S&T Roadmap for Disaster Risk Reduction and Climate Change Adaptation (DRR-CCA)

CY 2021-2025
Disaster Risk Reduction (Tsunami Hazard)

OVERALL STRATEGIES

a. Human Resource
- Training human resource in the analysis of multi-natural hazard mapping and modeling for seismic and hydro-geologic hazards.
- Capacity Building and Training for stakeholders and beneficiaries.
- Increase and availability of experts.

b. R&D Technologies
- Maintenance and updating of data platforms.
- Establishment of accurate and precise early warning systems for multi-natural hazards.
- Updating Vulnerability and Risk Maps.
- Operationalization of outputs from the stakeholders by the mandated agencies.

c. Facilities and Services
- Establishment of GIS and remote sensing processing laboratories for big data analytics.

d. S&T Policies
- Dialogue and coordination with LGUs and policy makers for concrete applications.

Possible Solutions

Vision
- Collated readily accessible tsunami data for detection and early warning
- Working and accurate tsunami early detection and warning system
- Updated maps and models for highly Vulnerable and High-risk Areas for Tsunami
- Tsunami vulnerability maps for all coastline communities

Vulnerability and Risk Assessment Studies for Tsunami-prone Areas in PAR

Overall Outcomes

a. Human Resource
- Trained human resource on tsunami processing and analysis.

b. R&D Technologies
- High-resolution tsunami maps and models
- Low-cost and Locally-developed instrumentation for early warning

b. Facilities/Services
- Laboratories for data processing tsunami maps and models.

d. S&T Policies
- Policy recommendation to LGUs in tsunami-prone areas and PAGASA as the mandated agency.

Milestones

2021
- Updated maps/models and assessments/analysis

2022
- Further analysis and generation of maps and models for tsunami-prone areas in the Philippines
- Adopted monitoring networks by PHIVOLCS

2023
- Operational monitoring networks for tsunamis
- Optimized Early Warning and Alarm Systems for Coastal Communities
- Deployment of tsunami detection prototypes

2024
- Prototyping of tsunami detection systems

2025
- Other alternative Early Warning Systems (EWS) for tsunami (low-cost, locally fabricated and developed detection systems)
Disaster Risk Reduction (Earthquake Hazard)

OVERALL STRATEGIES

a. Human Resource
- Training human resource in the analysis of multi-natural hazard mapping and modeling for seismic and hydro-geologic hazards.
- Capacity Building and Training for stakeholders and beneficiaries.
- Increase and availability of experts.

b. R&D Technologies
- Maintenance and updating of data platforms.
- Establishment of accurate and precise early warning systems for multi-natural hazards.
- Updating Vulnerability and Risk Maps.
- Operationalization of outputs from the stakeholders by the mandated agencies.

c. Facilities and Services
- Establishment of GIS and remote sensing processing laboratories for big data analytics.

d. S&T Policies
- Dialogue and coordination with LGUs and policy makers for concrete applications.

Possible Solutions

20M
- Updating of Earthquake Project ions through new and faster alternative techniques (including onshore and offshore mapping in PAR)

2021
- Updated nationwide Earthquake Projections
- Updated nationwide Earthquake Hazard Maps

2022
- Updated nationwide Earthquake Projections
- Updated nationwide Earthquake Hazard Maps

2023
- Updated maps and models for Earthquake-prone areas in PAR

2024
- Updated maps and projections incorporating new and historical data

2025
- Updated maps and models for highly Vulnerable and High-Risk Areas for Earthquakes

Vision

- Collated and updated readily accessible earthquake data

Milestones

- Translation of earthquake-related vector data from the 1970s to digital files
- Additional reference for earthquakes historical data

60M
- Nationwide Vulnerability and Risk Assessment Studies for Earthquake-prone Areas

Overall Outcomes

a. Human Resource
- Trained human resource on earthquake processing and analysis.

b. R&D Technologies
- High-resolution earthquake maps and models
- Nationwide mapping through faster alternative techniques
- Accurate earthquake susceptibility and projection maps

c. Facilities/Services
- Laboratories for data processing earthquake maps and models.

d. S&T Policies
- Policy recommendation to LGUs in earthquake-prone areas and PHIVOLCS as the mandated agency.
Disaster Risk Reduction (Volcanic Eruption Hazard)

OVERALL STRATEGIES

**a. Human Resource**
- Training human resource in the analysis of multi-natural hazard mapping and modeling for seismic and hydro-geologic hazards.
- Capacity Building and Training for stakeholders and beneficiaries.
- Increase and availability of experts.

**b. R&D Technologies**
- Maintenance and updating of data platforms.
- Establishment of accurate and precise early warning systems for multi-natural hazards.
- Updating Vulnerability and Risk Maps.
- Operationalization of outputs from the stakeholders by the mandated agencies.

**c. Facilities and Services**
- Establishment of GIS and remote sensing processing laboratories for big data analytics.

**d. S&T Policies**
- Dialogue and coordination with LGUs and policy makers for concrete applications.

**Possible Solutions**

- **Bathymetric Mapping of Sub-lacustrine Features in Volcanic Lakes**
- **Translation of active volcano vector data from the 1970s to digital files**
- **Low-cost instrumentation for geophysico-chemical monitoring and/or sampling/data collection volcanic gases and the volcanic crater**
- **Alternative locally-fabricated instruments for measuring data and seismic activity**
- **Bathymetric data for active volcanoes**
- **Nationwide Vulnerability and Risk Assessment Studies for Volcanic Eruption-prone areas**

**Vision**

- Collated and updated readily accessible volcano-related data
- Updated maps and models for highly Vulnerable and High-Risk Areas for Volcanic Eruption
- Updated maps and projections incorporating new and historical data

**Overall Outcomes**

**a. Human Resource**
- Trained human resource on volcano data processing and analysis.

**b. R&D Technologies**
- High-resolution volcano maps
- Low-cost and Locally-developed instrumentation for seismic data measurement, collection and monitoring

**c. Facilities/Services**
- Laboratories for data processing volcanic maps and models.

**d. S&T Policies**
- Policy recommendation to LGUs with volcanic activity and PHIVOLCS as the mandated agency.
Disaster Risk Reduction (Landslide Hazard)

OVERALL STRATEGIES

a. Human Resource
• Training human resource in the analysis of multi-natural hazard mapping and modeling for seismic and hydro-geologic hazards.
• Capacity Building and Training for stakeholders and beneficiaries.
• Increase and availability of experts.

b. R&D Technologies
• Maintenance and updating of data platforms.
• Establishment of accurate and precise early warning systems for multi-natural hazards.
• Updating Vulnerability and Risk Maps.
• Operationalization of outputs from the stakeholders by the mandated agencies.

c. Facilities and Services
• Establishment of GIS and remote sensing processing laboratories for big data analytics.

d. S&T Policies
• Dialogue and coordination with LGUs and policy makers for concrete applications.

Possible Solutions

Vision
• Collated and updated readily accessible landslide data

2025
2024
2023
2022
20M
• Landslide thresholds and models for areas with mining activities
• Nationwide rain-induced landslide thresholds database
• Landslide models in different typological substrates/types

20M
• Lahar/Landslide Models based on Climate Maps and Models

40M
• Landslide thresholds based on different Lithological Types
• Landslide thresholds and models for areas with mining activities

80M
• Nationwide Vulnerability and Risk Assessment Studies for Landslide-prone Areas

Milestones

2021
• Landslide models incorporated in the existing activities of DENR-MGB
• Operational monitoring networks for landslide forecasting

50M
• Updating of landslide maps and models

20M
• Updated landslide inventory of earthquake-induced and rain-induced landslide forecasting

20M
• Lahar/Landslide Models based on Climate Maps and Models

Overall Outcomes

a. Human Resource
• Trained human resource on landslide data processing and analysis.

b. R&D Technologies
• High-resolution landslide maps, models and thresholds
• Low-cost and Locally-developed instrumentation for landslide detection and early warning system

c. Facilities/Services
• Laboratories for data processing landslide maps and models.

d. S&T Policies
• Policy recommendation to LGUs with landslide-prone areas and PHIVOLCS/DENR-MGB/PAGASA as the mandated agencies.
Disaster Risk Reduction (Typhoons Hazard)

OVERALL STRATEGIES

a. Human Resource
- Training human resource in the analysis of multi-natural hazard mapping and modeling for seismic and hydro-geologic hazards.
- Capacity Building and Training for stakeholders and beneficiaries.
- Increase and availability of experts.

b. R&D Technologies
- Maintenance and updating of data platforms.
- Establishment of accurate and precise early warning systems for multi-natural hazards.
- Updating Vulnerability and Risk Maps.
- Operationalization of outputs from the stakeholders by the mandated agencies.

c. Facilities and Services
- Establishment of GIS and remote sensing processing laboratories for big data analytics.

d. S&T Policies
- Dialogue and coordination with LGUs and policy makers for concrete applications.

Possible Solutions

40M
- Improvement of the Prediction and Forecasting for Storm Surge, Lightning and Thunderstorms and Severe Wind

50M
- Impact-based Risk Assessment
- Cloud/Thunderstorm High-resolution Near real-time Detection/Mapping/Monitoring for Micro-weather Forecasting
- Ship Route Gale warning Visualization
- Bow Echo Detection for Tornado Warning

80M
- Storm surge forecasting using wind and wave current for the whole Philippines
- Automation of storm surge models
- Weather Forecast Visualization
- Intensity level short term forecast of extreme weather events

Vision

2022
- Storm surge forecasting using wind, wave current and other parameters in open sea setting

2023
- Impact-based Risk Assessment for the rest of the country in municipality/city level

2024
- Nationwide Intensity Forecast Guidance of Tropical Thunderstorms and Tropical Cyclones
- Nationwide Vulnerability and Risk Assessment Studies for Typhoon-prone Areas

2025
- Updated maps and models for highly Vulnerable and High-Risk Areas for Typhoons

Overall Outcomes

a. Human Resource
- Trained human resource on typhoon data processing and analysis.

b. R&D Technologies
- High-resolution typhoon maps and models
- Impact-based Risk Assessment for PAR in the municipality/city level

c. Facilities/Services
- Laboratories for data processing typhoon maps and models.

d. S&T Policies
- Policy recommendation to LGUs with typhoon-prone areas and PAGASA as the mandated agency.
Disaster Risk Reduction (Floods and Heavy Rains Hazard)

OVERALL STRATEGIES

a. Human Resource
• Training human resource in the analysis of multi-natural hazard mapping and modeling for seismic and hydro-geologic hazards.
• Capacity Building and Training for stakeholders and beneficiaries.
• Increase and availability of experts.

b. R&D Technologies
• Maintenance and updating of data platforms.
• Establishment of accurate and precise early warning systems for multi-natural hazards.
• Updating Vulnerability and Risk Maps.
• Operationalization of outputs from the stakeholders by the mandated agencies.

c. Facilities and Services
• Establishment of GIS and remote sensing processing laboratories for big data analytics.

d. S&T Policies
• Dialogue and coordination with LGUs and policy makers for concrete applications.

Possible Solutions

Community or Barangay Level Near-real time Flood Forecasting for Vulnerable Areas
- Land subsidence
- Urban/river flooding

Flood Vulnerability and Risk Assessments for critical Coastal Areas
- Land subsidence
- Urban/river flooding

Dams Water Release Protocols and Rover/Tributary Control

Scenario/simulations for rivers and dams crisis with plan of action

Repository of Location-based land subsidence and river flood reports

Urban flood maps and models with means of validation/ verification

Vulnerability and Risk Maps for Land subsidence and urban/river flooding

Automated collection of data from storm drains and canals

2021
- Flood monitoring systems (river inputs and heavy rains) and community-based EWS

2022
- Intelligent storm drain/canal sensors and/or systems
- Street level/ barangay level/ community level near-real time river monitoring and early warning system for all rivers nationwide
- Municipality/ City Level Early Warning Forecasting for Floods

2023
- Updating of flood maps and models

2024
- Updated maps and models for highly vulnerable and high-risk areas for floods and heavy rains

2025
- Nationwide Vulnerability and Risk Assessment Studies for Urban and River Flooding-prone Areas

Vision

Collated and updated readily accessible typhoon data in the bagong PAGASA website

Overall Outcomes

a. Human Resource
• Trained human resource on floods and heavy rain data processing and analysis.

b. R&D Technologies
• High-resolution and updated flood/heavy rain maps and models
• Low-cost and locally-developed instrumentation for flood monitoring and early warning system

c. Facilities/Services
• Laboratories for data processing flood/heavy rain maps and models.

d. S&T Policies
• Policy recommendation to LGUs with flood/heavy rain-prone areas and PAGASA as the mandated agency.
Climate Change Adaptation (Climate-related Hazards)

OVERALL STRATEGIES

a. Human Resource
- Training human resource in the analysis of multi-natural hazard mapping and modeling for seismic and hydro-geologic hazards.
- Capacity Building and Training for stakeholders and beneficiaries.
- Increase and availability of experts.

b. R&D Technologies
- Maintenance and updating of data platforms.
- Establishment of accurate and precise early warning systems for multi-natural hazards.
- Updating Vulnerability and Risk Maps.
- Operationalization of outputs from the stakeholders by the mandated agencies.

c. Facilities and Services
- Establishment of GIS and remote sensing processing laboratories for big data analytics.

d. S&T Policies
- Dialogue and coordination with LGUs and policy makers for concrete applications.

Possible Solutions

Vision
- Collated readily accessible data for all climate-related hazards

Overall Outcomes

a. Human Resource
- Trained human resource on climate-related hazards data processing and analysis.

b. R&D Technologies
- High-resolution data used for climate-related hazards such as Extreme Weather Phenomena, Temperature Extremes or Sea Level Rise/Flooding
- Low-cost and Locally-developed instrumentation

c. Facilities/Services
- Laboratories for data processing climate-related hazard maps and models.

d. S&T Policies
- Policy recommendation to LGUs with flood/heavy rain-prone areas and PAGASA as the mandated agency.

Milestones

2021
- Database/repository of CoastalFlooding, Land Surface Temperatures, Urban Heat Island and Micro-climate Model

2022
- Field validated values for Coastal Flooding, Land Surface Temperatures, Urban Heat Island and Micro-climate projections

2023
- Field validated thermal and environmental-related land-use scenarios

2024
- Developed low-cost and local instruments/sensors for extreme phenomena:
  - Heatwaves
  - Droughts
  - Frost
  - Hail
  - Intense Storms

2025
- Early warning systems for climate-related extreme phenomena adopted by the mandated agencies
- Updated maps and models for highly Vulnerable and High-Risk Areas for Extreme Weather Phenomena, Temperature Extremes or Sea Level Rise/Flooding

Legend

Done
Ongoing
Not yet Available

Nationwide Vulnerability and Risk Assessment Studies for Extreme Weather Phenomena, Temperature Extremes or Sea Level Rise/Flooding