Importance of AI for Early Warning Systems

Speaker: Dr. Tin Mar Htay

Deputy Director

Department of Meteorology and Hydrology

Myanmar

Shanghai

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Outlines

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- Myanmar's Hazard Context
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- Applications of AI in EWS
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A brief introduction of DMH

Mission of DMH

Observing and understanding weather, climate and water resources as well as providing meteorological, hydrological, seismologic and related services in support of national needs, including protection of life and property, safeguarding the environment, contributing to national security and sustainable development and promoting capacity building. It also contributes to national, regional and international cooperation.

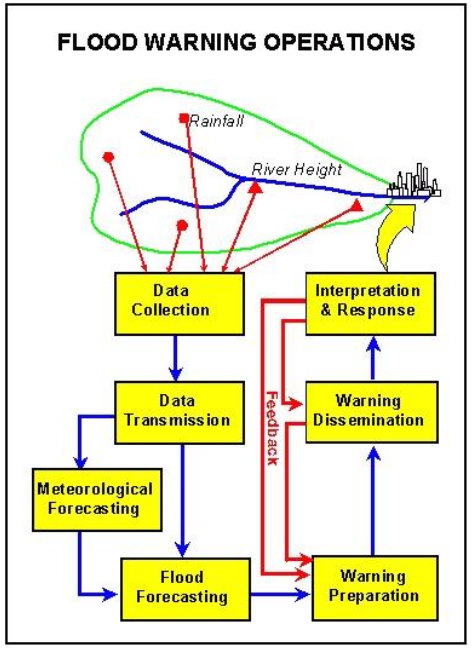
Vision of DMH

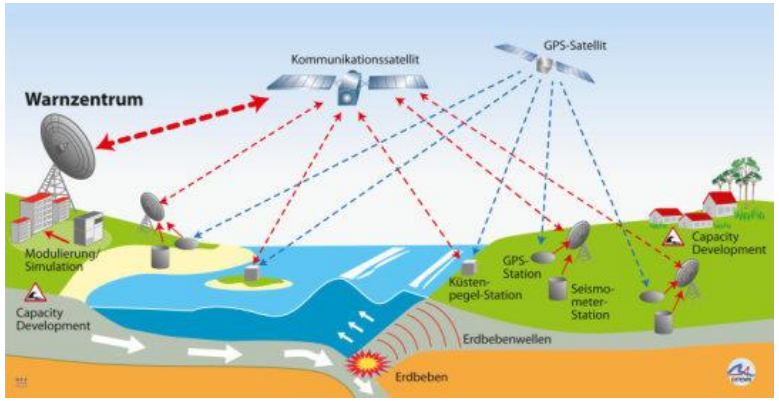
Contribute to the socio-economic development of Myanmar and to enhance the safety, security and general well-being of its people.

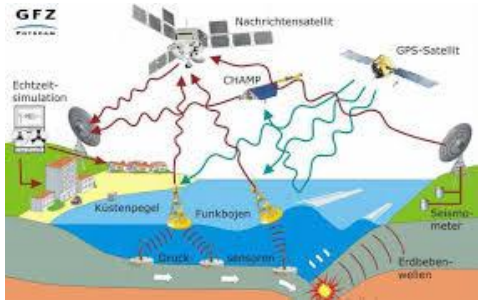
How=> It achieves that through the provision of information, forecasts and early warnings in the areas of weather climate, water and seismology through effective systems and innovative solutions.

Role and Responsibility of DMH for Disaster Risk Reduction

- Early Warning System is the main responsibility of DMH in case of Disaster Risk Reduction
- DMH are observing Meteorological, Hydrological and Seismological phenomena to provide necessary information for disaster prevention/ mitigation and development of socio-economic activities.

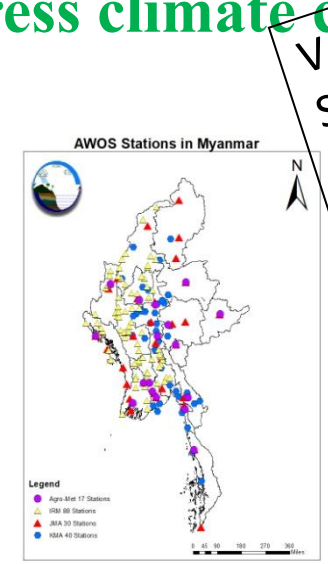


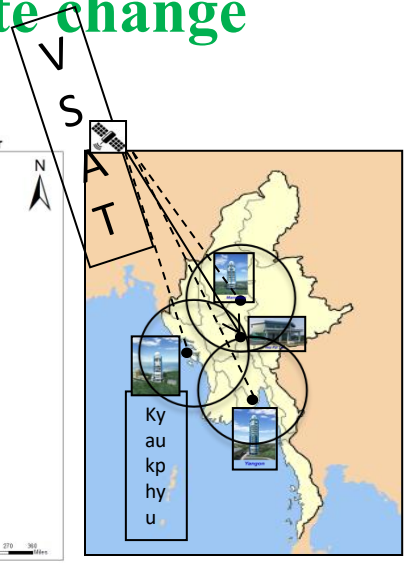


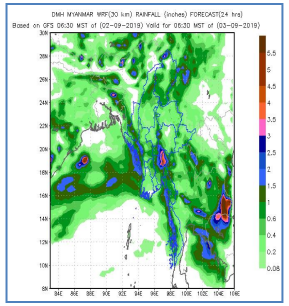


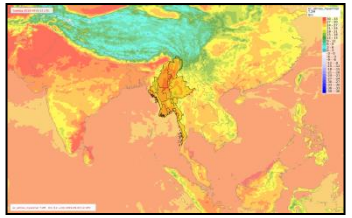
Current key tasks to improve weather services and to address climate change

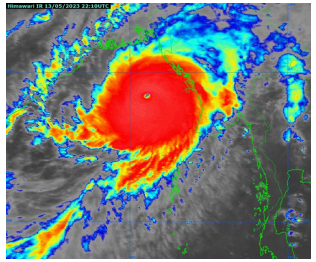
- Improving Automatic Observation System
- Installed 3 Radars
- Himawari - 8 Satellite/ CMA Satellite
- Numerical Weather Prediction (WRF & Diana)
- Climate Change Projections for Myanmar
- Seasonal Forecast and Climate Information
  - Issuing Seasonal Forecast (twice a year),
    National Monsoon Forum (twice a year)
  - Cooperating in ASEANCOF and SASCOF
- Capacity Building (Trainings, Scholarships)
- Cooperation for DRR (NDMC, Drills, Aware-ness, Media)
- International Cooperation(WMO, CMA, SMS, RIMES, KMA, JMA, JICA, KOICA, IPCC, ECMWF, ASMC, BIMSTEC. etc..)

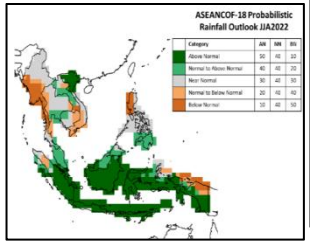


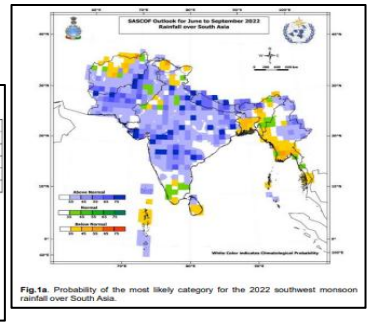








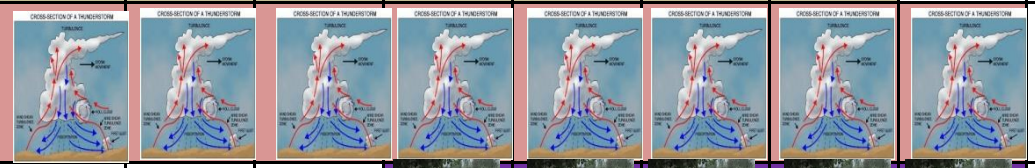
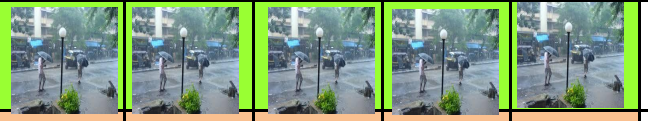
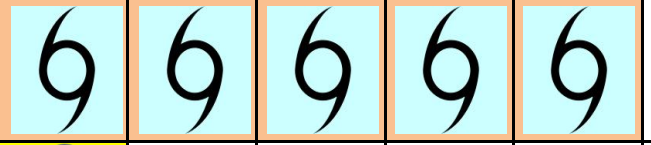




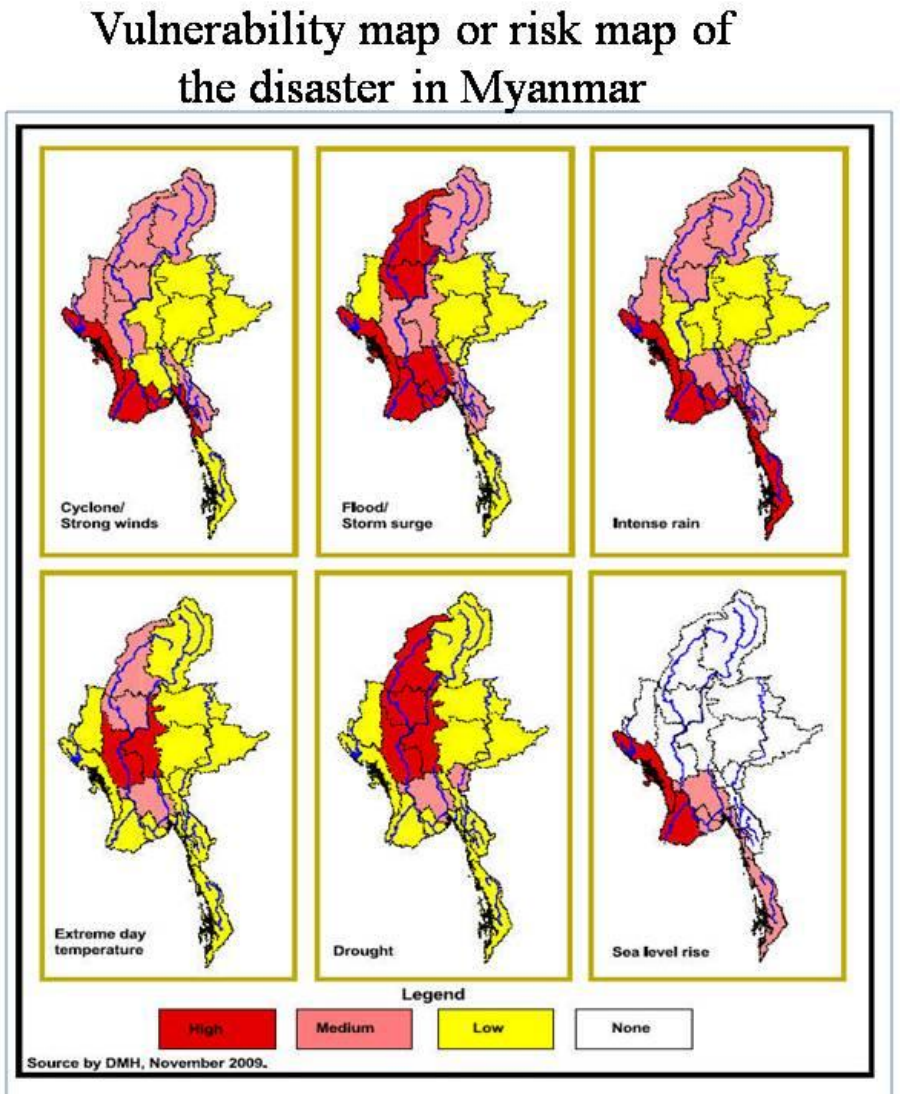
Myanmar's Hazard Context

- Frequent hazards:
  - ✓ cyclones,
  - ✓ floods,
  - ✓ landslides,
  - ✓ droughts

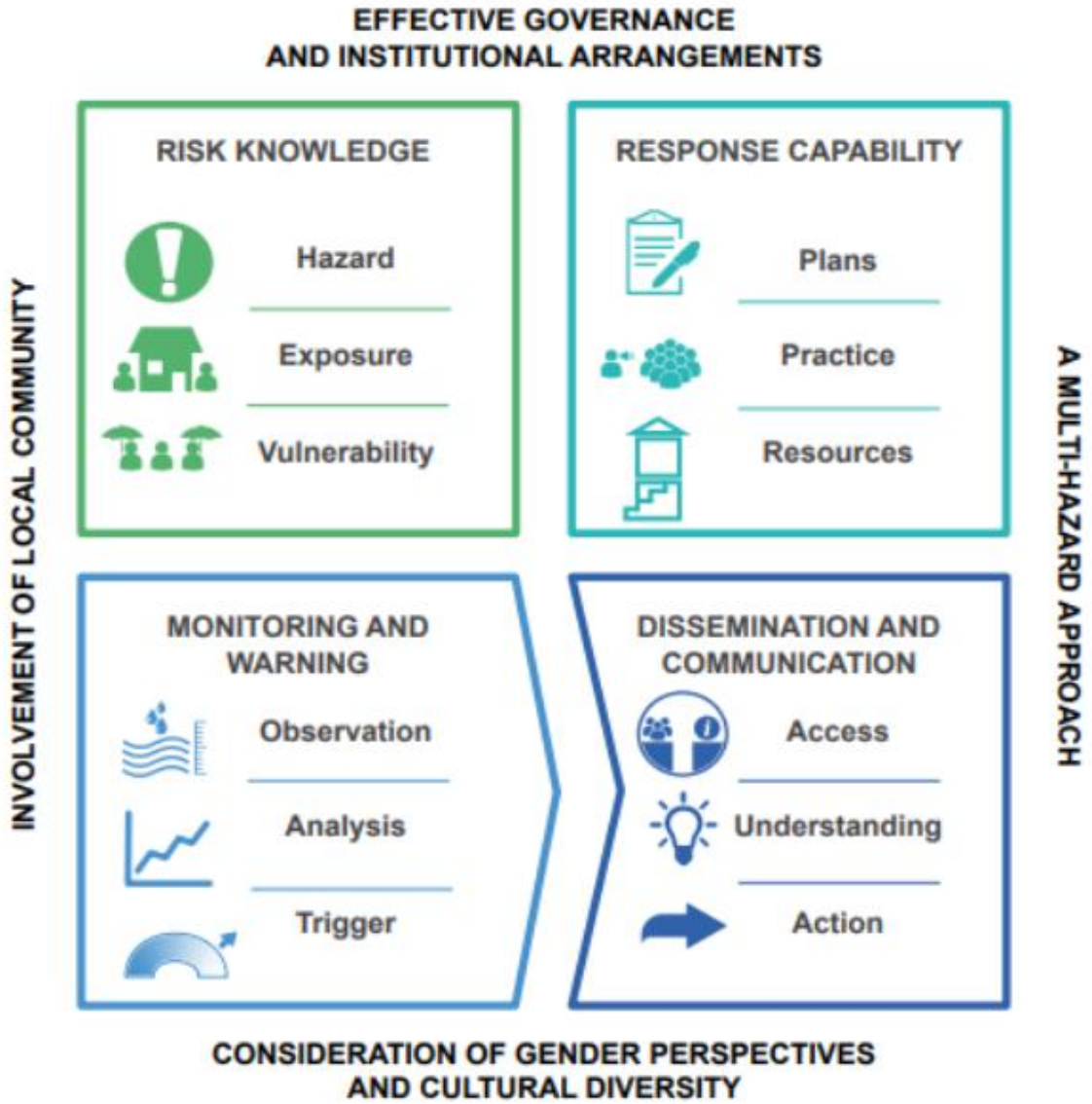
Meteorological Hazards Calendar

Hazards	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Cyclone												
High Temperature												
Low Temperature												
Drought												
Squalls& Thunderstorm												
Flood												
Heavy Rain												
Monsoon Depression												
Hail												

Vulnerable geography and high-risk



Need for effective, timely early warning systems (EWS)



The Role of DMH in Early Warning

- National authority for weather, climate, and hydrology
- Issuance of forecasts and warnings to public and stakeholders
- Supports disaster preparedness and response coordination

Introduction to Artificial Intelligence

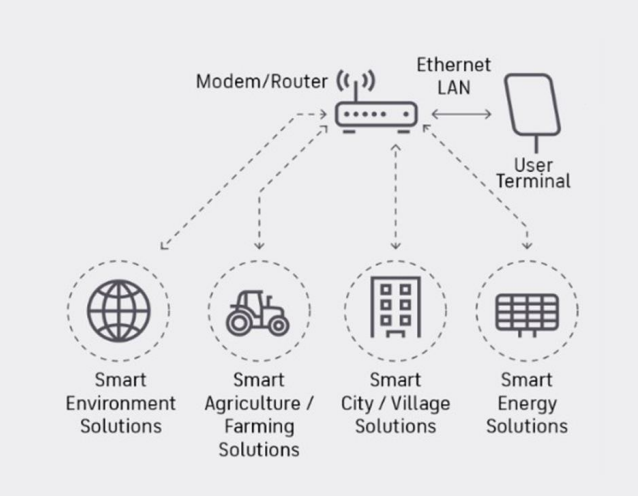
- AI simulates human intelligence using machines
- Key tools: machine learning, neural networks, big data analytics
- Powerful in recognizing complex weather patterns

Why Use AI in EWS?

- Automates data processing and prediction
- Improves accuracy and speed of alerts
- Enables real-time response and adaptation

Key Components of AI-Based EWS

- Data Collection: IoT sensors, satellite data, weather stations
- Data Processing: Big data and AI models
- Prediction: Machine learning, deep learning
- Communication: Automated alerts, mobile apps



DMH’s AI Integration Efforts

- Partnerships with universities and regional bodies
- Pilot use of AI for localized rainfall forecasting
- Training programs for staff on AI tools

Applications of AI in EWS

- Flood forecasting using ML models
- Earthquake prediction using seismic data analysis
- Cyclone tracking using satellite imagery and AI
- Disease outbreak alerts using epidemiological models

Benefits of AI in EWS

- Faster and more reliable warnings
- Data-driven decision making
- Scalable to national and global levels
- Supports climate resilience
- Tailored alerts for vulnerable groups
- Better data utilization and public communication

Limitations and Risks

- AI requires high-quality data and computing infrastructure
- Need for ongoing human oversight and interpretation
- Data privacy and equity in access to warnings

Vision for the Future

- National AI strategy in EWS under development
- Linking AI models to DMH’s forecasting workflow
- Contributing to UN Early Warning for All (EW4ALL) goals

Challenges, Needs and Future Potential

Challenges

- Delayed detection of rapidly developing hazards
- Difficulty in customizing alerts for different regions/populations
- Data gaps and limited historical records
- Data availability and quality
- Infrastructure gaps in low-income regions

Needs

- DMH needs to develop human resources to use AI and ML to produce weather forecasts and early warnings
- To receive advance technologies and training programs related to AI and ML.

Future Potential

- AI-integrated multi-hazard warning systems
- Crowd-sourced and participatory AI systems
- Global AI-based risk dashboards

Conclusion

- ✓ AI transforms early warning capabilities
- ✓ AI enhances accuracy and speed of weather forecasting and disaster warnings
- ✓ Real-time data analysis enables earlier and more localized alerts
- ✓ Machine learning models enhance prediction accuracy by processing vast historical and real-time data.
- ✓ Bridges gaps in coverage, especially in remote and vulnerable communities
- ✓ AI ensures continuous risk monitoring and automated alert dissemination to vulnerable communities.
- ✓ Collaboration and investment needed
- ✓ Supports informed decision-making for risk reduction and emergency response
- ✓ Strengthens national resilience against increasing climate-related hazards
- ✓ Continued collaboration, capacity building, and investment needed


Thank
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