

INDO-PACIFIC GEOINTELLIGENCE FORUM-2026

MANEKSHAW CENTRE · NEW DELHI

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Geospatial Intelligence, Surveillance & the HADR Imperative

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THE GEO – INT IMPERATIVE IN HADR- 5

‘Ws’1 ‘H’

THE SINGLE GREATEST FORCE MULTIPLIER IN DISASTER RESPONSE IS NOT MANPOWER, IT IS NOT THE EQUIPMENT, IT IS KNOWING – “IN REAL TIME” – **WHEN** DID THE DISASTER STRIKE, **WHAT** HAS IT DONE, **WHERE** IS THE IMPACT, **WHO** IS AFFECTED AND **WHERE** ARE THOSE PEOPLE. EVERYTHING ELSE FOLLOWS.

Why the Armed Forces are always there in the room when a disaster response is being discussed??

NORTH & NORTH-EAST

We are not called in- we are already there!

- Kedarnath 2013 & Sikkim 2023 - GLOF
- **Pre-positioned** Manpower & equipment.
- Terrain & Demographic **data already held with local units.**
- Officers who know every valley, river crossing and vulnerable village.
- The first **organised response within hours** in coord with locals.

THE MAINLAND - TWO TRIGGERS

- 01** When scale of disaster overwhelms the resources deployed by Disaster Relief Forces- **Wayanad 2024**
- 02** Specialist equipment & Skills - **CBRN, HADR aviation, combat engineering, underwater rescue**
- 03** Vital enabler to NDRF & SDRF

HOW?

SURVEILLANCE MATRIX

DISASTERS THAT MOST NEED SITUATIONAL AWARENESS ARE THE ONES THAT **DESTROY THE GRND BASED SENSORS FIRST.**

2013

KEDARNATH – AWS operated by SASE was overwhelmed due to hy rains (Chorbari GLOF)

2021

CHAMOLI – Complete Blind spot in the upper reaches where the disaster originated.

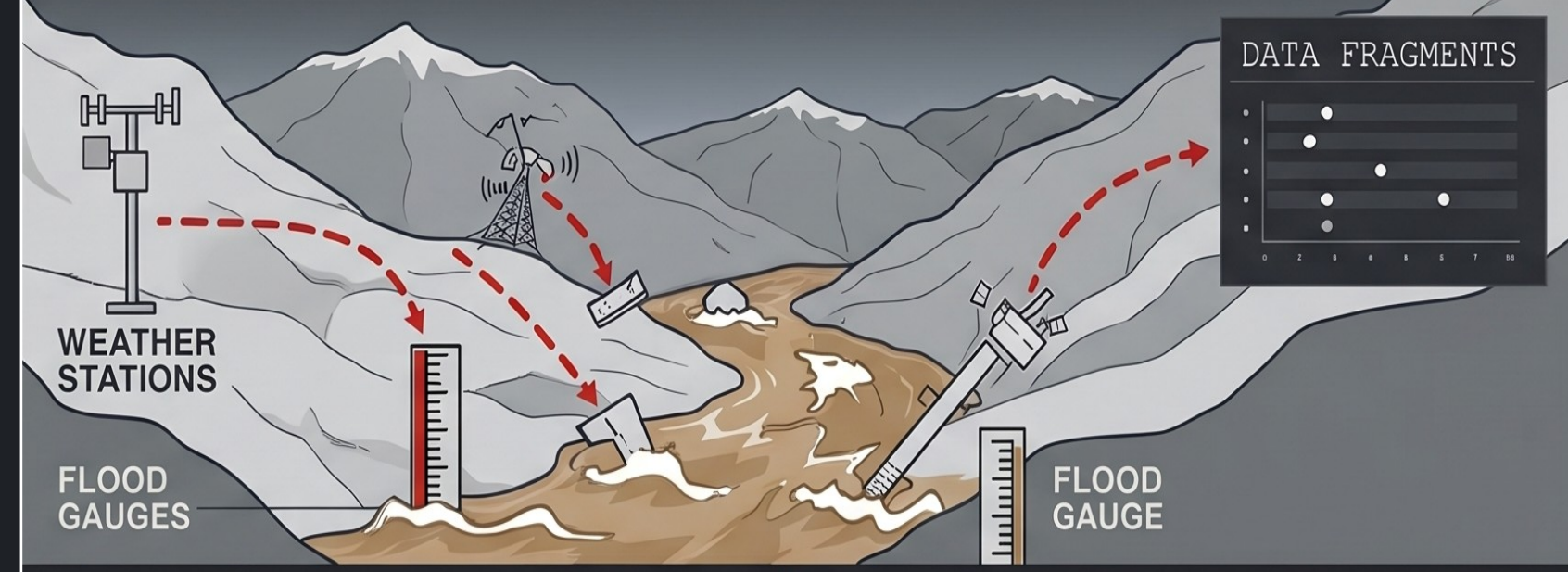
THE THREE-STAGE CHAIN THAT MINIMISES LOSS OF LIFE

<p>01 Risk Awareness & Hazard Mapping Know Vulnerable zones</p>	<p>02 Surveillance & Early Warning See it unfold in time to act</p>	<p>03 Respond Minimise Loss of Life Reach people first, with the right tools.</p>
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FROM GROUND TO SPACE

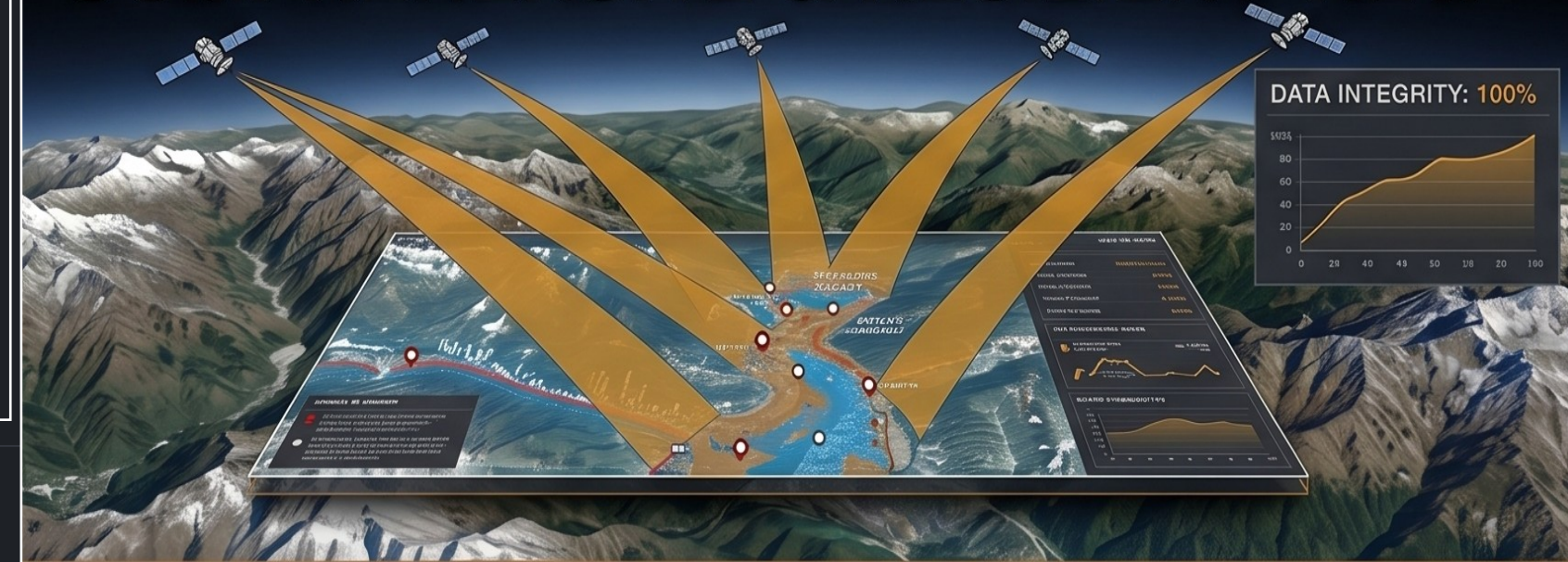
GROUND SENSORS: FAILED POINT DATA

FRAGMENTS OF ISOLATED DATA.



SPACE ASSETS: PERSISTENT COMPLETE CANVAS

COMPREHENSIVE & RESILIENT VIEW



ASSETS THAT MAKE HADR SURVEILLANCE OPERATIONAL

ResourceSat-2A

LISS-IV

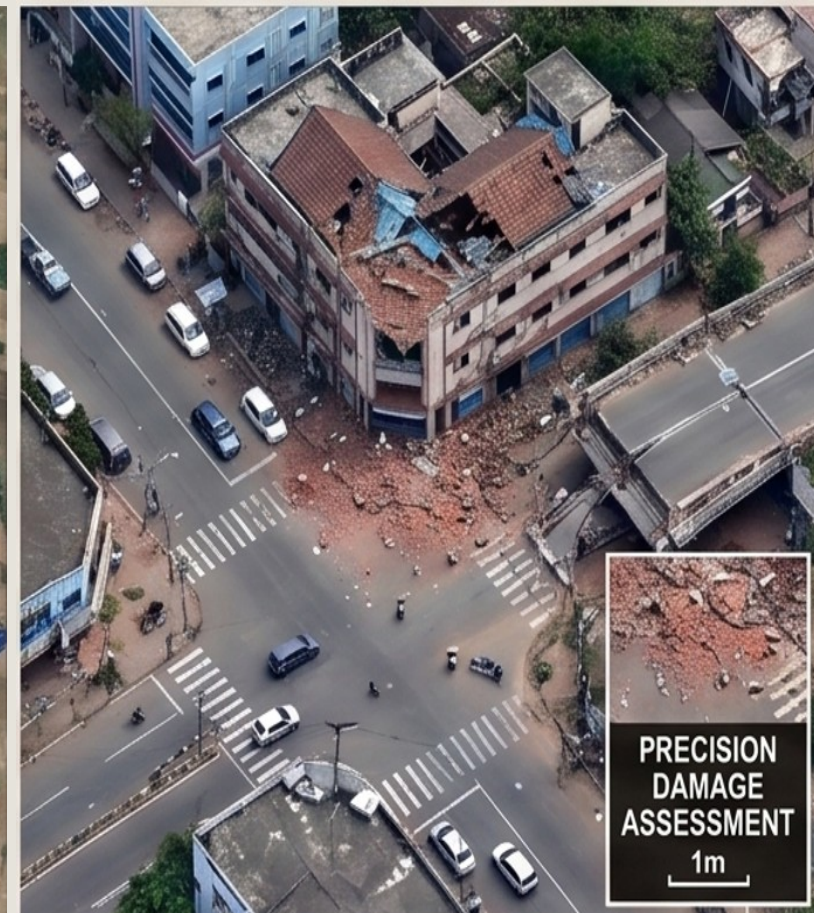


5.8m RESOLUTION

5-day revisit during disaster. Flood mapping & damage within days.

Cartosat-3

OPTICAL

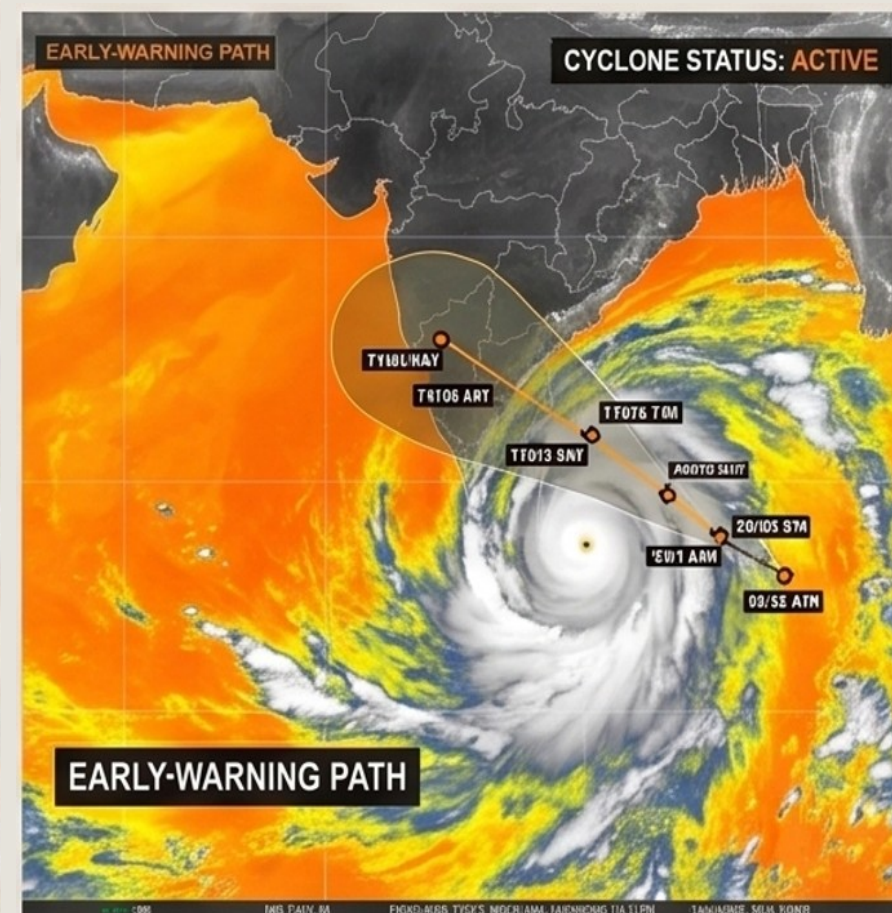


<1m SUB METRE IMAGERY

Precise damage to buildings & infrastructure.

INSAT-3D / 3DR

METEOROLOGICAL

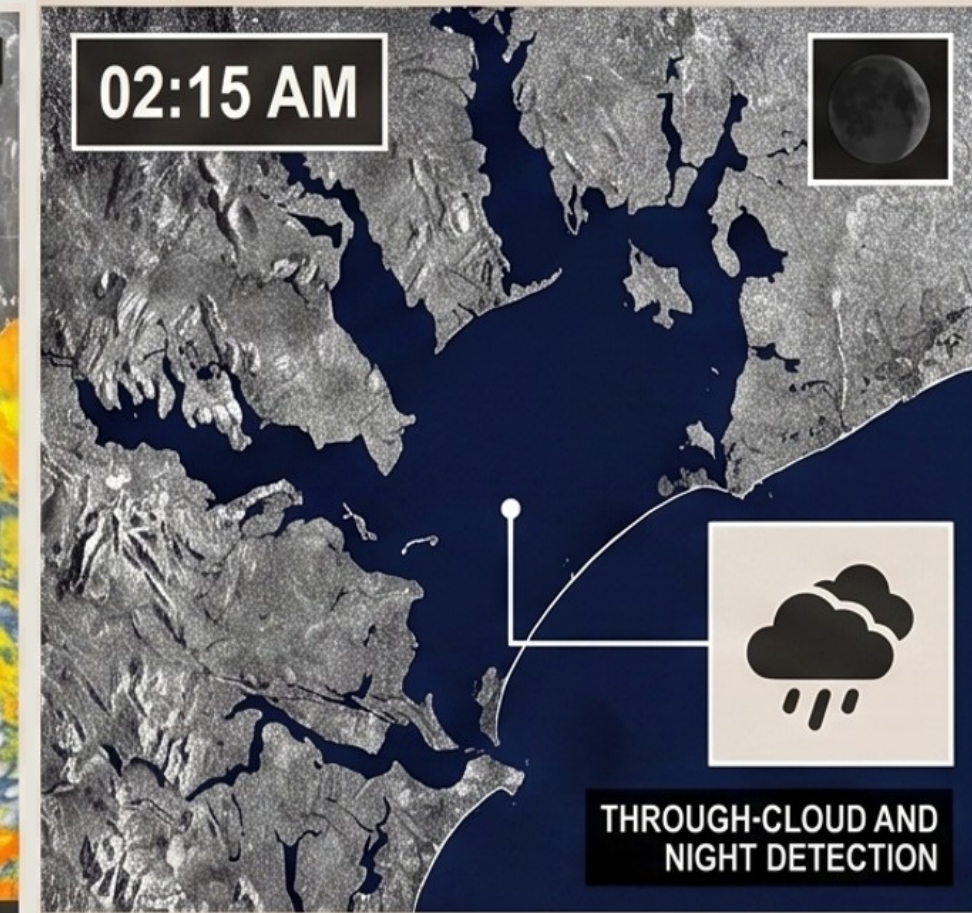


IMD

cyclone early-warning feed — the backbone of coastal evacuation.

RISAT-1A

SAR · ALL-WEATHER



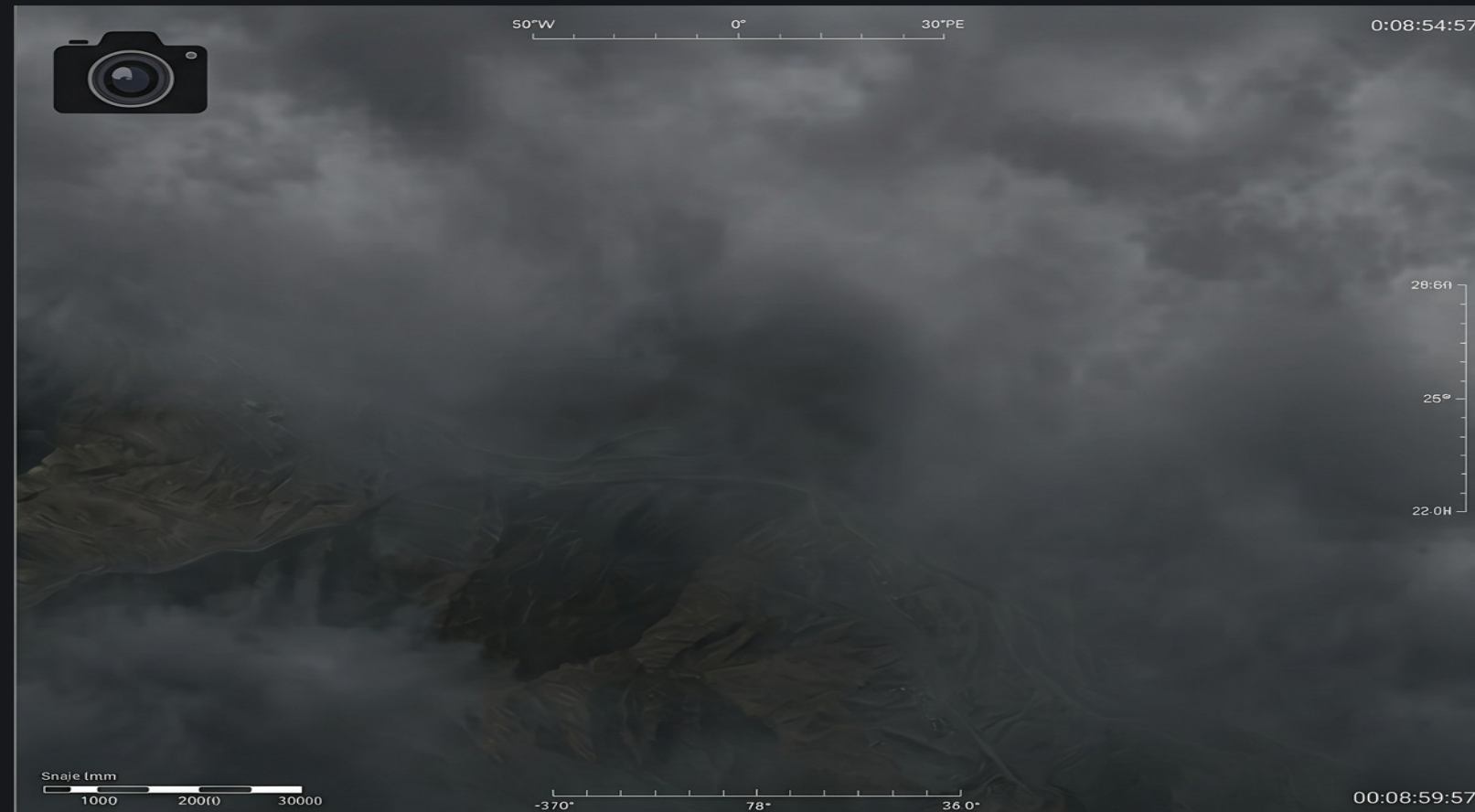
24/7

Sees through cloud, night & monsoon. The game-changer

WHY SAR MATTERS?

ALL-WEATHER SURVEILLANCE

COMPARISON: MONSOON OVER HIMALAYAS (CRITICAL DISASTER SCENARIO)



OPTICAL SATELLITE (BLINDED BY CLOUD)



SAR: CLOUD PENETRATION & FULL RESOLUTION
DISASTER (LANDSLIDE) CLEARLY IDENTIFIED

Synthetic Aperture Radar works through cloud cover, at night, in monsoon the exact conditions under which our Himalayan and coastal disasters unfold.

SATELLITES FOR MACRO VIEW- DRONES FOR THE TACTICAL

PHASE 01 · PRE-DISASTER Persistent watch

Solar drones with extended endurance stationed permanently over glacier lakes, slope-stability zones & flood gauges - building a trained district level workforce *before* the



PHASE 02 · DURING Find & reconnect

BVLOS/ SAR mapping in any weather. Comms-relay drones restoring LTE, AI driven thermal detection & mobile mapping to detect survivors in rubble.



PHASE 03 · POST-EVENT Deliver & map

Logistics drones & Robots carrying medical supplies rations to marooned survivors under zero road dependency & assisting in casevac. Feed damaged maps into NDEM in near-real-time.



ORBIT TO THE CITIZEN'S PHONE

THE DECISION CHAIN



T+0
Satellite pass

T+15 min
NDEM ingestion

T+30 min
RSAC analysis
T+45 min
Command decision

T+60 min
SACHET broadcast

<90 sec
500M+ phones

ODISHA- SAME STORMS BUT 99% REDUCTION IN CASUALTIES.

World Bank · UNESCAP Zero-Casualty Model · PreventionWeb · CEEW Early Warning Systems Report

1999 - SUPER CYCLONE

10,000+ KILLED

No early warning. Mass casualties

2013 - PHAILIN

- 800+ shelters, 1,000+ km of rds, EW & sirens to 1,200 villages.
- 38 killed

2019 - FANI

1.2 MILLION EVACUATED

in <48 hrs. 80 killed

This is not luck- This is architecture!
Template for Urban & Himalayan HADR??

THE UNASKED QUESTION?

URBANISATION IN SEISMIC ZONES

We are building - at an unprecedented pace - in the **Highest Risk Zones!**

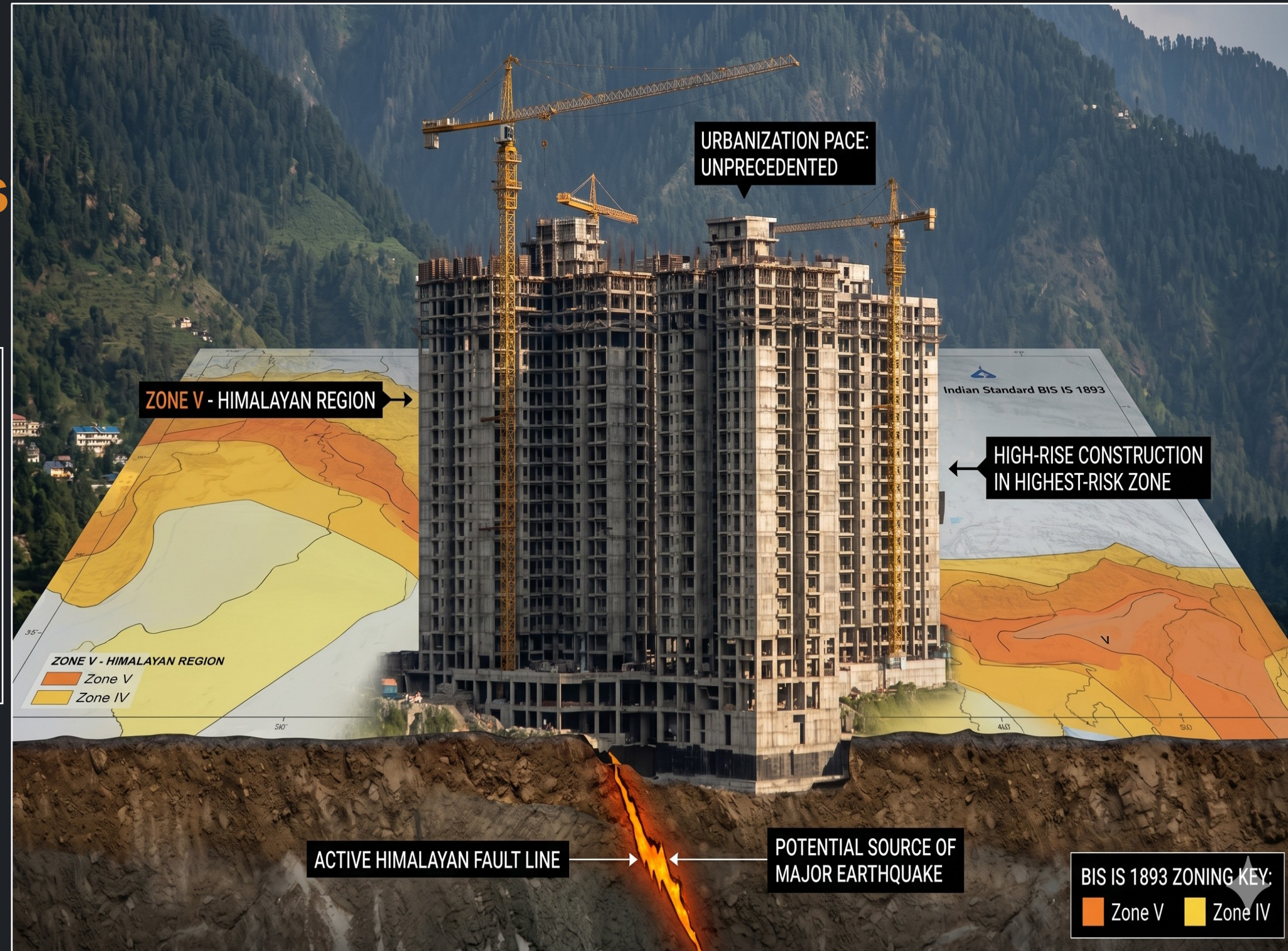
ZONE V - HIGHEST

J&K foothills, Himachal, Uttarakhand, entire North-East, A&N.

ZONE IV - HIGH

Delhi-NCR, large parts of Bihar, Sikkim, West Bengal.

59% of India's land area sits in moderate-to-high seismic risk- NDMA



Not natural disaster – We are Assisting in building a Disaster!

STRATEGIC IMPERATIVE

GEOINT- THE ENFORCEMENT GAP

CASE STUDIES- UNREGULATED URBANISATION

- MANALI - Multi-storey bldgs encroached on the flood channels of the river.
- NEPAL - ~9,000 deaths “mainly due to poorly constructed bldgs” lacking seismic-resistant features.
- NDMA WARNING - ~ 4,000 multi-storey buildings in Ahmedabad alone may not survive a severe earthquake- non-compliant with IS codes.

QUESTIONS THAT NEED ANSWERING !

- We are building with enthusiasm in disaster prone & earthquake zones. Are we regulating with same enthusiasm????
- Can GEOINT close the enforcement gap that legislation alone cannot??
- Can Integration of Space-based assets, Drones & AI-enabled surveillance of construction in hazard zones, flag violations & prevent ‘Assisted Disasters’ which are waiting to happen ???.

Jai Hind
THANK YOU