# Case Study 1: Innovative Approaches to Urban Flood Risk Reduction

Training Workshop on Building Resilient Cities: Strategies for Effective Urban Flood Management

28 January 2024

UNDRR
UN Office for Disaster Risk Reduction

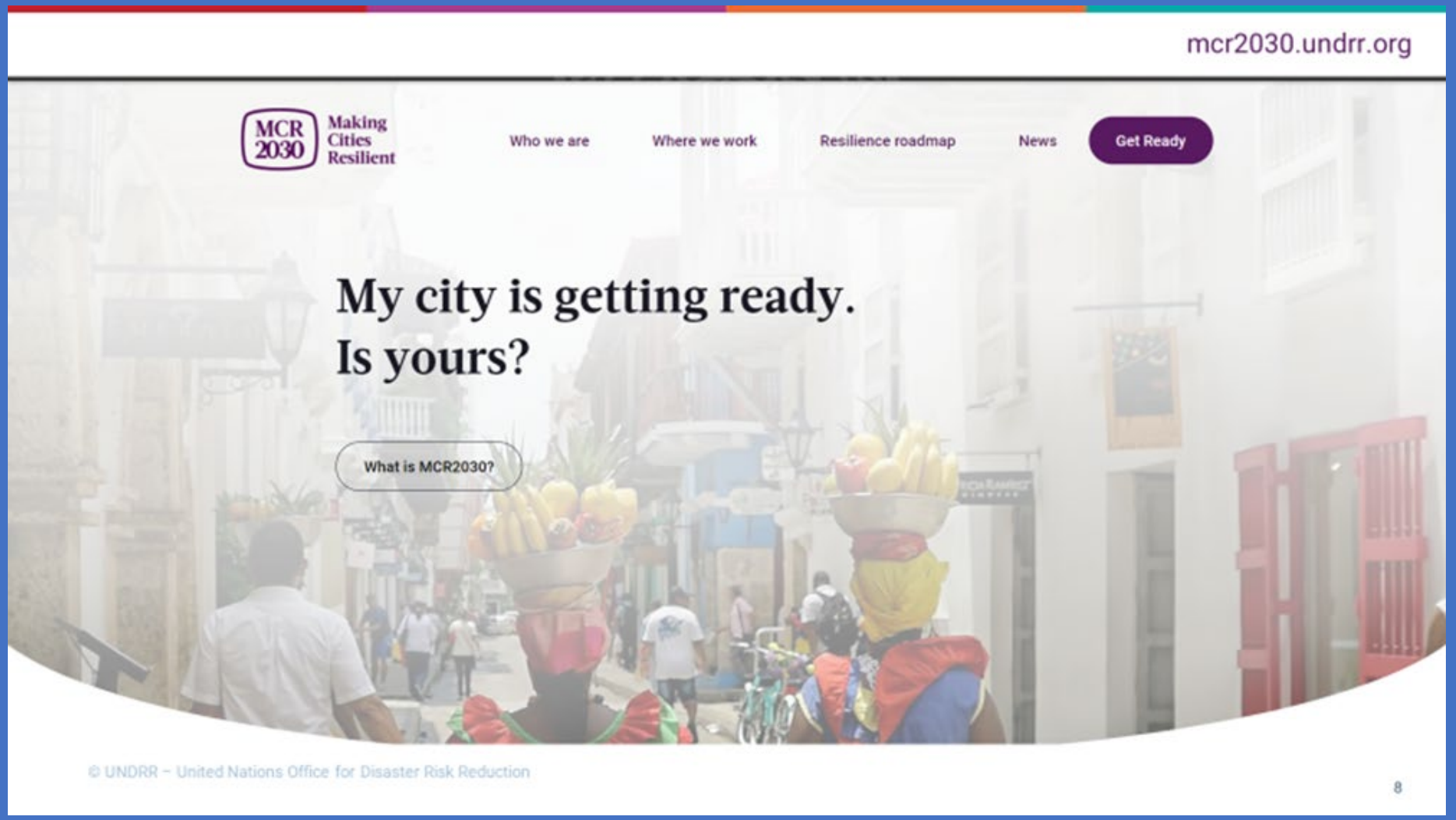
SAARC Disaster Management Center

SENDAI FRAMEWORK
FOR DISASTER RISK REDUCTION 2015-2030

*With the support of*

Ministry of the Interior and Safety

Incheon Metropolitan City

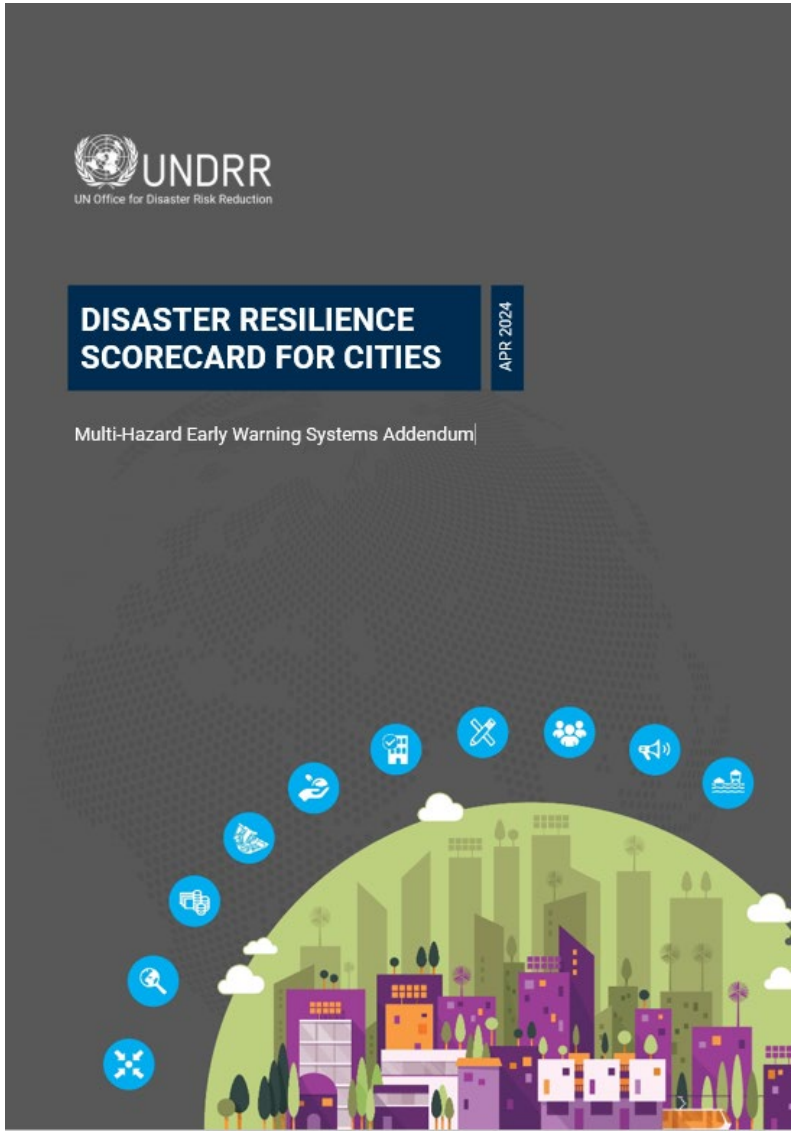



1786 cities and 400 partners

580 million urban population

# Multi-Hazard Early Warning Systems Addendum

- **Self-assessment tool** supporting **local** governments to develop people- and nature-centred, **multi-hazard approaches to early warning systems**.
- It is complimentary to and should be **used in conjunction with the Disaster Resilience Scorecard for Cities** (the City Scorecard) – supports flood prevention and management

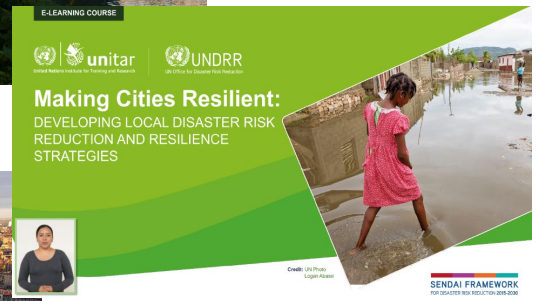


# Knowledge Sharing












# Example of Scorecard Application for flood risk reduction

Best Practice from the Republic of Korea

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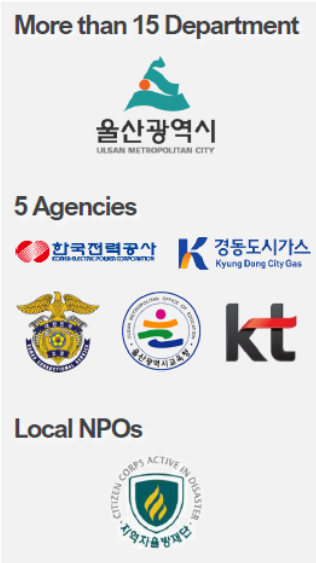
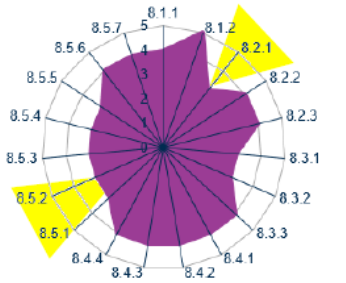
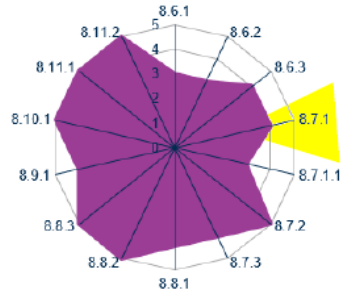
# Ulsan City

- Ulsan Metropolitan City has been applying the Disaster Resilience Scorecard for Cities every year since 2018, through scorecard assessment workshops led by Ulsan Research Institute.
- The consultations bring together 15 departments of the city, 5 agencies managing city infrastructure, academia, as well as civil society involved.





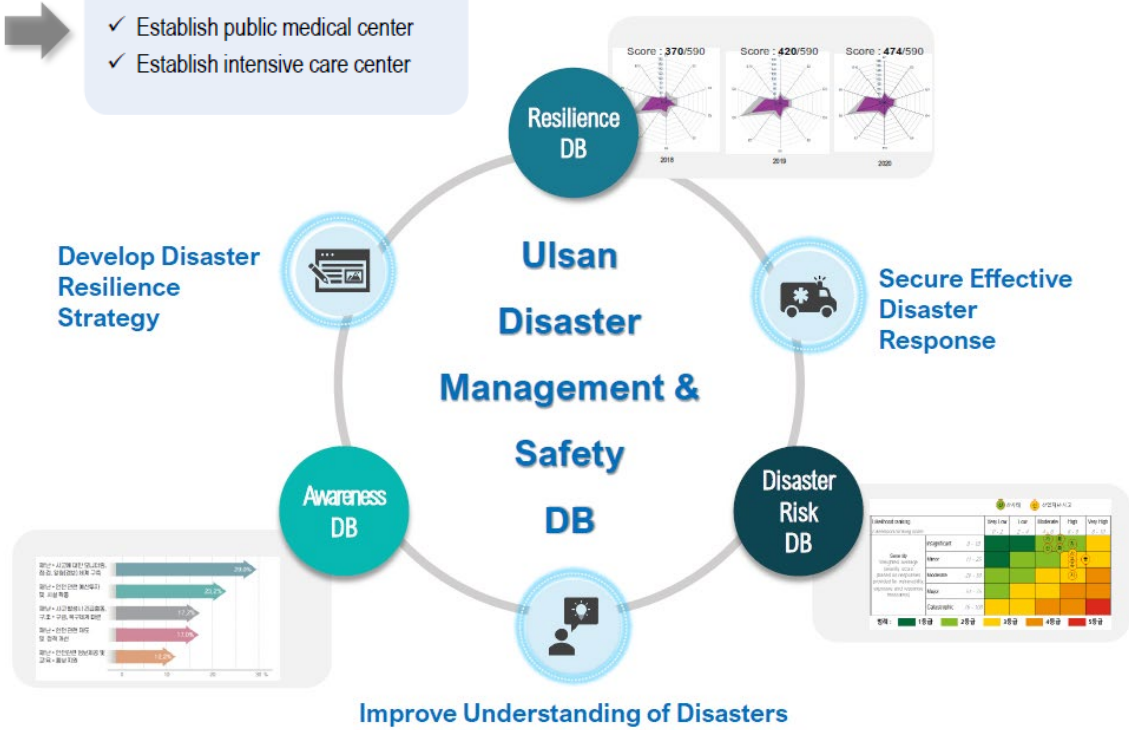



2021

| Vulnerable essentials | Problem | Improvement Policies |
|---|---|---|
| 8.2.1 | Water resource loss occurs due to typhoons | ✓ Curve the single water resource supply chain by 2035 |
| 8.5.1 | Decreased mobility of citizens after the disaster | ✓ Installation of automobile breakers, and waterproof film |
| 8.5.2 | Decreased mobility of citizens after the disaster | ✓ Announce bypass or another routes<br>✓ Designate evacuation road |
| 8.7.1 | Hospital bed loss due to complex disaster like fire or infectious disease | ✓ Establish public medical center<br>✓ Establish intensive care center |

- The scorecard assessment results are applied to improve existing policies and develop new plans for Ulsan Metropolitan City.



# Essentials 4 and 5

**Essential 1**

Organize for disaster resilience

- The Will of the Chief Manager
- Expansion of Civil Safety Division Operation
- Establish Plan in Each Field for Disaster Risk Reduction

**Essential 2**

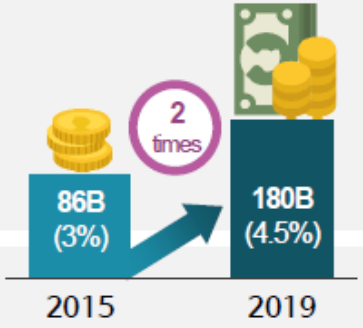
Identify, understand and use current and future risk scenario

- Development of Integrated Flood Disaster Management System Based on ICT
- Development of Urban Flood Monitoring System

**Essential 3**

Strengthen financial capacity for resilience

- Expansion of Disaster Management Funds
- Increasing Disaster Management & Safety Budget




**Essential 4**

Pursue resilient urban development

- Establish Urban Master Plan based on Risk Analysis
- Establish Urban Management Plan for Disaster Risk Prevention
- Manage Disaster Risk Management Zone
- Disaster Risk Management for Development Projects

**Essential 5**

Safeguard natural buffers

- Develop Ecological City around Taehwa River
- Preserve 40km-Bamboo Forest as Habitat of Migratory Birds, and Natural Buffer to Natural Disasters

# Essential 8

**Essential 6**

Strengthen institutional capacity

- Establish Cooperate System to National Disaster Management Research Institute
- Establish Consultive Group for Special Disaster Manage
- Host U.N. Typhoon Committee

**Essential 7**

Strengthen societal capacity

- Support Vulnerable Group in case of Disaster
- Sentimental Disaster Education by Establishment of Ulsan Safety Experience Center
- Strengthen Governance Activities

**Essential 8**

Increase infrastructure resilience

- Strengthening Green Infrastructure through Water Circulation Leading City Project
- Seismic Reinforcement of Public Facilities
- Strengthen Lifeline and Public Service Resilience

**Essential 9**

Ensure effective disaster response

- Establishment of On-Site Action Manual for each Disaster
- Establishment of Advanced Alarm Control Center
- Educate Safety Guidelines to Citizens

**Essential 10**

Expedite recovery and build back better

- Establish a Rapid Relief System
- Prepare Future Disaster Risk Mitigation Measures

# Applications of Technology for flood risk reduction

# Korea's Flood Forecasting and Warning System Reduces Unforeseen Disaster Risks

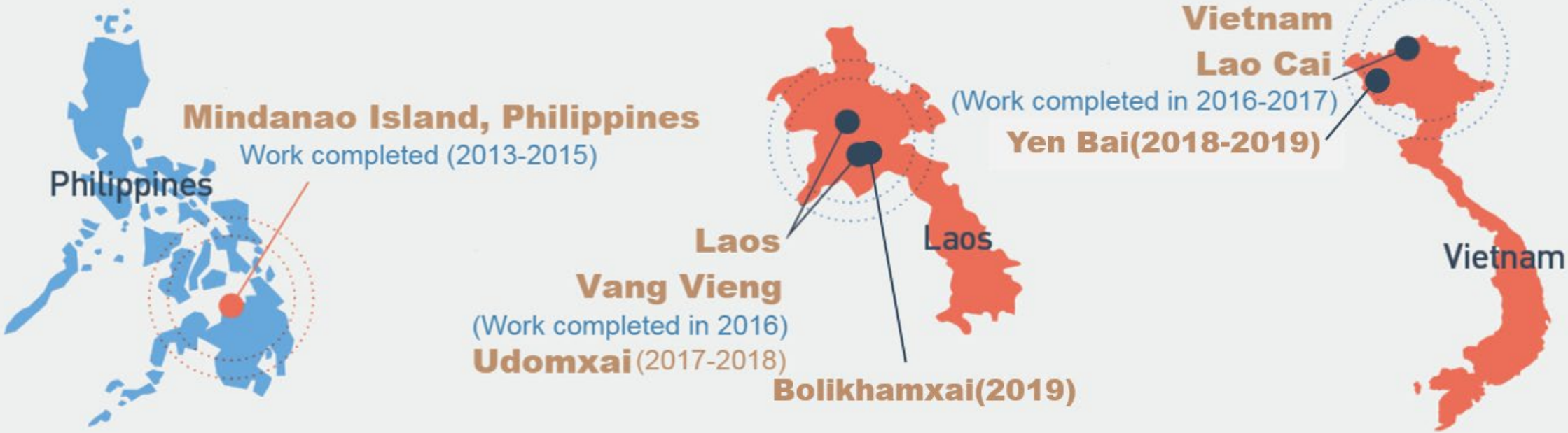
< Rainfall Observation Station >

< Warn Alarming Station >

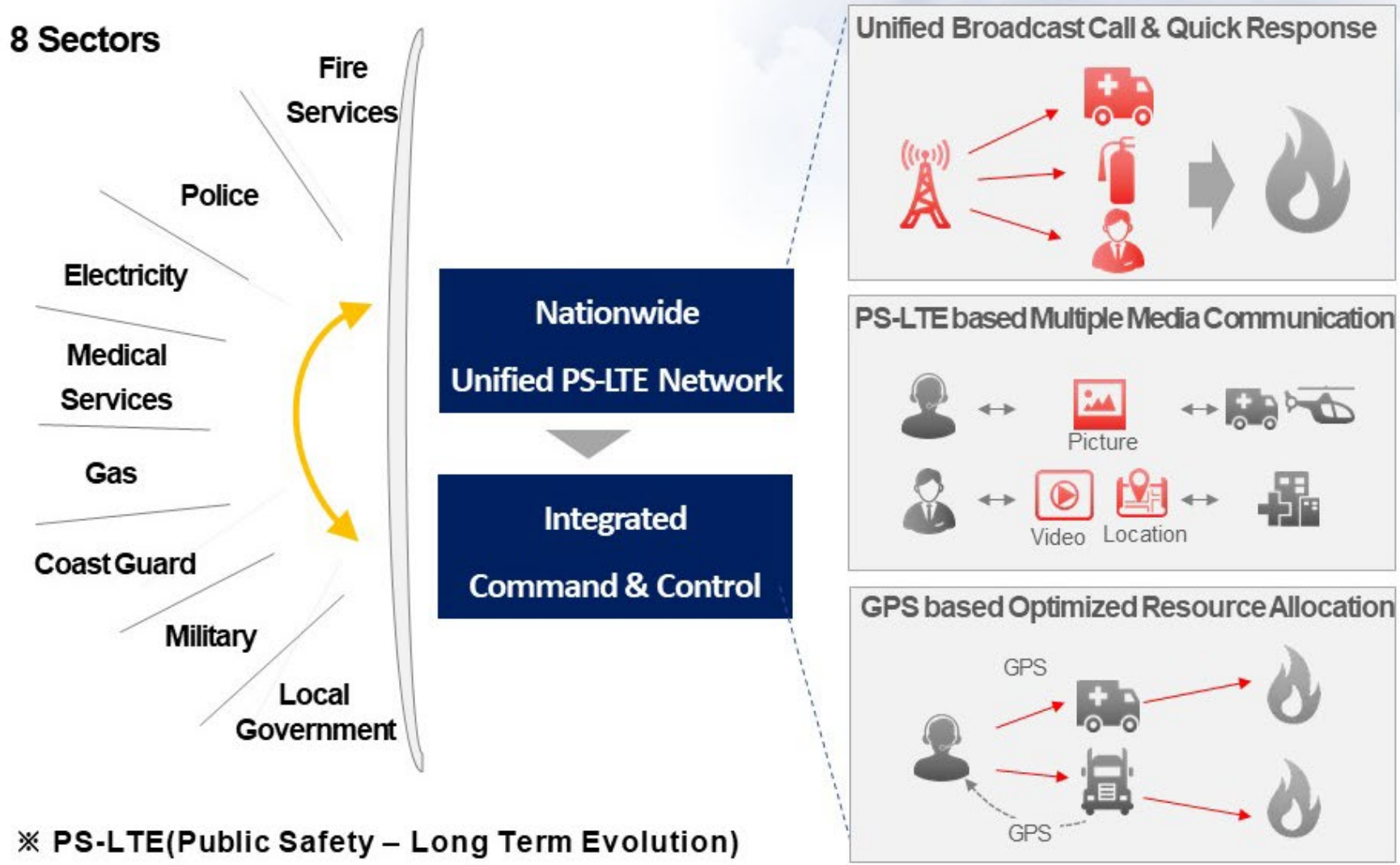
< Control Station >

< Monitoring Station >

# Countries that have adopted our flood outbreak forecast & warning system



# 01 Concept of Korea Safe-Net



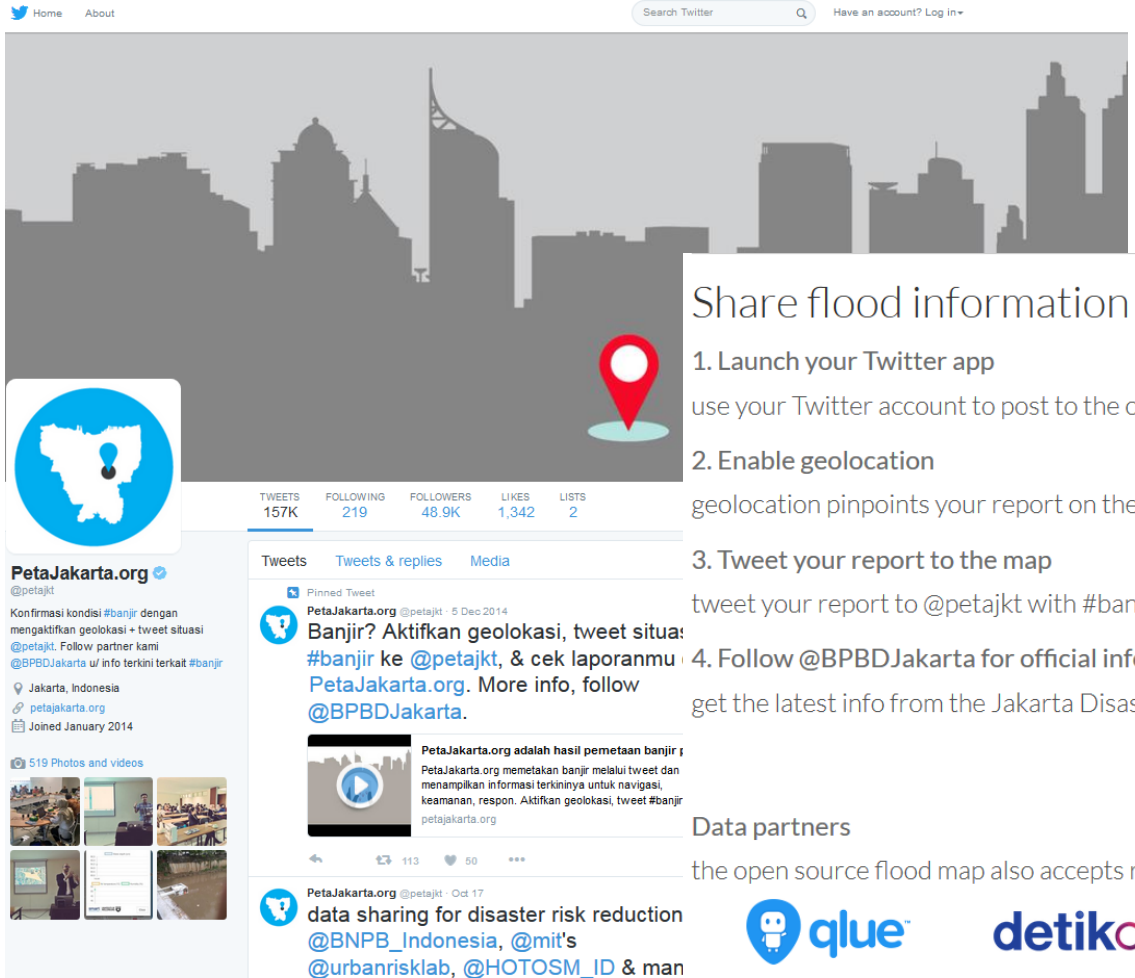

※ PS-LTE(Public Safety – Long Term Evolution)

# Be part of the solution

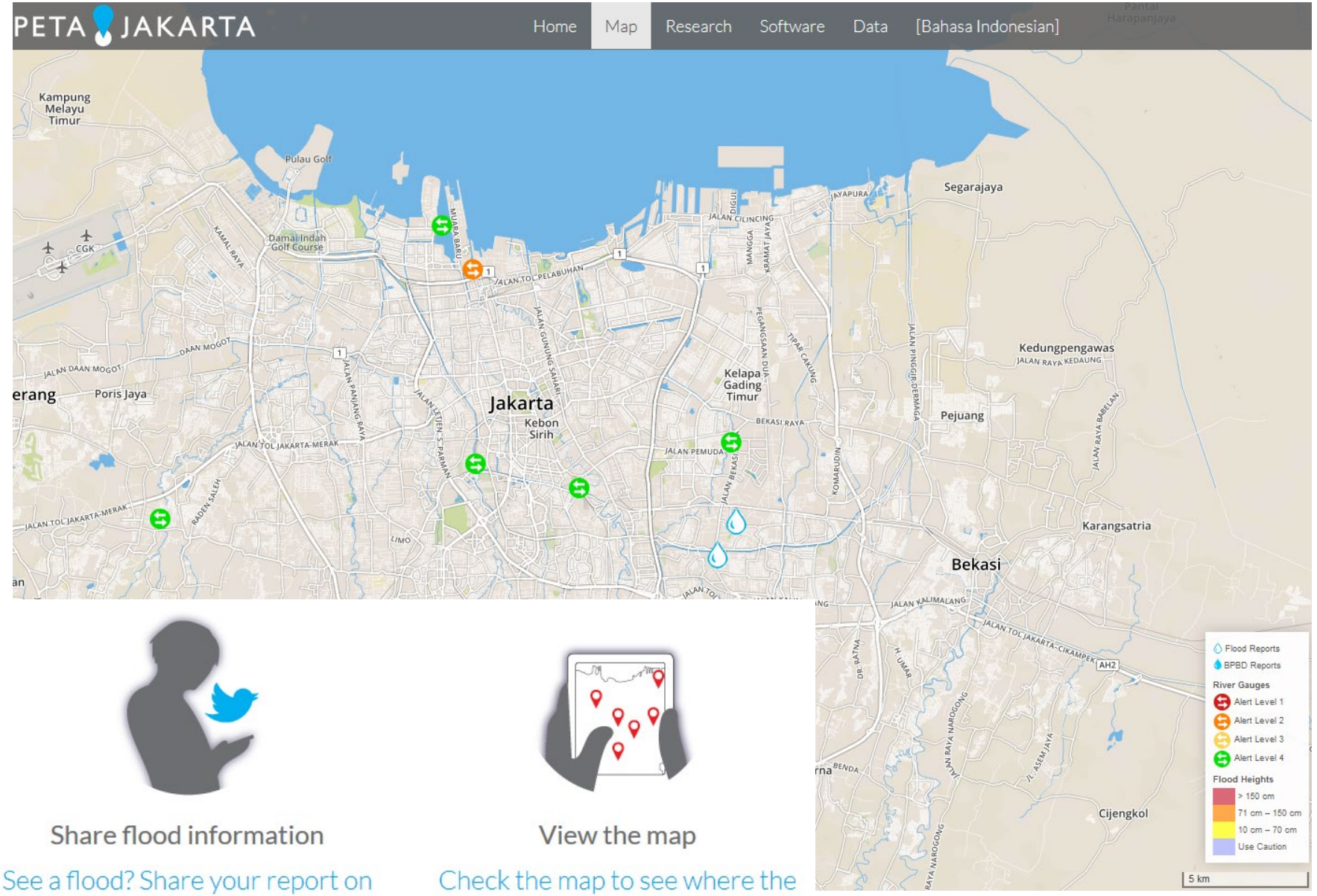
## Smart Emergency Response Systems

### CASE: Jakarta, Indonesia

- Using a number of crowdsourced platforms and installing them in the emergency control room.




- **Petajakarta**: real-time flood response management with citizen participation






## Share flood information

See a flood? Share your report on the open source map

Share »



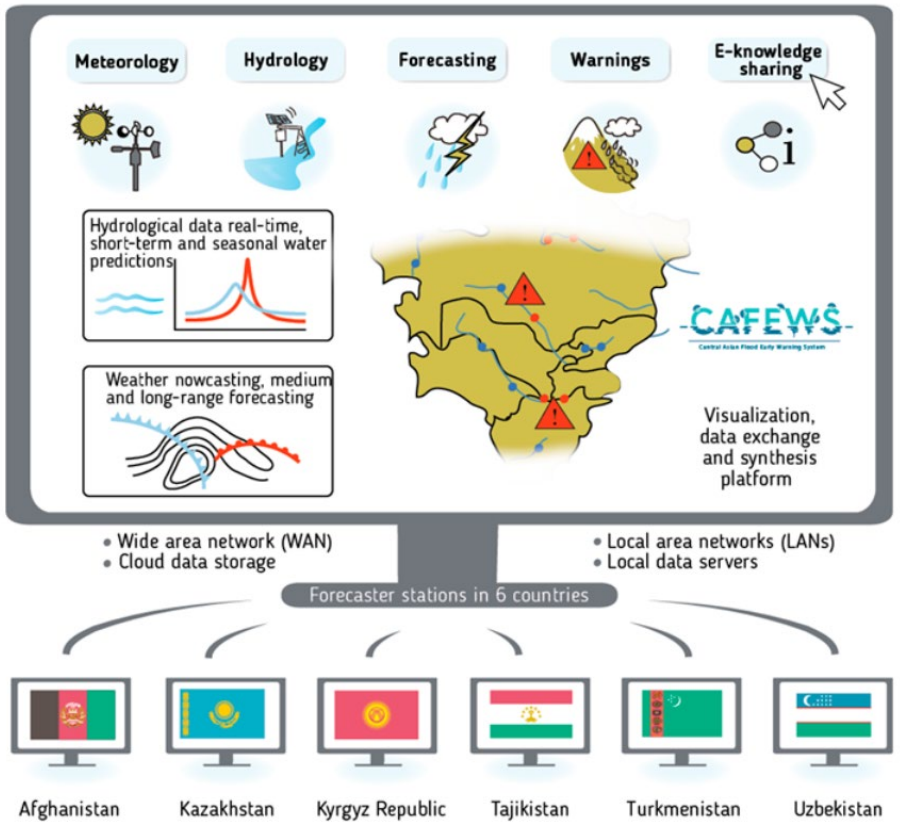
## View the map

Check the map to see where the floods are right now

Map »

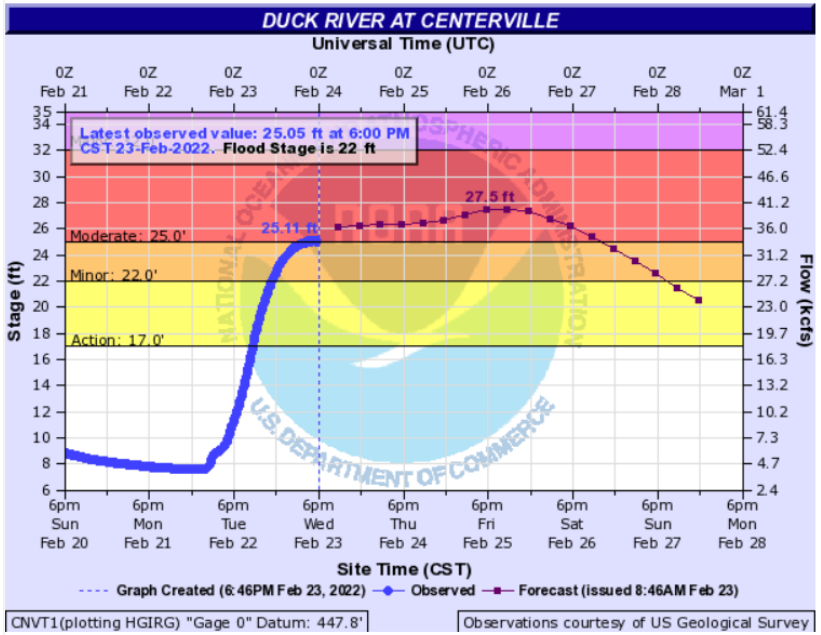
# Cross-Border Warnings Exchange: CAFEWS

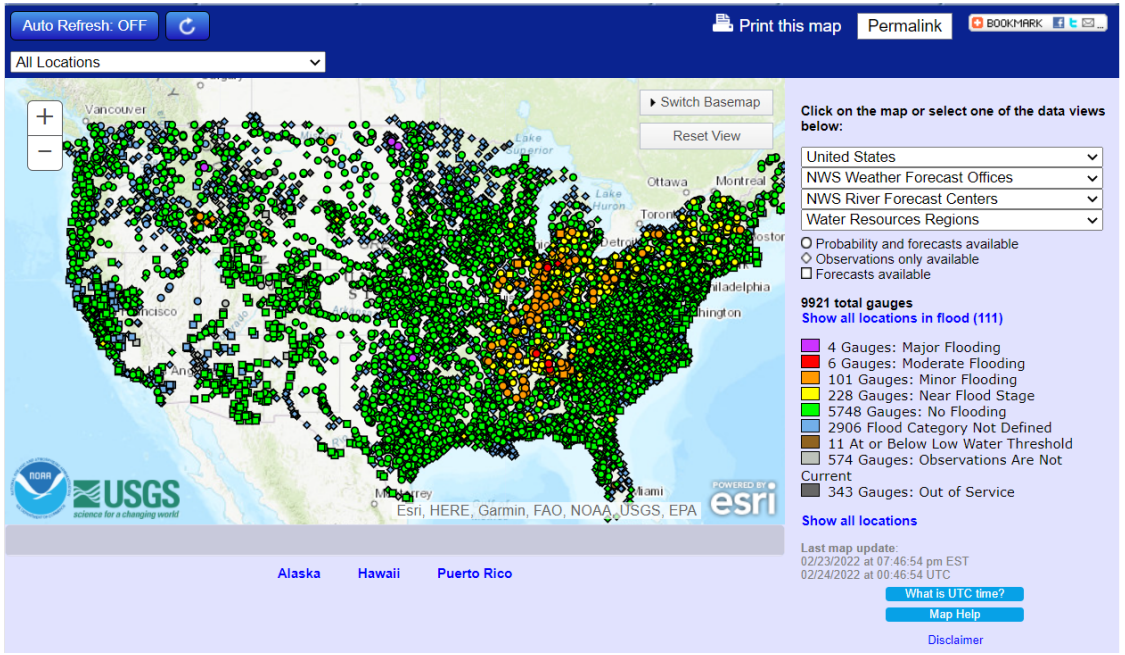
- The Central Asian Flood Early Warning System provides a shared virtual platform for data exchange and weather and flood forecasting to better manage the transboundary risks
- CAFEWS provides improved information on transboundary and national hydrometeorological events to forecasters in all Central Asian countries and Afghanistan.
- https://www.youtube.com/watch?v=HIFxkgfRy90



# Monitoring networks: USA

- The US National Weather Service maintains an active national network of more than 9900 flood gauges.
- This network is called the Automated Flood Warning System Network. Managed by the US HydroMet Services
- Each flood gauge is accessible to any user
- [https://water.weather.gov/ahps](https://water.weather.gov/ahps)



# Dire Dawa, Ethiopia: Using nature-based solutions

- Following floods killing  256 people  and causing immense damage one of the priorities in the DRR action plan was to improve watershed management.
- The city constructed 17 kilometers of retention walls either side of the Dechatu river. The river passes through the city and the retention walls reduce the threat of flooding.
- The city terraced and planted trees on the hillsides surrounding the city to prevent soil erosion.
- Other infrastructure projects include the construction of small dams that capture and conserve rainwater and recharge underground reserves.

# Albay Province: Local Government Makes Risk Reduction a Formal and Permanent Priority

The Albay provincial government in the Philippines established a permanent disaster risk management office in 1995 to deal with the high risk of typhoons, floods, landslides and earthquakes.

Disaster risk reduction was institutionalized, funded, and mainstreamed into local government planning and programs, making it clear that disaster reduction was a formal and permanent priority within regular planning.

As a result, disaster prevention, preparedness and response have been well coordinated and, casualties have reduced

# Kisumu Kenya: Engaging the youth

This is the third largest city with 600,000 population swelling to over one million during the day.

60% of the city's residents live in slums or informal settlements.

The city placed emphasis on engaging communities in DRR activities.

By involving young people in **digging or clearing drainage channels** the city increased employment and created a sense of responsibility.

The city dump extended over ten acres. In 2018 it was moved to a managed site on a disused quarry where town engineers have prepared to ensure it does not affect the water table.

# North Vancouver: Innovation and Community Practice in Holistic Disaster Risk Reduction and Policy

North Vancouver, Canada formed a natural hazards task force comprised of eight volunteer district residents.

Their mandate was to recommend to the Council the community's tolerable level of risk from natural hazards.

The task force received presentations from subject matter experts and consulted the public for their input.

The resulting recommendations make up the District's policy for risk tolerance.

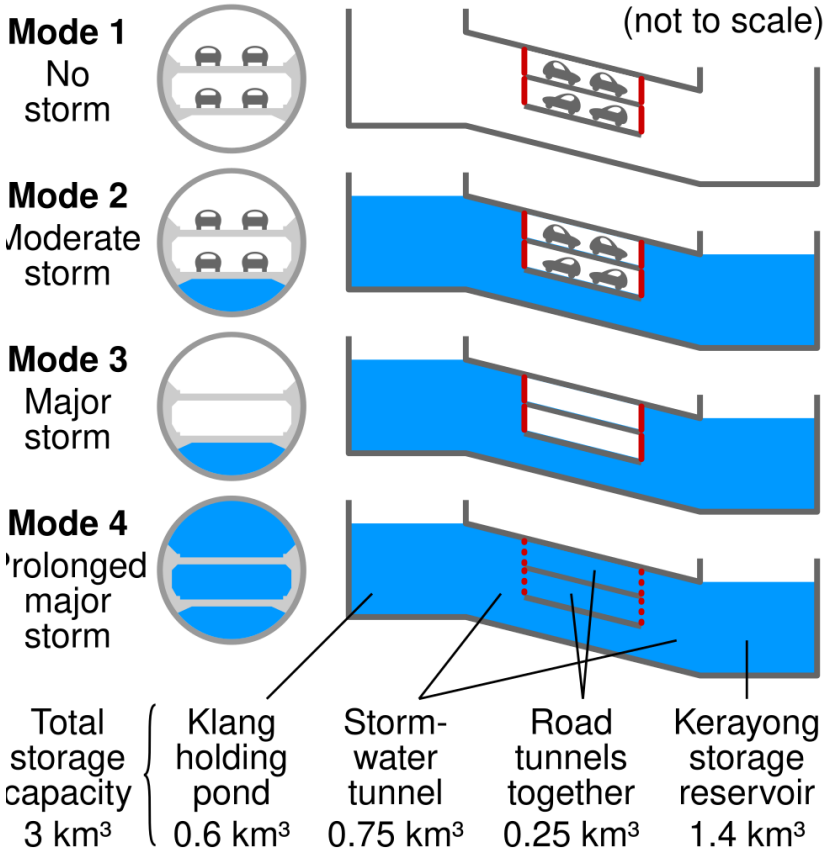
Hazards and risks are considered when granting building and development permits.

Risk is compared with the risk tolerance criteria and further reduced to as low as is reasonable.

The District works with residents, private corporations and landowners to reduce risk from landslides and forest fires by taking action to improve drainage on slopes and create defensible spaces along the urban-wild land interface areas.

# Kuala Lumpur's Stormwater Management and Road Tunnel (SMART)

- Multipurpose infrastructure projects, such as Kuala Lumpur's Stormwater Management and Road Tunnel (SMART). Floods from heavy rains are a hazard, and the 9.7 km. long, $514 million tunnel has three levels, the lowest for drainage and the upper two for road traffic.
- The drain allows large volumes of flood water to be diverted from the city's financial district to a storage reservoir.
- Combining the drain with the road has two advantages: it ensures that this "critical infrastructure" is subject to higher-than-usual margins of safety (the extra strength that engineers build into designs).
- The SMART operations was used 114 times to divert excess water and have successfully averted at least seven flash floods and have saved hundreds of millions in potential losses.



# Hubei Province (China) Ecosystem-based Disaster Risk Management

- A wetland restoration programme reconnected lakes to the Yangtze River and rehabilitated 448 sq.km of wetlands with a capacity to store up to 285 million cubic meter of floodwater.
- The local government reconnected eight more lakes covering 350 sq. km.
- The local administration has designated lake and marshland areas as natural reserves.
- In addition to contributing to flood prevention, restored lakes and floodplains have enhanced biodiversity, increased income from fisheries by 20-30% and improved water quality.

# New York (United States) Ecosystem-based Disaster Risk Management

- Untreated storm water and sewage regularly flood the streets because the ageing sewerage system is no longer adequate.
- After heavy rains, overflowing water flows directly into rivers and streams instead of reaching water treatment plants.
- Traditional pipe improvements are estimated to cost US$6.8 billion.
- Instead, New York City invested US$5.3 billion in green infrastructure on roofs, streets and sidewalks. This saved over $1 billion.
- The new green spaces absorb more rainwater and reduce the burden on the city's sewage system.


Cartoon by Chris Britt/SJ-R

SUSTAINABLE DEVELOPMENT GOALS

# Thank You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