

Integrating Sentinel Asia Step- 3 and Early Warnings for All

2026-2030 STRATEGIC FRAMEWORK

Roadmap for space-based disaster management systems in Asia-Pacific, aiming for universal early warning coverage by 2027.

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Presented at the 10th JPTM Meeting, Dubai
12 February 2026





CONTEXT

The Urgency of Action in Asia-Pacific

Asia-Pacific is the world's most disaster-prone region. Climate change and urbanization are intensifying hazards, yet a critical gap persists between generating risk information and enabling early action.

60%

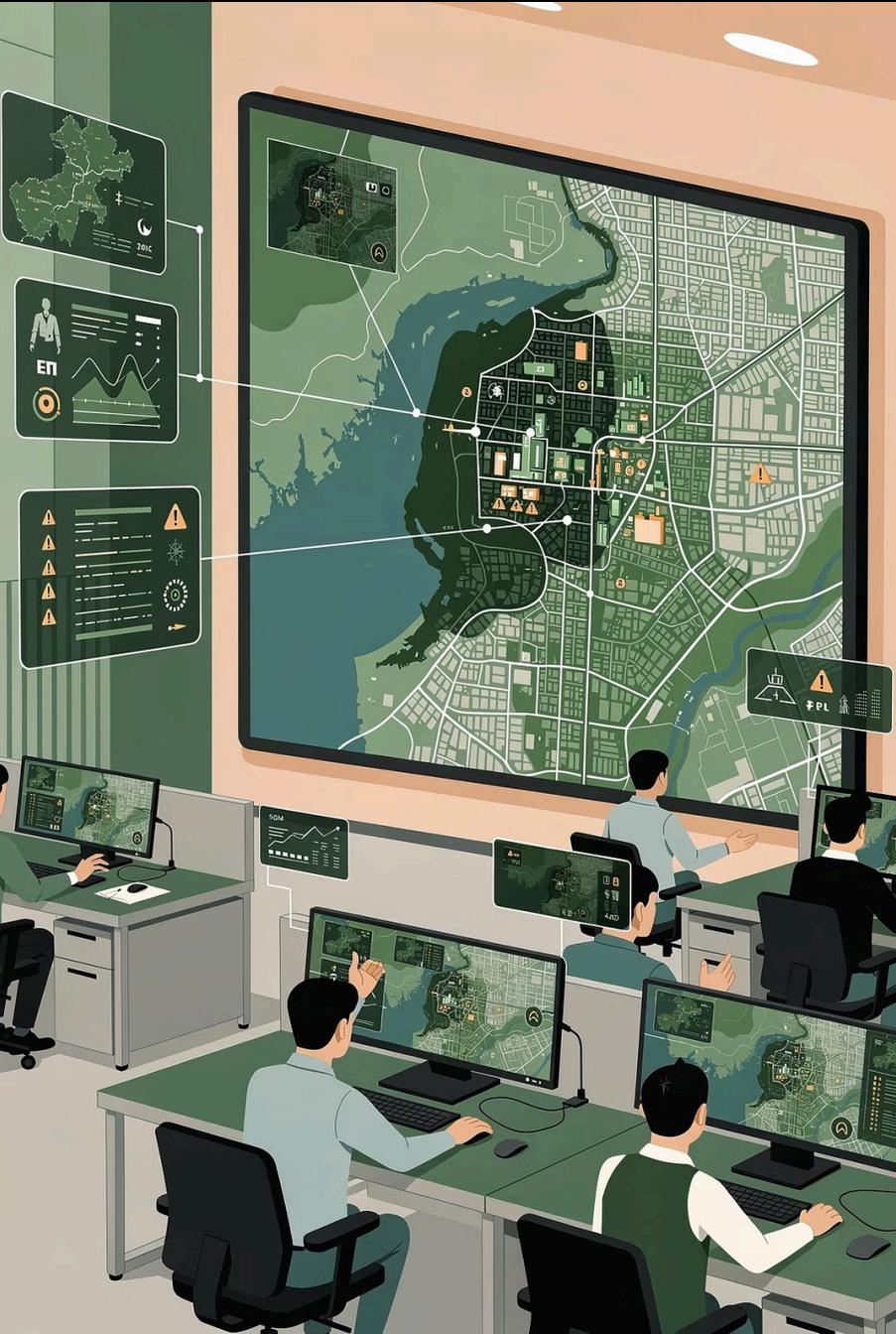
Countries with MHEWS

119 countries now protected
(2025)

111

Member Organizations

Across Sentinel Asia network



CASE STUDIES

Sentinel Asia in Action: Recent Success Stories

Recent Sentinel Asia activations demonstrate rapid, coordinated emergency response across the region.

Xizang Earthquake Response, China (January 2025)

- 6.8-magnitude earthquake
- Multi-satellite response: GISTDA, ISRO, JAXA, TASA
- Supported rescue for 126 fatalities, 188 injured

Typhoon Season Response, Philippines & Vietnam (2025)

- Multiple EORs for 5 major typhoons
- 24-48 hour flood mapping
- Integrated with national emergency centers

Multi-Hazard Monitoring Across Central Asia (2025)

- Forest fires (Kazakhstan, Kyrgyzstan)
- Glacier monitoring (Tajikistan)
- Demonstrates multi-hazard versatility



The EW4All Initiative: Four Pillars for Universal Coverage

The UN's Early Warnings for All initiative targets universal coverage by Multi-Hazard Early Warning Systems (MHEWS) by 2027. Success relies on coordinated action across these four interconnected pillars:



Disaster Risk Knowledge

Understanding hazards, exposure, and vulnerability via data collection and analysis.



Detection & Monitoring

Observing and forecasting hazards through integrated systems.



Dissemination & Communication

Delivering timely, understandable warnings to at-risk populations.



Preparedness & Response

Enabling communities and institutions to act on warnings effectively.

As of 2025, 60% of countries (119 nations) have MHEWS, a 113% increase in a decade. However, significant gaps persist:

- Only 43% of Small Island Developing States have systems.
- Comprehensiveness varies widely by region.
- Africa shows greatest progress (+72% since 2015) but still needs the most support.



EVOLUTION

Sentinel Asia Step 3: A Paradigm Shift

Sentinel Asia Step 3 marks the initiative's most mature phase, built on nearly two decades of lessons. It decisively evolves from ad hoc, event-driven satellite data provision to a user-driven, operational, end-to-end disaster management system.



From Data Push

Earlier phases responded to imagery requests during disasters.



To Requirement Pull

Step 3 is requirement-driven; users define priority needs in advance.

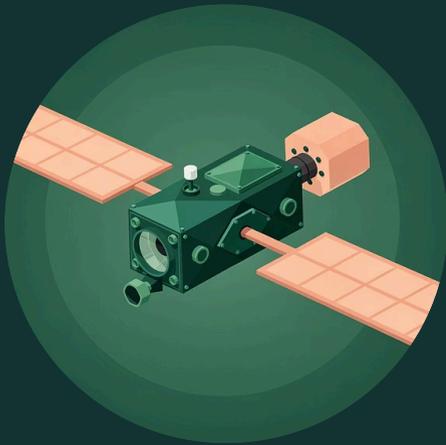


Operational Integration

Information supports specific decisions across the disaster management cycle.

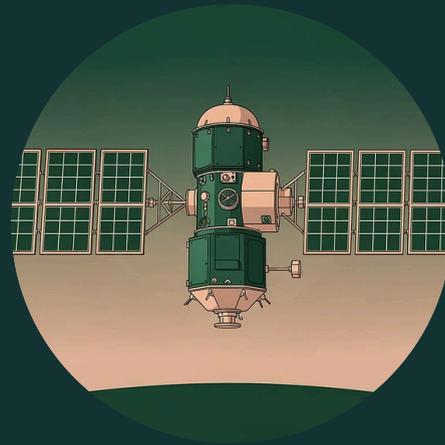
Triple-Satellite Architecture: The Operational Backbone

Sentinel Asia Step 3 utilizes a robust triple-satellite architecture. This integrated system ensures continuity, redundancy, and reliability for disaster management across the region.



Earth Observation

Provides multi-sensor data for hazard detection, exposure analysis, damage assessment, and recovery monitoring.



Communication

Ensures data flow and warning dissemination, even when terrestrial infrastructure is disrupted.



Positioning & Navigation

Offers precise geolocation, direct alert delivery, and validates in-situ data collection.

Alignment with Global Frameworks

Sentinel Asia Step 3 aligns with the Sendai Framework for Disaster Risk Reduction (2015–2030), specifically Target G, which mandates increasing multi-hazard early warning systems.

Sendai Priority	Sentinel Asia Activity	EW4All Pillar
Understanding Risk	Risk element mapping and pre-disaster image repositories	Pillar 1: Risk Knowledge
Strengthening Governance	Standard Operating Procedures for JPT members	Pillar 1 & 4: Governance
Investing in DRR	Mainstreaming space technology into national development plans	Cross-cutting Enabler
Enhancing Preparedness	Emergency Observation Requests and "Build Back Better" monitoring	Pillar 4: Response & Recovery

Comprehensive Multi-Hazard Early Warning Systems (MHEWS) are life-saving: disaster-related mortality in countries with these systems is nearly six times lower. This highlights the critical need for universal MHEWS coverage and strengthened system comprehensiveness across all regions by 2027.

This mapping ensures Sentinel Asia directly contributes to internationally agreed priorities and reporting mechanisms, bridging global ambition with national implementation.



REGIONAL EXAMPLES

Country Spotlight: National Implementation Models

Tailored national approaches demonstrate effective Sentinel Asia Step 3 integration across the region.

1 Philippines: Typhoon Early Warning

- Integrated into national DRR strategy.
- Mobile alerts reach 85% of at-risk populations.

2 Nepal: Mountain Hazard Monitoring

- GLOF and landslide monitoring via satellite.
- Seasonal flood forecasting for Terai region.

3 Vietnam: Coastal Resilience

- Multi-hazard monitoring (typhoons, floods, sea-level rise).
- Anticipatory finance linked to satellite triggers.

Country	MHEWS Coverage	Sentinel Asia Activations (2025)	Population Protected
Philippines	Comprehensive	12 requests	45 million
Vietnam	Comprehensive	8 requests	32 million
Nepal	Developing	4 requests	8 million
China	Comprehensive	3 requests	Regional focus

Technology Enablers for Human-Centered Systems

Sentinel Asia Step 3 leverages advanced technologies to translate complex data into timely, actionable guidance.



Artificial Intelligence & Advanced Analytics

Automated algorithms enable rapid flood, landslide, and wildfire mapping. Machine learning integrates hazard and vulnerability data for impact-oriented products.



Uncrewed Aerial Systems

UAVs provide ultra-high-resolution mapping and infrastructure inspection, integrating with satellite data for multi-scale awareness.



Digital Decision Support Platforms

IWMI's AWARE Platform integrates satellite data and forecasts with response triggers, enabling early action linked to pre-arranged funding.



Human-Centered & Inclusive Design

Inclusive strategies account for language, gender, disability, and socio-economic context, ensuring warnings reach marginalized communities.

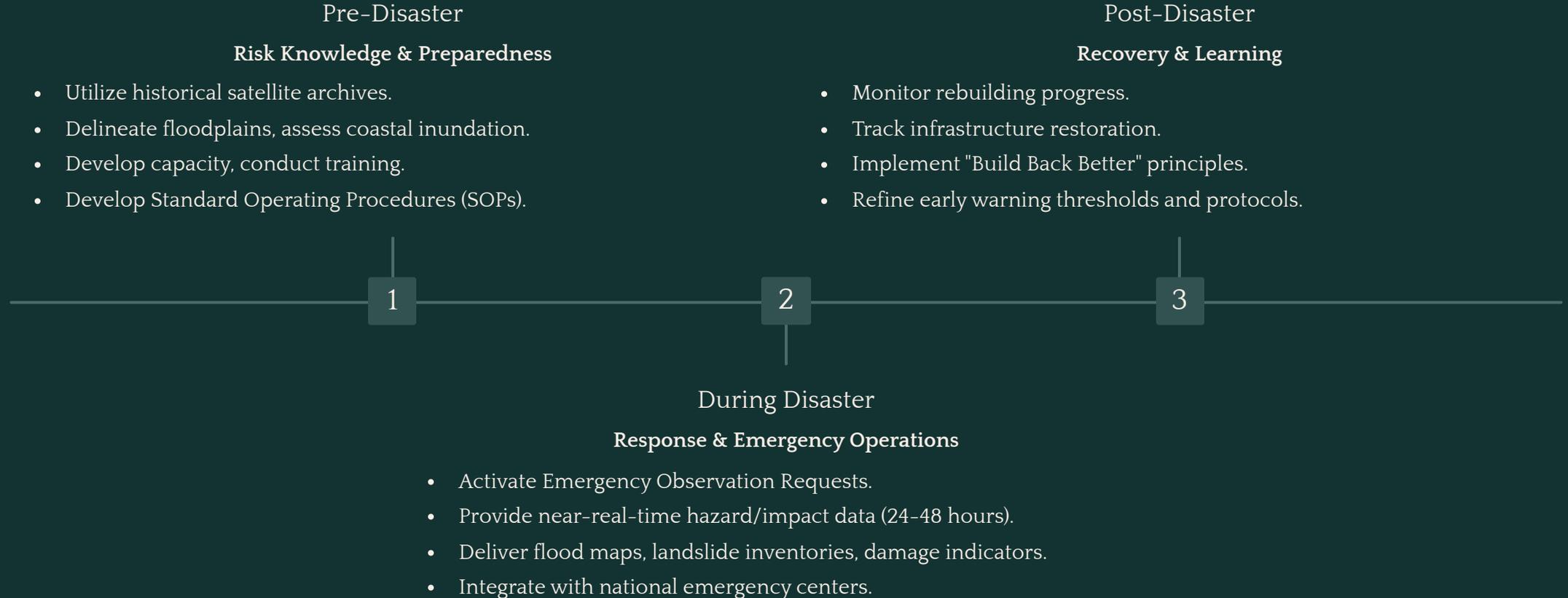


IWMI AWARE Platform: Operational Excellence

Operational in 8 countries supporting 15+ million people. Enables protective action 48-72 hours before impact through forecast-based financing.

Operationalization Across the Disaster Management Cycle

Sentinel Asia Step 3 operationalizes early warning and disaster management support across the full cycle: risk reduction, preparedness, response, and recovery.



Standardized Multi-Hazard Information Framework

Harmonized, interoperable information across hazards and sectors is essential. This framework provides a structured template for national agencies.

Core Information Domains

- Hazard Analysis

Historical frequency, magnitude, spatial extent, and compound risk characteristics.

- Exposure & Vulnerability

Population, critical infrastructure, livelihoods, and socio-economic sensitivity.

- Monitoring Infrastructure

Observation networks, radars, gauges, sensors, and satellite capabilities.

- Last-Mile Communication

Channels, language coverage, accessibility, and community feedback.

Category	Data Element	Frequency
Hazard Analysis	Historical frequency/magnitude ranking	Annual
Sea Level Rise	Coastal inundation/shoreline changes	Semi-annual
Alert Infrastructure	Radar, sensor, GBON compliance status	Monthly
Last Mile Reach	SMS partnerships and feedback loops	Quarterly

This framework enhances regional interoperability and supports rapid emergency activation.

2026–2030: Phased Implementation Strategy

Sentinel Asia Step 3 serves as the core regional delivery mechanism for EW4All, emphasizing consolidation, scaling, and institutionalization.

The Green Climate Fund's multi-country project (FP258) supports seven countries through 2030. Bridging the \$1.5 billion annual investment gap requires combined regional, national, and partner financing.



2026–2027: Consolidation & EW4All Alignment

- Align operations with national EW4All plans.
- Expand digital platforms like AWARE.
- Support the 2027 universal coverage target.



2028: Mid-Term Review & Innovation Scaling

- Conduct strategic review of performance and effectiveness.
- Scale AI-enabled analytics and anticipatory finance.
- Strengthen climate adaptation linkages.



2029–2030: Institutionalization & Sustainability

- Integrate within regional and national systems.
- Establish sustained financing and capacity-building.
- Achieve mature platform contributing to Sendai and EW4All targets.

Strategic Recommendations for Success

Strategic actions at regional, national, and institutional levels are essential for successful integration.

Institutionalize Anticipatory Action & Early Finance

Link forecasts to predefined actions and financing through forecast-based triggers in national policies.

Strengthen Regional Interoperability & Data Sharing

Enhance interoperability across data systems with open standards and regional sharing protocols.

Scale AI-Enabled Decision Support

Scale AI and analytics to reduce warning-to-action timelines and enhance decision relevance.

Invest in Human & Institutional Capacity

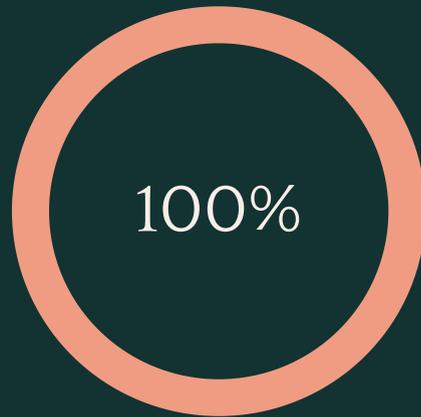
Sustain investment in training, peer learning, and inclusive capacity-building.

A Global Reference Model for Regional EW4All Delivery

"Achieving universal, inclusive, and effective multi-hazard early warning coverage in Asia and the Pacific is both an urgent necessity and a complex institutional challenge."

Early warning systems provide a tenfold return on investment and reduce disaster mortality by up to six times. With 111 member organizations and momentum toward 2027 universal coverage, Asia-Pacific is positioned to lead in translating warnings into action.

Sentinel Asia Step 3 offers technological capability, governance structures, and regional trust essential for sustained delivery. Success by 2030 requires continued political commitment, sustained financing, and investment in people and institutions.



Universal Coverage Goal
All people protected by MHEWS



Countries Served
Across Asia-Pacific region



Target Achievement
Mature, sustainable platform

With these elements, Sentinel Asia Step 3 can serve as a global reference model for regional EW4All implementation, contributing to Sendai Framework targets and resilient development across Asia and the Pacific.