en/flood-forecasting-hydrological-observation

Strategic Action	Nodal Department / Agency	Supporting Agencies
Flood Monitoring & EWS Integration	Irrigation & Water Resources Dept.	CWC, IMD, DEOC, GMDA
Heatwave Action Plan Implementation	Health Department / DDMA	IMD, Revenue Dept., Labour Dept., ULBs
Industrial/Chemical Emergency Planning	DISH (Dept. of Industries)	PESO, HSPCB, District Fire Services
Community-Based DRR & Aapda Mitra	Revenue & DM Department	NDRF, PRIs/ULBs, CSOs, Red Cross
Shelter & Health Infrastructure Assessment	PWD / Health Department	DDMA, NHM, District Education Dept.
Gender-Responsive DRR Planning	Women & Child Development Dept.	DDMA, CSOs, Panchayati Raj Dept.
DDMP Preparation & Updation	DDMA / Revenue Department	HSDMA, NIDM, UNDP-SDGCAC
Real-time Data Integration (DEOC)	IT Department / DEOC	CWC, IMD, NRSC, NIC
Capacity Building & Mock Drills	HSDMA / NIDM	NDRF, Fire Services, Civil Defence
CSR Coordination for Industrial Zones	District Administration	CII/FICCI local chapters, DISH

7. Institutional Governance & Resource Mobilization

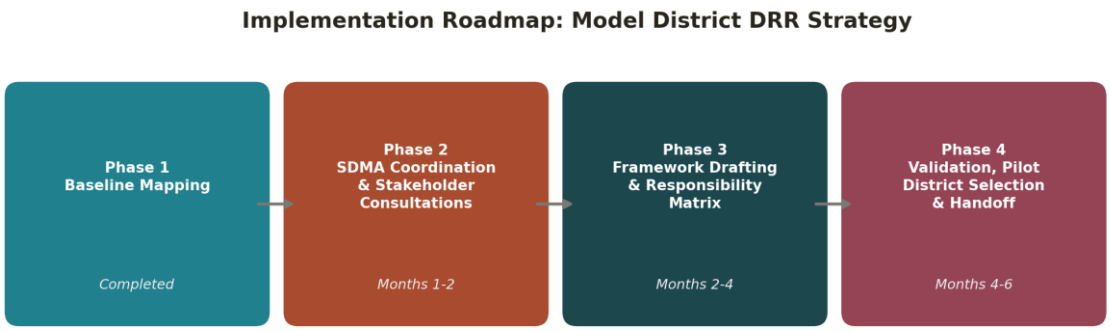
For the strategy to be successfully implemented and sustained, it must be anchored in existing administrative mechanisms and pragmatic funding streams:

- **Governance via DDMAs:** The District Disaster Management Authority (DDMA), chaired by the District Magistrate / Deputy Commissioner, will serve as the primary nodal agency. The framework will emphasize convergence among line departments (Revenue, Irrigation, Public Health, Urban Local Bodies/PRIs, and Women & Child Development).
- **SDMA Coordination:** Before proposing formal implementation, the framework's scope and proposed activities will be presented to the Haryana SDMA for alignment with existing proposals and mandates under the Disaster Management (Amendment) Act, 2025. The Haryana government is currently fast-tracking the establishment of a dedicated Haryana State Disaster Response Force (HSDRF), which provides a window for embedding the DRR strategy within the state's evolving institutional architecture.[18]
- **Resource Mobilization:** The rollout of pilot models and readiness checklists will identify synergies with existing funding windows, including the capacity-building components of the State Disaster Response Fund (SDRF), 15th/16th Finance Commission grants earmarked for disaster mitigation, and targeted Corporate Social Responsibility (CSR) partnerships within industrial hubs.

[18] Punjab Newsline, "Haryana Accelerates SDRF Establishment," Jan 2026 — https://www.punjabnewsline.com/news/haryana-accelerates-establishment-of-dedicated-state-disaster-response-force-under-disaster-management-act-2025-%E2%80%93-dr-s-99980

8. Next Steps

Figure 4: Implementation Roadmap



The development of the Model Strategy and Checklists will follow a consultative, participatory approach to ensure state ownership and operational feasibility.

Summary Timeline

Phase	Key Activities	Timeline	Key Deliverables/Milestones
Phase 1: Baseline Mapping	Desk review of DDMPs, SOPs; identification of Pan-India best practices; preparation of Approach Note	Completed (March 2026)	Approach Note with DDMP Baseline Assessment & Best Practice Mapping
Phase 2: SDMA Coordination & Stakeholder Consultations	Formal engagement with SDMA to align activities; structured workshops with HSDMA, District Administrations, GMDA, and sectoral departments (Irrigation, Health, ULBs, DISH, WCD); validation of proposed pilot models	April – May 2026	SDMA alignment confirmation; stakeholder workshop proceedings; validated pilot model selection
Phase 3: Framework Drafting & Responsibility Matrix	Formulation of Model District DRR Strategy Framework; development of Minimum Readiness Checklists; finalization of implementation responsibility matrix; integration of gender, social inclusion, and informal economy parameters	May – July 2026	Draft Model DRR Strategy Framework; Minimum Readiness Standards Checklist; Responsibility Matrix
Phase 4: Validation, Pilot District Selection & Handoff	Final review with state authorities; pilot district prioritization (Gurugram — urban floods; Panipat — industrial hazards; Hisar/Sirsa — heatwave resilience); formal handoff to DDMA/HSDMA	August – September 2026	Validated DRR Strategy Framework; Implementation Matrix with pilot district action plans; Handoff report to State Government

Annexure - DDMP Baseline Assessment & Pan-India Best Practice Mapping

This desk review maps the current status of District Disaster Management Plans (DDMPs) across Haryana's 23 districts, evaluates their framework readiness, and identifies actionable Pan-India DRR models that can be contextualized for Haryana's specific hazard profile. The assessment finds that while a majority of districts have prepared DDMPs, many plans are dated (pre-2020) and lack localized Hazard, Risk, Vulnerability, and Capacity (HRVC) assessments. The review also identifies five national best-practice models from Odisha, Ahmedabad, Mumbai, Gujarat, and Kerala along with emerging technologies such as NDMA's CAP-based SACHET system and drone-based assessment protocols that Haryana can pilot across high-risk districts.

Data Limitations & Methodology Note

This assessment is based on publicly accessible documents on official government portals (.gov.in, .nic.in, ndma.gov.in, hdma.gov.in) and verified secondary sources as of 8th March 2026. The following limitations apply:

- Internal DDMPs: Several districts may have DDMPs that exist as internal administrative documents but are not published on their web portals. The absence of a plan on a portal does not necessarily mean the plan does not exist.
- HSDMA Portal Content: The HSDMA portal's "District DDMP English" section could not be fully accessed during this review; plans hosted there may supplement the NDMA repository.
- Newly Notified District: Hansi's formal status and administrative handover timeline were not fully verifiable from public sources.
- DDMP Updation: Web-hosted DDMPs may not reflect the most recent internal revisions if updated copies have not been uploaded.

Section 1: Haryana DDMP Status & Readiness Matrix

The Haryana State Disaster Management Authority (HSDMA), constituted in 2007, provides the institutional umbrella for district-level planning. The Haryana State Disaster Management Plan (HSDMP) 2016 establishes the framework and role clarity for rapid mobilization of resources. Each district is mandated under the DM Act, 2005 to prepare and periodically update its DDMP. The HSDMA portal[19] hosts a dedicated "District DDMP" section in both Hindi and English.

The following matrix consolidates publicly accessible DDMPs as of March 2026. Data was sourced from NDMA's repository[20], HSDMA[19], and individual district NIC portals (.nic.in / .gov.in). Where no plan was located on any official portal, this is explicitly noted.

[19] http://hdma.gov.in/en
[20] https://ndma.gov.in/sites/default/files/PDF/SDMP/SDMP%20HARYANA%2007.10.2016.pdf

District	DDMP Availability	Year of Update	Key Hazards	Opportunities for Enhancement
Ambala	DDMA page exists; full DDMP PDF not publicly accessible	Undated	Riverine floods (Ghaggar/Tangri), waterlogging	Scope to develop updated DDMP with localized HRVC for Ghaggar basin flooding
Bhiwani	No Data Publicly Available	—	Floods, drought, seismic (Zone IV)	Priority district for DDMP development; integrate earthquake preparedness SOPs
Charkhi Dadri	No Data Publicly Available	—	Drought, industrial hazards	Needs first-generation DDMP with industrial hazard mapping
Faridabad	Available (NDMA)	2017	Urban flooding, industrial hazards, epidemics	Update overdue; integrate urban flood SOPs, chemical hazard off-site plans for Ballabhgarh industrial zone
Fatehabad	DDMA page exists; no DDMP PDF located	—	Floods (Ghaggar drainage), drought	Prepare digitized DDMP with flood-drought dual hazard framework
Gurugram	Available (NDMA)	2020	Urban flooding, industrial/chemical hazards, road accidents	Integrate ward-level urban flood SOPs, real-time rainfall monitoring; includes IRS, resource inventory, hazard assessment
Hisar	Available (NDMA)	2019–20	Heatwaves, drought, floods	Integrate localized Heat Action Plan and drought-specific protocols for Rajasthan border villages
Jhajjar	Available (District Portal)	2025	Seismic (Zone IV), urban flooding, industrial	Recently updated; one of the most current DDMPs in the state
Jind	Available (NDMA)	2017	Floods, waterlogging, epidemics	Plan significantly outdated; needs updated HRVC, IRS refresh, community preparedness modules
Kaithal	District Disaster Profile and crisis planning documents available; full DDMP PDF not located	—	Floods (Ghaggar system), waterlogging	Develop comprehensive DDMP building on existing disaster profile
Karnal	Available (NDMA)	Pre-2020 (undated)	Riverine floods (Yamuna), waterlogging, industrial	Needs dated refresh; 70 km Yamuna frontage requires updated embankment status

				and village-level evacuation plans
Kurukshetra	DDMP page exists on district portal	Undated	Floods, waterlogging	Develop publicly accessible PDF; integrate satellite-based flood mapping (NRSC data available)
Mahendragarh	Available (District Portal)	2022	Heatwaves, drought, fire	Integrate heat action plan; temperatures have reached 47.5°C
Nuh (Mewat)	Available (District Portal)	2025–26	Floods, drought, road accidents	One of the most recently updated DDMPs; a positive baseline for other districts
Panchkula	Available (District Portal / NDMA)	2018–19	Riverine floods (Ghaggar/Shivalik streams), soil erosion, landslides, epidemics	Update needed with localized landslide/flash flood protocols for sub-mountainous terrain
Palwal	No comprehensive DDMP PDF located	—	Floods (Yamuna khadar belt), drought, road accidents	Priority for development; flood-free plan under CM initiative for completion by 2027–28
Panipat	Available (NDMA)	2020	Floods, industrial/chemical hazards (refinery, NFL), terrorism	Includes IRS, SOPs, rapid damage assessment framework, and chemical emergency protocols
Rewari	Available (District Portal)	Undated	Drought, heatwaves, road accidents	Accessible on portal with links to mini-secretariat and railway station DM plans; needs year-specific update
Rohtak	Available (Scribd reference; old plan)	2010	Floods (Drain system), seismic (Zone IV)	Significantly outdated; needs comprehensive revision with updated flood drain data and seismic preparedness
Sirsa	No Data Publicly Available	—	Heatwaves, floods (Ghaggar), drought	Recorded 48.4°C (2024); urgent need for DDMP with integrated Heat Action Plan
Sonipat	Available (NDMA)	2022–23	Floods (Yamuna), seismic (Zone IV), industrial	Most recently updated NDMA-hosted DDMP; includes flood control room details, IRS, and resource inventory
Yamunanagar	DDMA page exists; plan under updation	2018	Riverine floods (Yamuna), industrial accidents, landslides	Portal explicitly states "DDMP for year 2018 will be updated soon"; high flood vulnerability demands urgent revision

Hansi (New District)	No Data Publicly Available	—	Heatwaves, drought	Newly notified district carved from Hisar; first-generation DDMP development required

Key Observations

- **DDMP Availability**: Of 23 districts, approximately 14 have some form of publicly accessible DDMP, though quality and currency vary significantly.
- **DDMP Updations**: Only Jhajjar (2025), Nuh (2025–26), and Sonipat (2022–23) have plans updated within the last three years. Several plans date to 2017 or earlier.
- **Accessibility**: The NDMA repository hosts PDFs for approximately 10 Haryana districts. Several district portals (.nic.in / .gov.in) host plans locally but with inconsistent formatting and discoverability.
- **Critical Gaps**: Bhiwani, Charkhi Dadri, Sirsa, Palwal, Fatehabad, and the newly formed Hansi district have no publicly accessible DDMPs, representing a significant preparedness deficit.

Section 2: Framework Readiness & SOP Assessment

HRVC Integration Assessment

The DDMPs that are available generally follow the NIDM/HIPA template structure, which includes chapters on hazard and risk assessment, institutional mechanisms, prevention and mitigation measures, capacity building, response and relief, and reconstruction. The Gurugram DDMP 2020, for instance, includes a dedicated chapter on "Hazard & Risk Assessment" based on historical disaster data and incorporates structural and non-structural mitigation measures. The Panipat DDMP 2020 explicitly includes "Hazard Analysis, Incident Response System (IRS), Emergency Preparedness Checklist, and Standard Operating Procedures (SOPs) for different stakeholders".[21,22]

However, a localized, quantitative HRVC assessment conforming to contemporary standards (spatial hazard mapping, ward/block-level vulnerability indexing, capacity gap analysis) is generally absent from the older plans. The Haryana Sub-Regional Plan for NCR-2021 noted that district plans should include "demarcation of areas vulnerable to different forms of disasters" and "capacity-building and preparedness measures," but implementation at the granular level remains uneven.[23]

Inventory of Preparedness Checklists & SOPs

Based on the desk review, the following operational checklists and SOPs are either present within available DDMPs or circulated through the HSDMA/Revenue Department framework:

[21] https://ndma.gov.in/sites/default/files/PDF/DDMP/Haryana/Gurugram.pdf
[22] https://ndma.gov.in/sites/default/files/PDF/DDMP/Haryana/Panipat.pdf
[23] https://tcpharyana.gov.in/ncrpb/FINAL%20SRP%20FOR%20WEB-HOSTING/15_Disaster%20Management.pdf

Administrative Readiness SOPs commonly found in DDMPs:

- Incident Response System (IRS) activation protocols (present in Gurugram, Panipat, Sonipat, Jind DDMPs)[24,25,26]
- Emergency Support Functions (ESFs) matrix with designated nodal departments
- Flood Control Room rosters with details of pump operators and emergency contacts (Sonipat, Karnal DDMPs include specific flood control room details)[24,27]
- District Disaster Management Resource Inventory (DDMRI) in tabular/Excel format
- Rapid Damage and Need Assessment (RDNA) templates (Preliminary, Detailed, and Final formats)[26]
- Nodal officer directories for DDMA members, district crisis group, and police control rooms[24]

Hazard-Specific Preparedness Checklists identified:

Checklist / SOP	Status & Source
Heat Wave Action Plan	State-level plan developed (2019) with checklists for City Magistrates, Revenue Officers, Health Department, Municipal Corporations, Labour Department, ULBs, and Police; includes pre-summer, during-event, and post-summer evaluation protocols[28,29]
Cold Wave & Frost Action Plan	Developed by Revenue & DM Department with stakeholder roles defined[30]
Flood Control Order	Annual order issued by Revenue Department; available on HSDMA portal[31]
Pre-Monsoon Drain Desilting Protocol	Referenced in Haryana State Drought Relief & Flood Control Board (HSDR&FCB) proceedings; 444 new flood schemes proposed for monsoon 2023[32]
Mock Drill Protocols	Referenced in DDMPs; HSDMA/NDMA conduct periodic mock drills
Chemical Emergency SOPs	Present in Panipat DDMP (NFL ammonia incident reference); fire-fighting agents and antidotes listed[26]
Citizen Do's & Don'ts	Available on HSDMA portal under "Citizen Corner" for: Earthquake, Flood, Fire, Heatwave/Coldwave, Lightning, Storm, Chemical/Industrial, Landslides, Nuclear, Smog[31]

[24] https://ndma.gov.in/sites/default/files/PDF/DDMP/Haryana/Sonipat.pdf
[25] https://ndma.gov.in/sites/default/files/PDF/DDMP/Haryana/Jind.pdf
[26] https://ndma.gov.in/sites/default/files/PDF/DDMP/Haryana/Panipat.pdf
[27] https://ndma.gov.in/sites/default/files/PDF/DDMP/Haryana/Karnal.pdf
[28] https://heathealth.info/resources/haryana-heatwave-action-plan/
[29] https://www.scribd.com/document/901051650/21-Haryana-Heat-Action-Plan
[30] https://cdnbbsr.s3waas.gov.in/s31177967c7957072da3dc1db4ceb30e7a/uploads/2025/12/2025122447112570.pdf
[31] http://hdma.gov.in/en
[32] https://hid.gov.in/Uploads/NewsRelease/Final%20Agenda%2054th%20HSDR&FCB%20Meeting_compressed.pdf

Evacuation & Relief Distribution Design	Present in Faridabad DDMP with flood-prone village-specific logistics plan[33]

Strengths in Current Preparedness Framework

- The HSDMA portal provides a centralized repository of citizen-facing advisories across 10+ hazard categories.
- The Heat Wave Action Plan (2019) is a relatively well-structured document with department-specific checklists modeled after the Ahmedabad HAP framework.
- The Haryana State Drought Relief & Flood Control Board meets regularly to approve flood protection schemes (323 new schemes approved in 53rd meeting, 444 proposed in 54th).
- Recent updates to Jhajjar (2025) and Nuh (2025–26) DDMPs indicate institutional momentum toward plan currency.[34,35]

Enhancement Opportunities

- **Localized HRVC**: Move from template-based hazard description to GIS-integrated, ward/block-level vulnerability mapping across all 23 districts.
- **SOP Standardization**: Develop a common "Ready Reckoner" handbook for district-level officers with standardized IRS activation flowcharts, emergency contact templates, and resource mobilization protocols.
- **Digital Accessibility**: Ensure all DDMPs are published on both district portals and the centralized HSDMA/NDMA repository in searchable PDF format with version dating.
- **Community Preparedness Protocols**: Expand citizen-facing advisories into localized, vernacular "pocket cards" distributed through Panchayat networks.

Section 3: Consolidated Best Practice Mapping Table

Overview of Pan-India Models

The following analysis maps five proven DRR models from other Indian states to Haryana's specific hazard profiles, along with emerging technology innovations. Each model is assessed for contextual fit, suggested pilot district, and estimated implementation complexity.

Origin State/City	Best Practice Model	Core Features	Why It Fits Haryana	Suggested Pilot District(s)	Estimated Complexity
Odisha	Community-Based DRR: Multipurpose Cyclone/Flood	814+ multipurpose shelters across 25 districts; 400+ trained community	Yamuna/Ghaggar flood belts require decentralized shelter infrastructure and	Yamunanagar, Ambala	High

[33] https://www.scribd.com/document/613253207/nanopdf-com-district-disaster-management-plan-2015
[34] https://jhajjar.nic.in/document/district-disaster-management-plan-2025/
[35] https://nuh.gov.in/document/district-disaster-management-plan-nuh-2025-26/

	Shelters + Aapda Mitra Volunteers	volunteers deployed during Cyclone Fani for evacuation, first aid, relief distribution; shelters double as schools/community halls[36,37,38]	trained community first-responders for rapid evacuation in riverine flood scenarios		
Ahmedabad	Heat Action Plan (HAP) with Threshold-Based Alert System	Four-tier color-coded alert (White ≤41°C, Yellow 41.1–43°C, Orange 43.1–44.9°C, Red ≥45°C); inter-agency coordination protocol; cool roofs program; estimated 1,190 deaths averted annually since 2013[39,40]	Sirsa recorded 48.4°C (2024); Haryana already has a 2019 HAP but lacks district-level threshold calibration and systematic cool-roof deployment[41,42]	Hisar, Sirsa, Narnaul (Mahendragarh)	Low
Mumbai	iFLOWS (Integrated Flood Warning System)	Seven modules: data assimilation, flood modeling, inundation mapping, vulnerability assessment, risk assessment, dissemination, decision support; provides 6–72 hour advance flood	Gurugram experiences severe urban waterlogging (100+ mm rainfall events); needs localized inundation forecasting and real-time drain capacity monitoring[45]	Gurugram, Faridabad	High

[36] https://www.osdma.org/aapada-mitra/?lang=en
[37] https://rsisinternational.org/journals/ijriss/Digital-Library/volume-9-issue-2/4191-4197.pdf
[38] https://www.preventionweb.net/news/following-odisha-example-developing-community-based-disaster-management-india
[39] https://climahealth.info/resource-library/ahmedabads-heat-action-plan-development-and-lessons-learned/
[40] https://www.nrdc.org/sites/default/files/ahmedabad-heat-action-plan-2018.pdf
[41] https://economictimes.com/news/india/blistering-heat-continues-in-haryana-punjab-sirsa-records-48-4-deg-c/articleshow/110471701.cms
[42] https://cdnbbsr.s3waas.gov.in/s3d79c6256b9bdac53a55801a066b70da3/uploads/2020/10/2020101187.pdf
[45] https://timesofindia.indiatimes.com/india/delhi-ncr-rains-gurugram-admin-issues-advisory-for-schools-offices-urges-online-working

		warnings at ward level[43,44]			
Gujarat (GSDMA)	State Chemical Disaster Management Plan with Off-site Emergency Plans	Comprehensive CDMP covering 380+ MAH units; 33 district-level off-site emergency plans; categorization of districts by chemical hazard severity (AA/A/B/C); annual mock drills mandated[46,47,48]	Panipat (refinery, NFL), Manesar (auto/chemical industry), Bahadurgarh (mixed industrial) have concentrated MAH units but lack structured off-site emergency planning	Panipat, Gurugram (Manesar)	Medium
Kerala (KSDMA)	Local Self-Government DM Integration	Post-2018 floods, Kerala mandated DM plans at Grama Panchayat, Municipality, and Corporation levels; plans integrated with annual development plans; approved through Grama Sabha and District Planning Committee; training modules for panchayat-level officials[49,50,51]	Haryana has 6,197+ Gram Panchayats; strengthening GP-level preparedness, especially in flood-prone and heat-affected rural areas, would extend DRR to the last mile[52]	Karnal, Kaithal (flood); Hisar (heat)	Medium

[43] https://www.drishtiias.com/daily-news-analysis/iflows-mumbai-flood-warning-system
[44] https://www.pib.gov.in/PressReleasePage.aspx?PRID=1630928
[46] http://www.gsdma.org/Content/chemical-and-industrial-disaster-4236
[47] https://www.greentribunal.gov.in/sites/default/files/news_updates/Action%20Taken%20Report%20by%20State%20of%20Gujarat%20in%20OA
[48] https://www.scribd.com/document/576713451/Gujarat-State-Chemical-Disaster-Plan
[49] https://sdma.kerala.gov.in/wp-content/uploads/2021/06/Best-practice-document-150621jjg-1.pdf
[50] https://sdma.kerala.gov.in/wp-content/uploads/2021/10/KSDMA_Panchayat-Module_Final.pdf
[51] https://sdma.kerala.gov.in/wp-content/uploads/2025/11/2020-2025-Kozhikode-Village_Gram-Panchayat-Disaster-Management-Plan-1.pdf
[52] https://www.ijcrt.org/papers/IJCRT21X0349.pdf

Analysis of Each Model and Contextualization for Haryana

Odisha: Community-Based Flood Shelter Network & *Aapda Mitra*

Odisha transformed its disaster preparedness following the devastating 1999 Super Cyclone (10,000 fatalities). The state has since constructed 814+ multipurpose cyclone and flood shelters across 25 vulnerable districts, designed to withstand wind speeds of 300 km/hr with elevated platforms, ramps, and solar lighting. These shelters serve dual purposes as schools and community halls during non-disaster periods[37,38].

The *Aapda Mitra* scheme, piloted in Odisha's Puri and Jagatsinghpur districts, trained 400 community volunteers in flood rescue, first aid, and relief coordination. During Cyclone Fani (2019), these volunteers were engaged in early warning dissemination, evacuation of vulnerable populations (elderly, pregnant women, persons with disabilities), and managing community kitchens at shelters[36].

Contextualization for Haryana: The Yamuna and Ghaggar flood belts affect districts like Yamunanagar (221 flood-affected locations in 2023), Ambala (315 locations), and Kurukshetra (298 locations). Multipurpose flood shelters at identified high-risk habitations, combined with trained *Aapda Mitra* volunteers, would create a localized response capacity currently absent from most Haryana DDMPs. NDMA has already upscaled the *Aapda Mitra* scheme to 350 districts nationally with a target of 100,000 trained volunteers.[53,54,55]

Ahmedabad: Heat Action Plan

Launched in 2013 as South Asia's first municipal heat action plan, the Ahmedabad HAP operates through three core strategies: (1) public awareness and community outreach, (2) an early warning system with staged temperature-threshold alerts, and (3) capacity building of healthcare workers. The four-colour alert system (White/Yellow/Orange/Red) triggers progressively escalating responses from routine advisories to full mobilization of cooling centers, water distribution, and hospital surge capacity.[39,40,56]

Contextualization for Haryana: Haryana's 2019 Heat Wave Action Plan already incorporates many HAP elements, including department-specific checklists and an early warning framework. However, district-level calibration of temperature thresholds is absent. Given that Sirsa recorded 48.4°C and Mahendragarh 47.5°C in 2024, districts like Hisar and Narnaul need locally calibrated alert thresholds that account for humidity indices and occupational exposure (agricultural workers, construction labor). The Ahmedabad cool-roof program (reflective white roof coatings) could be piloted in high-heat urban centers.

Mumbai: iFLOWS

[53] https://timesofindia.indiatimes.com/city/gurgaon/haryana-floods-12-districts-affected-ambala-panchkula-yamunanagar-among-the-worst-hit/articleshow/101966284.cms
[54] https://aapdamitra.ndma.gov.in/about/
[55] https://www.pib.gov.in/PressReleaseIframePage.aspx?PRID=2158183&reg=3&lang=2
[56] https://www.nrdc.org/sites/default/files/ahmedabad-hap-evaluation.pdf

The Integrated Flood Warning System for Mumbai (iFLOWS-Mumbai), developed jointly by the Ministry of Earth Sciences and MCGM, comprises seven modules integrating weather models from NCMRWF and IMD, rain gauge network data, urban drainage mapping, and GIS-based vulnerability layers. The system provides ward-level inundation predictions 6–72 hours in advance. A similar system, CFLOWS-Chennai, has been operationalized for Chennai with a "Red Atlas Action Plan Map" for flood mitigation operations.

Contextualization for Haryana: Gurugram's recurring urban waterlogging (100+ mm events triggering work-from-home advisories) makes it an ideal candidate for a simplified, GIS-based early warning system. While a full iFLOWS implementation would be resource-intensive, a phased approach could begin with: (a) densified rain gauge network across Gurugram's 24 sectors, (b) real-time drain capacity monitoring, and (c) a web-GIS decision support dashboard for the DDMA. HARSAC (Haryana Space Applications Centre) already generates satellite-based flood inundation maps for Haryana, providing a foundation for integration.[45,57,58]

Gujarat: Industrial Chemical Disaster Management Plan

Gujarat's CDMP, developed by GSDMA with international consultants, is one of India's most comprehensive chemical disaster management frameworks. It covers 380+ MAH units across the "Golden Corridor," with district-level off-site emergency plans for 33 districts, mandatory annual mock drills, and a categorization system (AA/A/B/C) for chemical hazard severity. The plan synchronizes on-site and off-site emergency plans and integrates roles of DISH, GPCB, PESO, and district crisis groups.

Contextualization for Haryana: Panipat's Indian Oil refinery and National Fertilizer Limited (NFL) plant, Manesar's automotive-industrial belt, and Bahadurgarh's mixed-industry cluster represent significant chemical hazard concentrations. The Panipat DDMP already references the NFL ammonia incident and includes chemical-specific antidote lists, but a structured off-site emergency plan covering buffer zones, community evacuation routes, and inter-agency coordination protocols (modeled on Gujarat's framework) is absent. HSDMA could categorize Haryana's industrial districts on a Gujarat-style severity index and develop cluster-specific CDMPs.[59]

Kerala: Panchayat-Level DM Integration

Following the catastrophic 2018 floods (35 fatalities by NDRF count, massive infrastructure damage), Kerala pioneered the integration of disaster management planning at the Local Self-Government Institution (LSGI) level. KSDMA and KILA jointly developed standardized templates for Village/Grama Panchayat Disaster Management Plans (VDMP/GPDMP), which are discussed in Grama Sabha meetings, approved by Panchayat committees, and integrated into annual development plans via District Planning Committees. Training modules were developed for

[57] https://www.tribuneindia.com/news/haryana/heavy-rain-lashes-gurugram-authorities-issue-work-from-home-advisory-for-september-2/
[58] https://hwra.org.in/Atlas2025/files/basic-html/page135.html
[59] https://ndma.gov.in/sites/default/files/PDF/DDMP/Haryana/Panipat.pdf

panchayat-level officials on DRR mainstreaming. By 2024–25, DM plan updation training was conducted across multiple block panchayats.

Contextualization for Haryana: Haryana's 6,197+ Gram Panchayats could serve as first-responder nodes if empowered with localized DM plans. Currently, DM planning stops at the district level. Piloting GP-level DM plan preparation in flood-prone blocks of Karnal and Kaithal (Yamuna/Ghaggar affected) and heat-vulnerable blocks of Hisar could create a replicable model. Integration with the Panchayat annual development plan process would ensure budgetary allocation for DRR activities.

Section 4: Global/National Innovations in Early Warning

Common Alerting Protocol (CAP) – SACHET Platform

NDMA's SACHET (**सचेत**) system is a CAP-based Integrated Alert System developed by C-DOT that enables geo-targeted, multi-lingual disaster alert dissemination through SMS, mobile applications, browser notifications, satellite (GAGAN/NavIC), social media, and RSS feeds. The system integrates alerts from six alerting agencies: IMD, CWC, INCOIS, DGRE, GSI, and FSI. Over 4,300 crore SMS alerts have been disseminated nationally.[60,61]

Cell Broadcast Technology: In addition to SMS, nationwide testing of indigenous Cell Broadcast (CB) technology is underway for near-real-time alert dissemination during time-critical disasters (tsunamis, earthquakes, gas leaks). The CB system sends alerts in broadcast mode to all mobile phones in an affected area without requiring registration.[62]

Relevance to Haryana: SACHET is already operational across all 36 States/UTs. Haryana could ensure full integration of district-level DEOC systems with the SACHET platform, enabling DDMA officials to issue localized, geo-fenced alerts during flood, heatwave, and industrial emergency events. Training of district nodal officers on CAP alert origination would be a low-cost, high-impact intervention.

Drone-Based Damage and Risk Assessment

Drones are increasingly deployed in India for disaster management applications including rapid damage assessment, flood inundation mapping, search and rescue support, and infrastructure inspection. The Government of India has recognized drones as a scalable solution for disaster preparedness, with NDRF teams utilizing drones during flood operations.[63,64]

Relevance to Haryana: Haryana may consider:

- **Pre-monsoon surveys**: Drone-based mapping of embankment conditions along the Yamuna (Karnal, Panipat, Sonipat) and Ghaggar (Ambala, Panchkula) to identify vulnerable stretches before monsoon onset.

[60] https://sachet.ndma.gov.in
[61] https://www.pib.gov.in/PressReleasePage.aspx?PRID=2080659
[62] https://www.pib.gov.in/PressReleasePage.aspx?PRID=2140843
[63] https://www.pib.gov.in/PressNoteDetails.aspx?NoteId=157407&ModuleId=3&reg=3&lang=1
[64] https://nidm.gov.in/PDF/TrgReports/2025/March/Report_10-11March2025sp.pdf

- **Real-time assessment**: During flood events, drone feeds integrated with the DEOC dashboard for rapid situational awareness, supplementing NRSC satellite mapping (which currently has a 24–48 hour turnaround)[65].
- **Industrial hazard mapping**: Aerial surveys of buffer zones around MAH units in Panipat and Manesar for off-site emergency plan preparation.

Satellite-Based Flood Monitoring (NRSC/ISRO)

The National Remote Sensing Centre (NRSC) already generates near-real-time flood inundation maps for Haryana using Sentinel-1A SAR and RISAT-1A data during active flood events. These maps cover districts including Kurukshetra, Ambala, Sonipat, and Panipat with flood inundation layers overlaid on land-use data. HARSAC (Haryana Space Applications Centre) has produced a comprehensive Water Resources Atlas 2025 with flood-affected area mapping,[66].

Enhancement Opportunity: Haryana may Institutionalize the NRSC flood mapping workflow into DDMA decision-making by establishing standard protocols for receiving, interpreting, and acting on satellite-derived flood intelligence at the district EOC level.

[65] https://ndem.nrsc.gov.in/documents/Disaster_Document/2025/HR/hrflood50dsc03092025_1800hrs/hrflood50dsc03092025_1800hrs_map.pdf
[66] https://hwra.org.in/Atlas2025/files/basic-html/page135.html

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