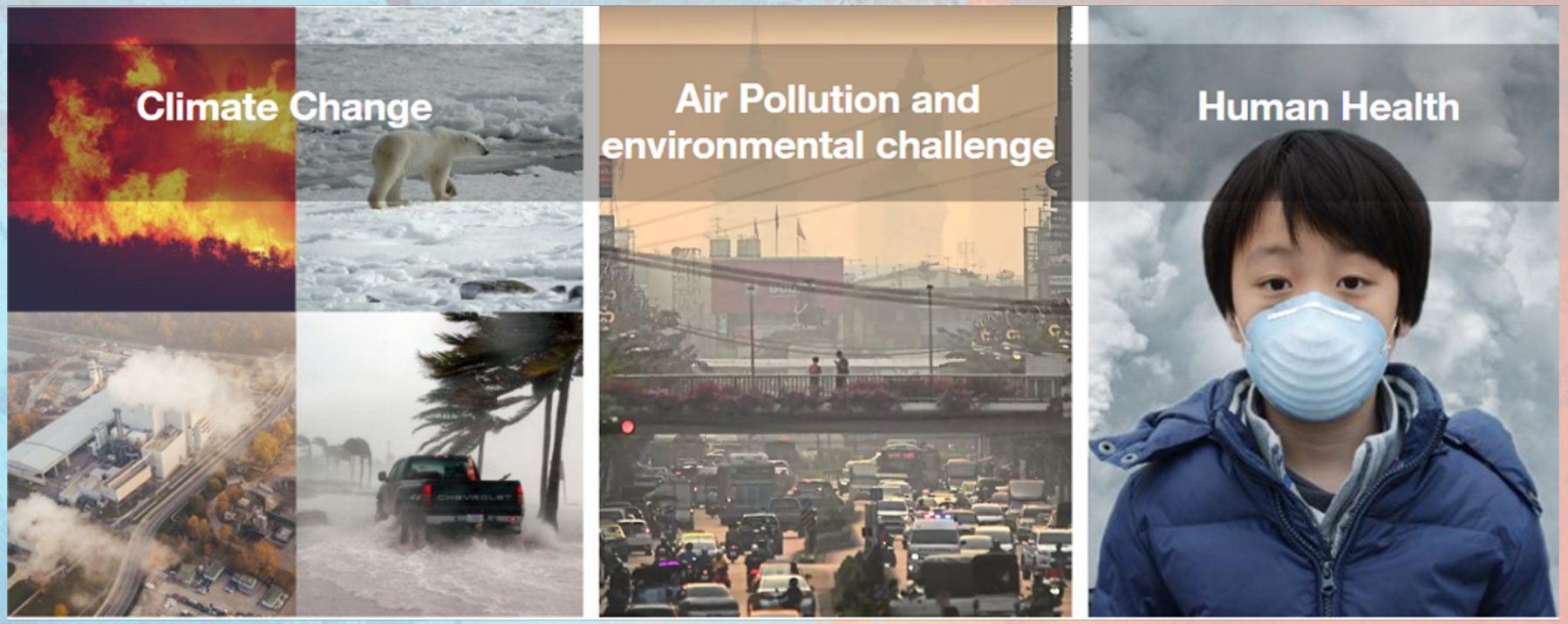
Leveraging Digital and AI Technologies for Climate Resilience in APEC Economies:
Emerging Risks, Opportunities, and Challenges

Aslam Perwaiz
Executive Director
Asian Disaster Preparedness Center

Outline

- Why Should the APEC Pay Attention to Climate Change?
- How Can Disruptive Innovative Technology Assists Economies?
- Opportunities and Learning from the Region
- The Future of APEC : A vision of Climate-Resilient Economy



1. The Cost of Emerging Risks and Increasing Vulnerabilities in APEC Economies

Impact from Extreme Weather Events Globally including the APEC Region

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Global Economic & Human Impacts

Overall Annual Losses

In 2025, economic losses from disasters US$ 224 billion to US$ 260 billion driven by weather-related events.

APEC Region

Home to 70% of the world's disasters, with a potential 18.3% loss in GDP within the century under business-as-usual emissions.

Regional Climate & Disaster Impacts

Southeast Asia

US$ 235 billion in damages from 1970–2024 and US$ 25 billion in damages with 2,000 deaths in late 2025.

Pacific Islands

138,380 people affected with 715 fatalities in 2024 and US$16.1 billion in annual infrastructure losses.

East Asia

US$ 18.4 billion in flooding losses in China, US$ 3.0 billion in storm dam-ages, and US$ 2 billion in Japan.

The America's

US$ 115 billion annual costs in the US, 4x higher losses in Canada, and US$ 43 billion in Brazil.

Key message: "For APEC, climate change is shifting disaster risk from isolated hazards toward interconnected, cascading and transboundary risks, threatening economic growth, food and energy security, infrastructure, supply chains and human well-being."

From Extreme Hazards to Cascading Risks: APEC's Climate Challenge

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More extreme and prolonged heat	**Up to 100 additional days per year above 35 °C heat index in China, the Republic of Korea and southern Japan**
More severe floods and intense rainfall	**~7% more water vapour for every 1 °C of warming, amplifying flash flooding and landslides**
Greater urban heat stress	**Heat island effects add 2-7 °C in Tokyo, Seoul, Bangkok, Beijing, Manila and Jakarta**
Rising coastal and island risks	**Sea-level risk threatens coastal cities, ports and infrastructure with changes projected by 2050**
Agricultural and food security pressures	**Rising temperatures threaten crop yields, livestock productivity and farm labour**
More frequent drought and water stress	**Rising temperatures intensify drought and water shortages affecting agriculture, freshwater and hydropower**

2. Opportunities and Learning from the Region

Building Climate Resilience: From Risk Reduction to Resilient Development

"The goal here is not only to withstand individual hazards, but to prevent climate risks from cascading across people, infrastructure, economies and ecosystems."

1. **Mitigate Climate Change:** **Reduce** emissions through renewable energy, energy efficiency, and low-carbon transport, cities and industries.
2. **Adapt to Changing Climate Risks:** **Strengthen** resilient agriculture, water management, ecosystems and critical services to prepare for increasing heat, droughts, floods and extreme rainfall.
3. **Reduce Disaster & Cascading Risks:** **Integrate** multi-hazard risk assessments, strengthen early warning and anticipatory action, and build resilient infrastructure and supply chains to prevent compound and cascading hazards from escalating.
4. **Build Inclusive & Nature-positive Resilience:** **Prioritize** vulnerable communities, invest in nature-based solutions and ecosystem resilience, and strengthen local capacity, governance, financing, and regional cooperation.

"Climate change requires economies to act across the full risk cycle not only respond to disasters, but anticipate, reduce and manage interconnected risks"

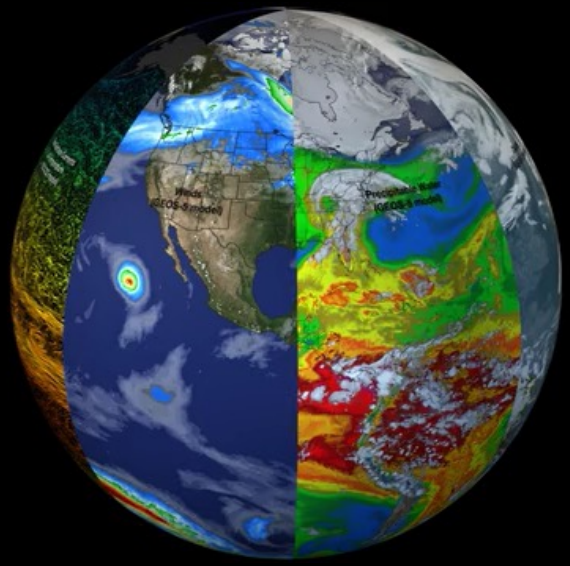
Enabling Climate-Resilient Decisions through Data, Science and Technology

- ***Use reliable data*** to understand current and future climate risks.
- ***Identify vulnerabilities*** and prioritize people, places and sectors most at risk.
- ***Apply science*** to develop evidence-based climate projections, early warning, and adaptation strategies and informed decisions
- ***Target investments effectively*** by directing resources toward the highest-risk areas.
- ***Enable proactive action*** by anticipating risks rather than responding after disasters occur.
- ***Strengthen resilience*** through locally appropriate, innovative and scalable solutions.

Example 1: Transforming geospatial data into actionable insight

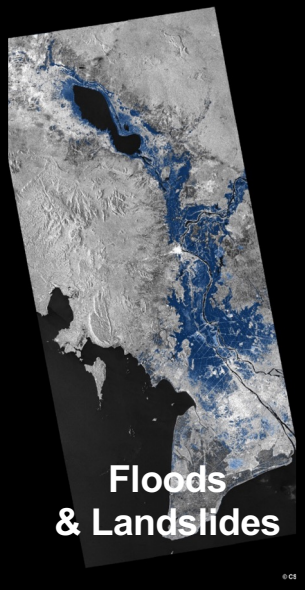
SERVIR Southeast ASIA

SERVIR SEA combines development goals with cutting-edge Earth science, ensuring countries in Southeast Asia can use satellite-based data to better prepare for natural hazards, and support evidence-based policymaking



Connecting space to village

Climate and Environmental surveillance



Example 2: Geospatial Technology for End-to-End Early warning Systems

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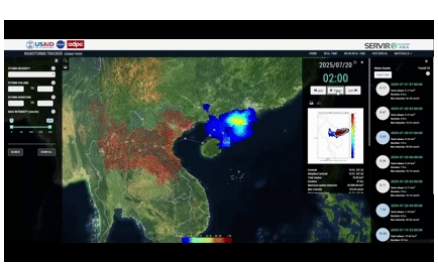
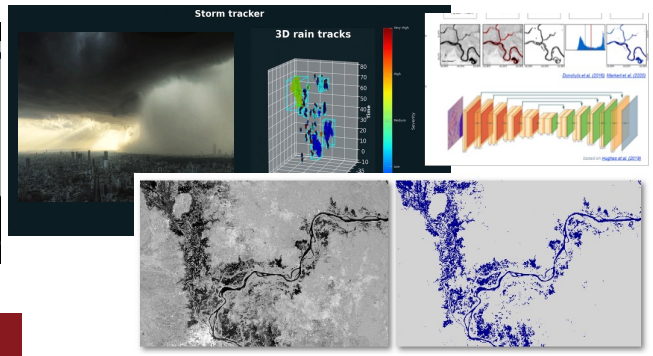
Data analytics and model integration

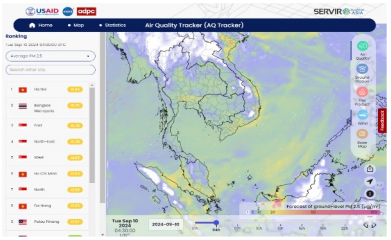
Developing high-quality, user-focused tools, models, and applications to address pressing development needs





DSS for Risk Communication

Using AI to Improve the sharing and accessibility of tailored geospatial data and services



Community engagement

Community engaging to reach the “last mile” in EWS

SERVIR Southeast ASIA

Example 3: AI-assisted vulnerability mapping in Thailand and Cambodia

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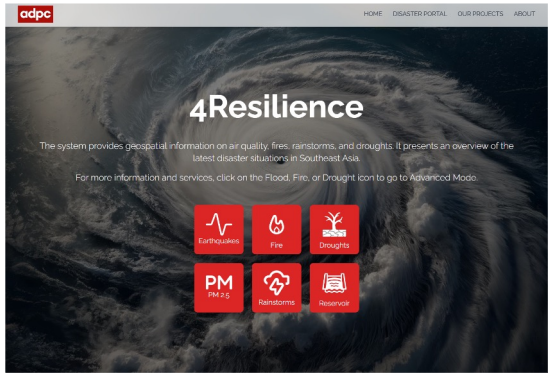
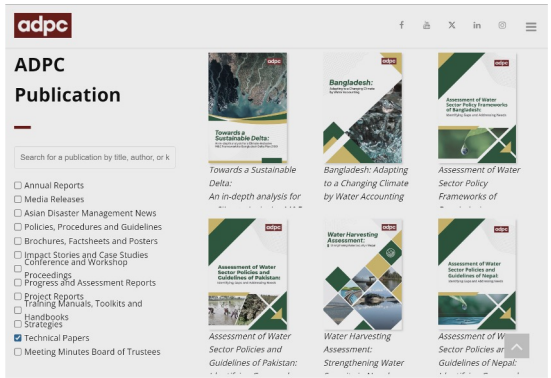
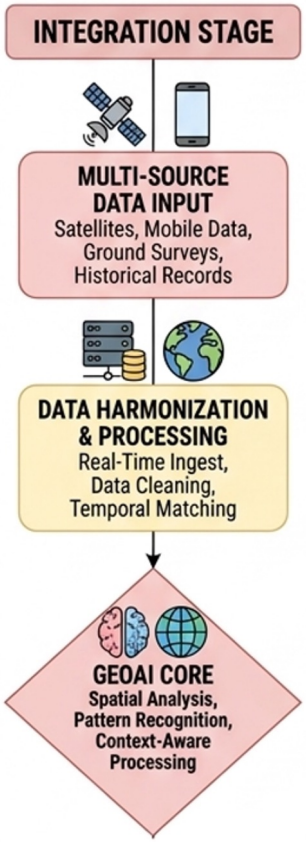
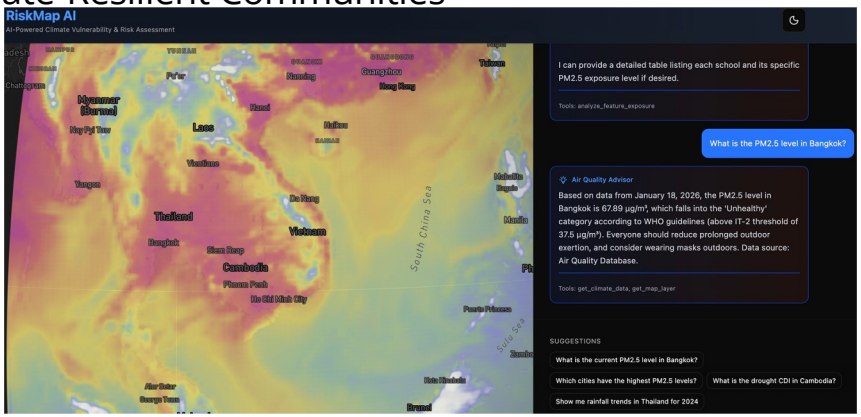
BRIDGING DATA AND ACTION

AI-Powered Mapping of Multidimensional Vulnerability for Climate-Resilient Communities

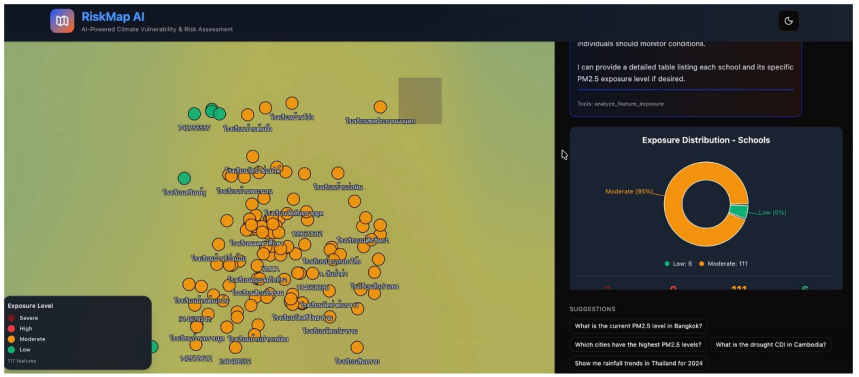








AI chat mapping near real time of PM2.5 in Bangkok

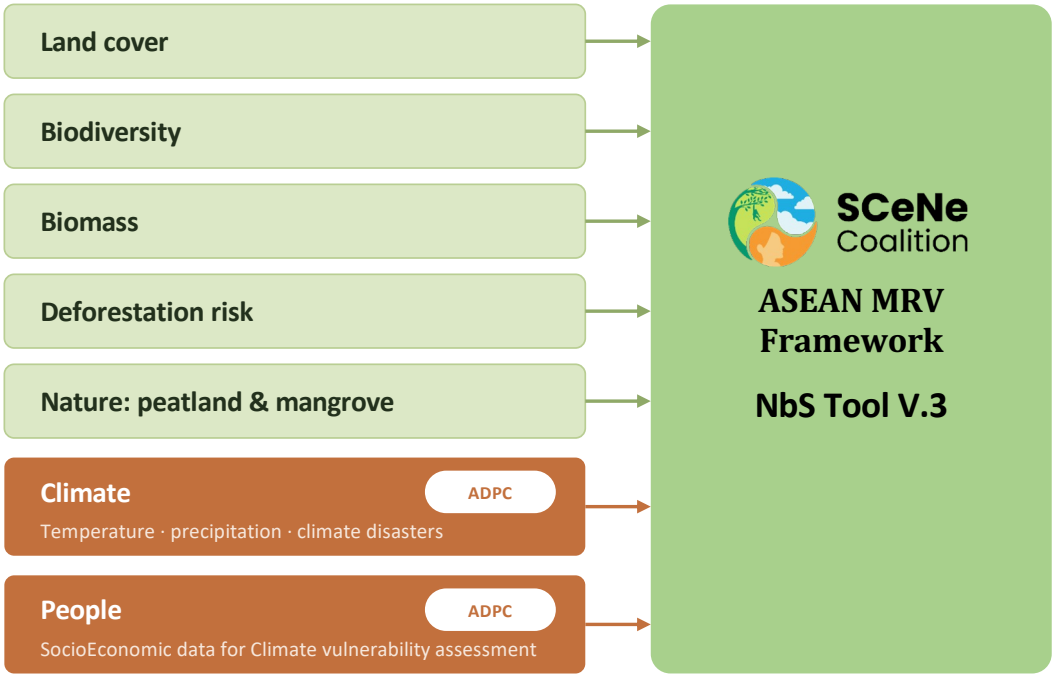


School and level of exposure to air quality issue in Chiang mai

Example 4: Bridging Socioeconomic & Climate Data to Power MRV and Nature-based Solutions Design in ASEAN

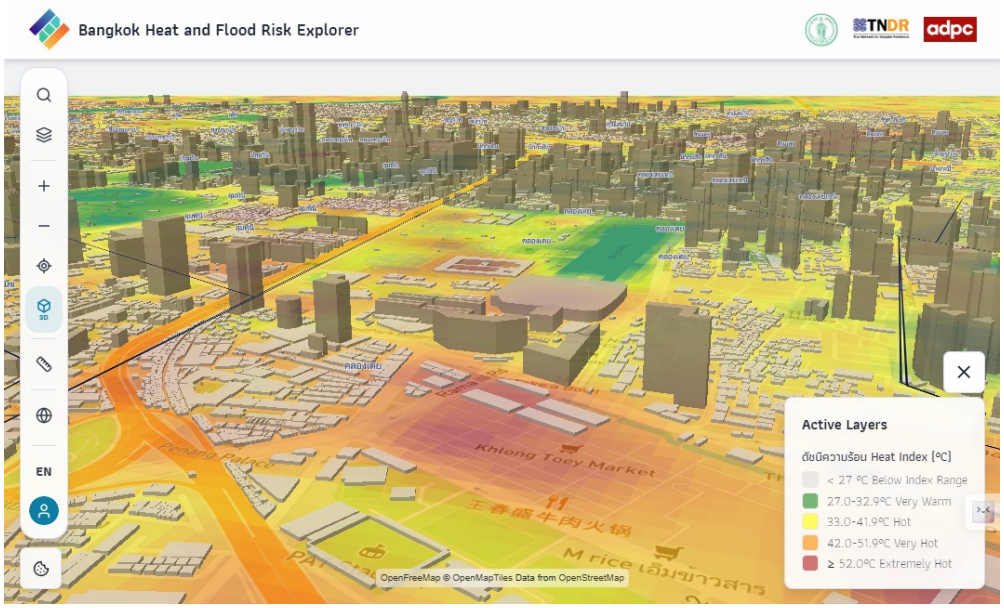
ASEAN–NbS Tool, Catalyzing Regional Action to Plan, Monitor, and Scale Nature-based Solutions
(NbS Models and Monitoring) under the ASEAN-UK Green Transition Fund

- The project **supports ASEAN Member States** (AMS) to **move from NbS potential to implementation and scale up**
- Support develop the **MRV framework** to provide a common ASEAN approach for **measuring the actual results and impacts of NbS interventions**

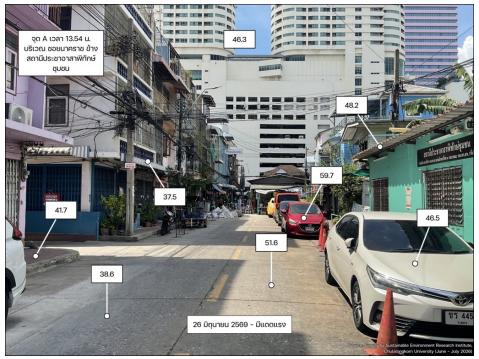


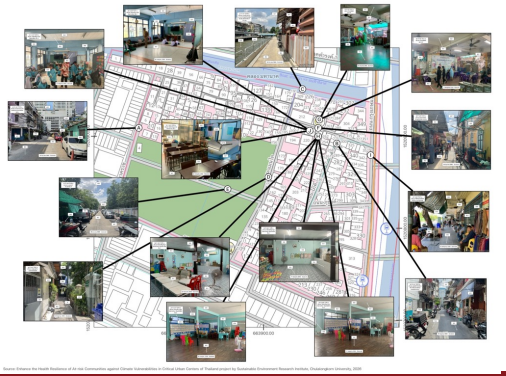
Example 5: Heat-Risk Mapping & Community Action in Bangkok

Fusing satellite hazard data (2015–2025) with exposure, vulnerability and public-health records — combined per the IPCC AR5 framework and ranked to community level — to find Bangkok's hottest, most vulnerable neighborhoods.



From the citywide map to the street: engaging high-risk communities and their most vulnerable — women working from home, the elderly and others — to build awareness of when and where dangerous heat hits.





Example 6: Digital Twin technology for landslide risk management in Thailand

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When the rain comes, where are the risk?

Thailand's national landslide warning system, built with the Department of Mineral Resources · live across the country today

1 WHEN?

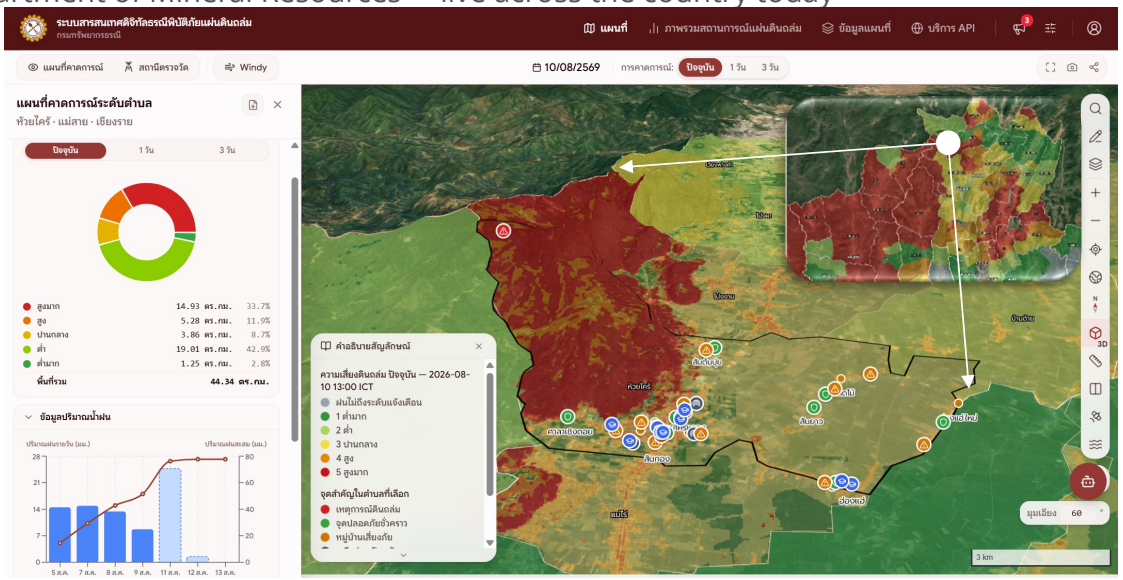
The rain trigger: how much rain each area can take before slopes give way

2 WHERE?

Risk analytics pinpoint the hot spots for today, tomorrow, and the next 3 days.

3 WHO?

Who is underneath: homes, schools, children and elderly, so the plan fits the people.



The system as it looked on 10 August 2026 · dmrlis.dmr.go.th

Next 3 days	12.5 m	every 6 hrs	Sub-district
of warning before the rain	detail on the ground	the whole country re-checked	where the warning lands

Example 6: Digital Twin technology for landslide risk management in Thailand

From a warning to an intelligence evacuation plan

A live 3D of an entire province: so an alert becomes a road, a shelter, and a time to leave

Built once in Thailand: ready for any APEC economy.

1 SEE THE DANGER

Where the landslide may give way. Refreshed every 15 minutes.

2 COUNT THE PEOPLE

Which homes and schools. How many people. Who needs help to move.

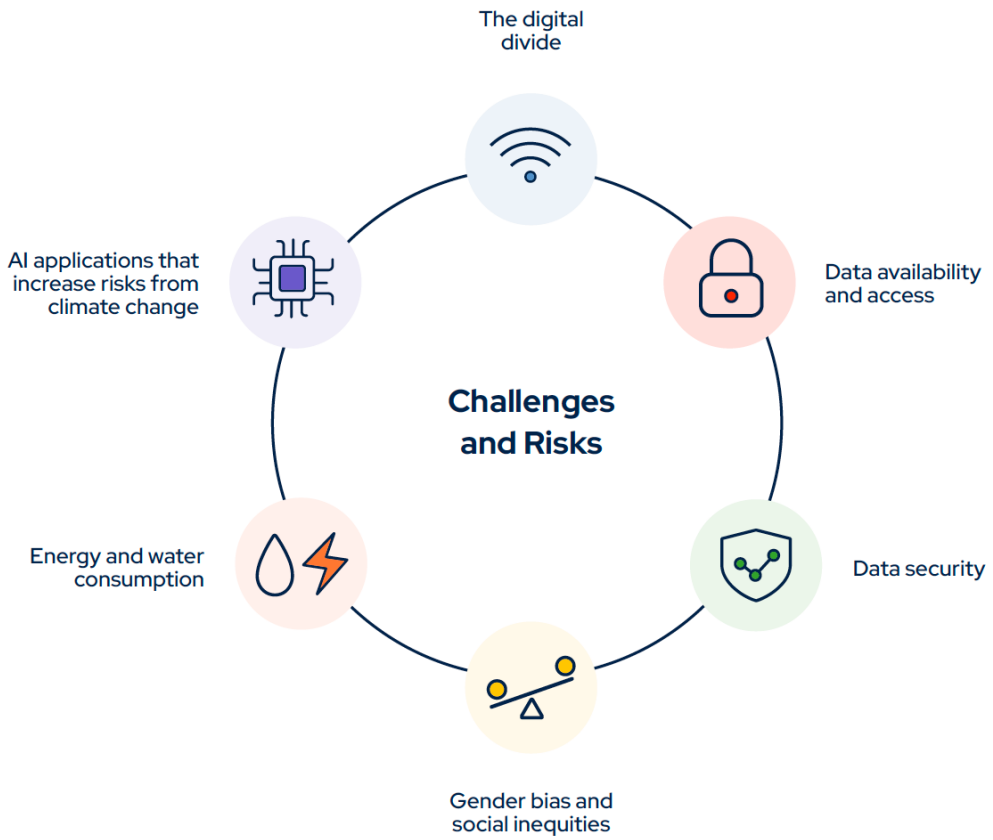
THE STEP THAT SAVES LIVES

3 PLAN THE WAY OUT

The safe road, the backup road, and whether the shelter has space.

4 WATCH IT LIVE IN 3D

Run different landslide scenarios, see the impacts, and prepare before the season.



3. THE RISK-TECHNOLOGY NEXUS : Risks worth Taking ?

Vision of a Climate-Resilient APEC Region

APEC economies anticipate climate and disaster shocks, safeguard development gains, and recover quickly — without leaving vulnerable communities behind.

Risk-informed growth | **Locally led resilience** | **Regional cooperation**

Coastal cities
Urban resilience and nature-based protection

Food systems
Climate-smart agriculture and supply continuity

Health & heat
Prepared services for heat and cascading shocks

Resilience protects lives, supply chains and public services — before, during and after shocks.

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Technology turns risk into earlier, better action

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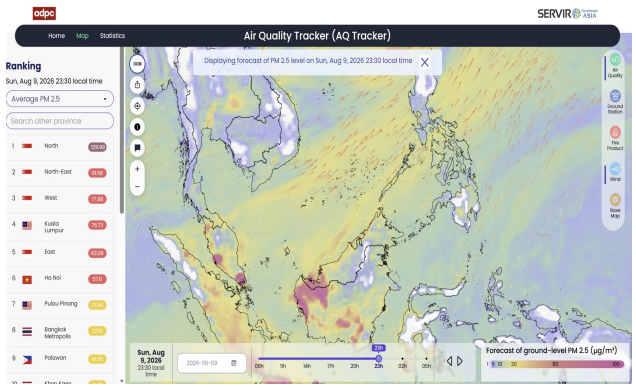
ADPC can help APEC economies move from reactive disaster response to anticipatory, data-driven resilience.



Satellite data, AI models and decision dashboards make hazards visible before they become disasters.

Sense
satellites • sensors
community data

→

Predict
AI models • scenarios
impact forecasts

→

Decide
dashboards • triggers
risk financing

→

Act
warnings • SOPs
community drills

→

Learn
after-action data
standards • scaling

What changes for APEC?

Longer lead time
from hazard alert to sector action

Targeted protection
people, assets and supply chains at risk

Shared standards
interoperable data and mutual assistance

Investment confidence
resilience evidence for finance

What ADPC can offer APEC

A delivery platform for resilient economies — combining technical depth, regional convening power and practical capacity building.

1. Diagnose risk	Multi-hazard analytics, climate projections, exposure and vulnerability mapping, and sector risk profiles.
2. Design systems	Early warning, preparedness, resilient recovery, urban resilience and climate-adaptation roadmaps.
3. Deliver capacity	Training, simulations, SOPs, institutional strengthening and community-based action.
4. Scale finance	Bankable concepts, GCF/Multilateral Bank alignment, private-sector continuity and investment cases.

Delivery principle: whole-of-society, inclusive and locally led — with regional knowledge exchange.

A regional "resilience accelerator" connecting policy, science, communities and investment.

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THANK YOU

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