

# REPORT OF THE 11<sup>TH</sup> MEETING OF THE RIMES COUNCIL

20-22 January 2020, Pathumthani, Thailand





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## List of Abbreviations

AMAMAS	Papua New Guinea's agro-advisory decision-support system
APDRN	Asia-Pacific Disaster Resilience Network
ARRCC	Asia Regional Resilience to a Changing Climate Programme
BANCCA	Bangladesh National Center for Climate Applications
BOM	Bureau of Meteorology, Australia
C3S	Copernicus Climate Change Service
CAMS	Copernicus Atmosphere Monitoring Service
CARE	Climate Adaptation and Resilience for South Asia project
CDAAS	Climate data access and analysis system
CREWS	Climate Risk and Early Warning Systems
CRISH	Climate risk information system for public health
CRM	Climate risk management
CSI	Country support initiative
DOM	Department of Meteorology, Sri Lanka
DM	Disaster Management
DSS	Decision-support system
ECMWF	European Centre for Medium-Range Weather Forecasts
ESCAP	United Nations Economic and Social Commission for Asia and the Pacific
ESCAPE	Evaluation System for Computing Accessibility and Planning Evacuation
EPS	Ensemble prediction system
EWS	Early Warning System
FloCAST	Basin-based flood forecasting and warning system
FOCUS	Seasonal forecast system
GBON/RBON	Global/ regional observing network
GCF	Green Climate Fund
GWIS	Global Wildfire Information System
IMD	India Meteorological Department
INAM	National Meteorological Institute, Mozambique
INSPIRE	Internet-based Simulation Platform for Inundation and Risk Evaluation
IoT	Internet of Things
IRU	IMD RIMES Unit
MOP	UK Met Office Partnership
MOU	Memorandum of Understanding
MOWRAM	Ministry of Water Resources and Meteorology, Cambodia
NAMHEM	National Agency for Meteorology, Hydrology and Environmental Monitoring, Mongolia
NCAC	National Climate Application Center
NCMWRF	National Centre for Medium Range Weather Forecasting, India
NCOF	National Climate Outlook Forum
NDA	National Designated Authority
NMHS	National Meteorological and Hydrological Service
NWP	Numerical Weather Prediction
OSFAS	Ocean state forecasting and advisory system
PAGASA	Philippine Atmospheric, Geophysical and Astronomical Services Administration

PNG	Papua New Guinea
RIMES	Regional Integrated Multi-Hazard Early Warning System
SAFSD	South Asia Forum on Sustainable Development Goals
SAHF	South Asia Hydromet Forum
SAP	Simplified Approval Process
SESAME	Specialized expert system for agro-meteorological early warning
ShakeCast	Rapid earthquake risk assessment system
SIDS	Small Island Developing States
SMART	Multi-hazard potential impact assessment and management and emergency response tracking
SNCCA	Sri Lanka National Center for Climate Applications
SOFF	Systematic Observation Financing Facility
SWFDP	Severe Weather Forecasting Demonstration Program
UKMO	UK Met Office
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
UNFCCC	United Nations Framework Convention on Climate Change
WFP	World Food Programme
WMO	World Meteorological Organization

# 1. Introduction

The 11<sup>th</sup> Meeting of the RIMES Council was held from 20-22 January 2020 at the AIT Conference Center in Pathumthani, Thailand, presided by Dr. Madhavan Nair Rajeevan, Secretary, Ministry of Earth Sciences, Government of India, and RIMES Council Chair. The Meeting gathered 34 delegates from 22 Member and Collaborating States and 14 representatives of 9 technical and development partners of RIMES (refer to Annex 1 for the list of participants).

The Opening Session received all delegates, and warmly welcomed Afghanistan, Nepal, and Somalia as new RIMES Member States (Somalia delegate signed the RIMES Cooperation Agreement during the session on country statements). Ms. Tiziana Bonapace, Director, ICT and DRR, United Nations ESCAP, provided the riskscape in the Asia-Pacific region as backdrop to Meeting discussions (refer to Annex 2 for the transcript of her remarks). Dr. Rajeevan enjoined all delegates to contribute meaningfully in the 3-day Meeting (refer to Annex 3 for the transcript of the Chair's Address, and to Annex 4 for the meeting agenda). Mr. Ali Shareef, Deputy Director-General, Maldives Meteorological Department, and Focal Point for RIMES Secretariat, reported on actions taken on the recommendations of the 10<sup>th</sup> Meeting of the RIMES Council (Table 1). Toward the end of the session, a minute of silence was observed to pay tribute to Mr. John Arumba and Mr. Tun Lwin, Member/ Past Member of the RIMES Council who both passed away in 2019.

**Table 1. Actions taken on recommendations of the 10<sup>th</sup> Meeting of the RIMES Council**

Action points	Actions taken
<i>Observed and sector-specific data</i>	
1. Countries to replicate Papua New Guinea (PNG) and Seychelles experience to access data from user agencies through MOUs	MOU between Sri Lanka DOM and user agencies completed; MOUs for Bangladesh and Nepal are under consideration
<i>Prediction, forecasting, and warning</i>	
2. Countries to validate RIMES forecast data for improving accuracy	RIMES assisted in the validation for Cambodia and Myanmar; other countries yet to share observation data
3. EWS back-up support to Tonga based on MOU with RIMES Program Unit	No formal request received from Tonga
<i>Capacity building</i>	
4. RIMES to ensure equitable program implementation in all Member States	RIMES programs expanded to Bhutan, Cambodia, Madagascar, Maldives, Mozambique, Nepal, PNG, Philippines, Timor-Leste, and Tonga; other countries are yet to mobilize resources
5. RIMES to assist countries in replicating DSS development experiences of Bhutan, India (Tamil Nadu), and Myanmar	Replication is underway in Bangladesh, Fiji, Mozambique, Nepal, and PNG
6. RIMES to continue its assistance to PNG in building the capacity of the National Multi-Hazard Early Warning Center, and enable it to function as RIMES Sub-Regional Hub for the Pacific	Seasonal Forums with users organized; FOCUS seasonal forecasting tool transferred and training provided; customization of SESAME and SMART decision support systems for agriculture and disaster management is in progress
<i>Outreach</i>	
7. RIMES to use social media to outreach its services to wider audience	Engagement through Facebook revived; through Twitter yet to be re-established
<i>Resource mobilization</i>	
8. RIMES to assist NMHSs in highlighting economic rationale of RIMES services, to convince Finance and Planning Ministries to invest in NMHS and enhance annual financial contribution to RIMES	Research to establish economic model, in collaboration with Economics Division of Indian Institute of Technology Madras, is nearing completion
9. Member States to involve RIMES as technical partner in the design and implementation of Green Climate Fund	Mozambique, Myanmar, PNG, and Sri Lanka involved RIMES as technical partner for implementation of GCF projects

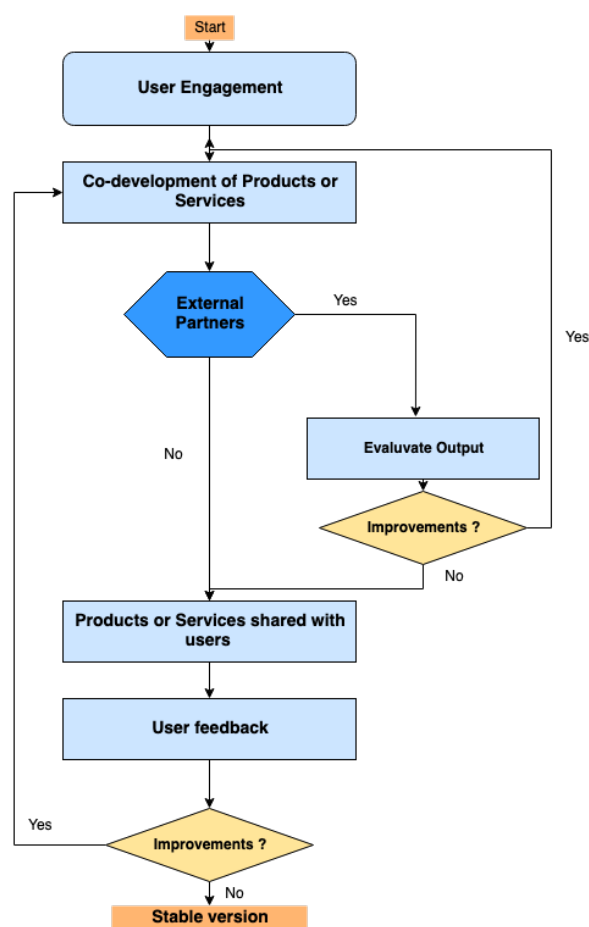


Action points	Actions taken
(GCF) projects, along the lines of Bhutan, Djibouti, Maldives, Seychelles, Sudan, and Timor-Leste	
10. Request Government of India to continue its support for Master Plan 2015-2020 priority projects	Phase II of INCOIS Ocean Information Services program is under consideration
11. Request the World Bank to facilitate the integration of RIMES services, particularly FloCAST, Ocean State Forecast, SESAME, and SMART, in its NMHS modernization efforts	World Bank support through project in Myanmar under World Bank – WMO agreement; IMD RIMES Unit (IRU) will be established with India Meteorological Department (IMD) for extending impact forecasting and decision support tools in a coordinated manner in all Indian States – a joint workplan has been developed with IMD support
<i>Other institutional matters</i>	
12. RIMES to evolve and implement an institutional mechanism to ensure active interaction of RIMES Council members, such as through workshops and online-based activities	South Asia Hydromet Forum (SAHF) provides additional avenue for increased interaction among NMHSs in the South Asian region, with potential for replication to other sub-regions
13. Madagascar to provide an update on establishing RIMES Sub-Regional Hub	Madagascar to report at the 11 <sup>th</sup> RIMES Council Meeting
14. Sri Lanka to provide an update on establishing RIMES Sub-Regional Hub	Sri Lanka to report at the 11 <sup>th</sup> RIMES Council Meeting
15. RIMES to organize a half-day special session on RIMES' scientific and technical work as an integral part of RIMES Council meetings	Technical session incorporated into the 11 <sup>th</sup> Meeting of the RIMES Council
16. RIMES Program Unit to provide the Terms of Reference for a Finance Management Committee, for approval at the 11 <sup>th</sup> Meeting of the RIMES Council	Prepared, and shall be tabled at the 11 <sup>th</sup> Meeting of the RIMES Council
17. Request the Royal Thai Government to apply the 2018 policy by the Ministry of Foreign Affairs on Thailand as Geneva of Asia, to support RIMES	In progress
18. Sri Lanka to host the 4 <sup>th</sup> RIMES Ministers Conference in 2020	Sri Lanka to report progress at the 11 <sup>th</sup> RIMES Council Meeting

## 2. Portfolio of RIMES Services

RIMES Program Unit presented its portfolio of services that is available to countries to enable them to contribute to climate-resilient development and disaster risk reduction efforts. This includes tools that assimilate information on real-time basis and dynamically render risk scenarios to support planning and decision-making processes. These tools are co-developed with National Meteorological and Hydrological Services (NMHSs) and sectoral user institutions through the process shown in Figure 1. The tools employ innovative technologies that suit the differing capacities of countries. These innovative technologies include analytics for producing informative data, machine learning algorithms to automate impact-based decision-making, and next-generation data processing and visualization platform, all integrated using open-source and free software utility packages. The tools also make use of user feedback to remain relevant, and are scalable to incorporate new technologies and requirements and better data/information as they become available. Testing, staging, and experimental operation in user environment ensure that tools adhere to quality standards. RIMES provides back-up operational support until tools are integrated into NMHS and user systems. Table 2 lists RIMES' portfolio of services.





**Figure 1. Tool development process**

Source: WMO Guidelines on Quality Management in Climate Services, 2018

**Table 2. RIMES portfolio of services**

<b>Improving data availability</b>
<ul style="list-style-type: none"> <li>○ Enhancement of observing and monitoring systems</li> <li>○ Development of data integration system</li> <li>○ Regional data sharing</li> </ul>
<b>Earthquake, tsunami and ocean services</b>
<ul style="list-style-type: none"> <li>○ Earthquake monitoring and tsunami warning</li> <li>○ Development of forecast and decision support systems               <ul style="list-style-type: none"> <li>– Ocean state forecasting and advisory system (OSFAS)</li> <li>– Rapid earthquake risk assessment system (ShakeCast)</li> <li>– Tsunami propagation and inundation simulation and risk assessment system (INSPIRE)</li> </ul> </li> <li>○ Low-cost methodologies for near-shore bathymetric, topographic, and exposure surveys</li> <li>○ Earthquake, tsunami, and coastal hazard assessments</li> <li>○ On-the-job training on earthquake monitoring and tsunami warning</li> </ul>
<b>Weather, climate, and hydrological services</b>
<ul style="list-style-type: none"> <li>○ High-resolution weather and extreme weather information</li> <li>○ Monthly and seasonal forecast information</li> <li>○ Downscaled climate projections</li> <li>○ Climate data access and analysis system (CDAAS)</li> <li>○ Development of forecast and decision support systems               <ul style="list-style-type: none"> <li>– Storm surge inundation forecasting and warning system</li> <li>– Basin-based flood forecasting and warning system (FloCAST)</li> <li>– Specialized expert system for agro-meteorological early warning (SESAME)</li> <li>– Climate risk information system for public health (CRISH)</li> <li>– Multi-hazard potential impact assessment and management and emergency response tracking (SMART)</li> </ul> </li> <li>○ Hydro-meteorological hazard assessments</li> <li>○ On-the-job and in-country trainings</li> </ul>
<b>Capacity building of users</b>
<ul style="list-style-type: none"> <li>○ Forecast provider-user forums (Monsoon/Seasonal Forums)</li> <li>○ Training on forecast translation into potential impacts</li> <li>○ Climate risk management field schools</li> <li>○ Demonstrations of climate information application</li> <li>○ Tool development               <ul style="list-style-type: none"> <li>– Evacuation planning (ESCAPE)</li> </ul> </li> </ul>

## 7.4 Institutional Mechanisms to Leverage Services

Bangladesh, Madagascar, Mozambique, Nepal, Pakistan, Papua New Guinea, and Sri Lanka shared their experiences on how they leveraged RIMES institutional mechanisms in developing impact forecasting services and risk-based early warning systems. These mechanisms include:

- National Climate Application Center for Impact Forecasting, a collaborative way of working between the NMHS and user agencies for co-design and co-production of climate services
- Sub-Regional Hub, a country that serves other countries in the sub-region as center of excellence in a specific thematic area
- Regional collaboration to tackle common concerns

Table 3 provides the highlights of these countries' presentations.

**Table 3. Efforts by countries in leveraging RIMES institutional mechanisms**

<i>National Climate Application Center for Impact Forecasting</i>	
<ul style="list-style-type: none"> <li>• Sri Lanka <ul style="list-style-type: none"> <li>○ Sri Lanka cabinet approved the establishment of the Sri Lanka National Center for Climate Applications (SNCCA) on 24 September 2019. The SNCCA also serves as RIMES Sub-Regional Hub for South Asia.</li> <li>○ The SNCCA has the following key functions: <ul style="list-style-type: none"> <li>– Support the development of climate risk management (CRM) capabilities in climate-sensitive sectors</li> <li>– Support the operation and maintenance of decision-support systems in user departments</li> <li>– Monitor and document climate applications in planning, decision-making, and in guiding investments, and provide technical guidance as needed</li> <li>– Draft evidence-based policy papers to influence policy on climate-resilient development</li> <li>– Share country experiences to inspire and guide other countries</li> </ul> </li> <li>○ The SNCCA is housed at the Irrigation Department, manned by Senior Technical Experts and Technical Assistants. SNCCA Head will report to the Secretary of the Ministry of Mahaweli, Agriculture, Irrigation, Rural Development, Internal Trade, Food Security, and Consumer Welfare. A Steering Committee guides SNCCA establishment, monitors its programs and activities, and provides policy support. The Steering Committee is chaired by the Secretary to the Sri Lanka President, with Secretaries of the following Ministries/Departments as members: meteorology, disaster management, National Building Research Organization, irrigation, Mahaweli Authority, agriculture, environment, National Water Supply and Drainage Board, health, fisheries, planning, and finance.</li> <li>○ The SNCCA shall coordinate with sectoral agencies through focal points (senior officers) designated by participating Department/Ministry</li> </ul> </li> </ul>	
<ul style="list-style-type: none"> <li>• Bangladesh <ul style="list-style-type: none"> <li>○ The Center (referred to as BANCCA) would have the same functions as SNCCA above</li> <li>○ BANCCA shall be established at Bangladesh Meteorological Department (BMD)</li> <li>○ BMD is in the process of getting government approval for BANCCA as a national center and RIMES regional center</li> </ul> </li> </ul>	
<ul style="list-style-type: none"> <li>• Nepal <ul style="list-style-type: none"> <li>○ Intends to establish a National Climate Application Center (NCAC) to complement the Department of Hydrology and Meteorology's modernization efforts</li> </ul> </li> </ul>	
<ul style="list-style-type: none"> <li>• Pakistan <ul style="list-style-type: none"> <li>○ Current focus of Pakistan Meteorological Department is capacity development for improving forecast accuracies, impact forecasting, and climate application</li> </ul> </li> </ul>	
<i>Sub-Regional Hubs</i>	
<ul style="list-style-type: none"> <li>• Sri Lanka <ul style="list-style-type: none"> <li>○ Newly-appointed government Secretaries need to be oriented regarding the Sub-Regional Hub</li> <li>○ Cabinet note on government's funding support submitted; proposal to obtain Consolidated Fund is ready; proposal for submission to GCF in progress</li> <li>○ Plans for 2020: <ul style="list-style-type: none"> <li>– 1<sup>st</sup> and 2<sup>nd</sup> Steering Committee meeting with all stakeholders</li> <li>– Forecast integration platforms</li> <li>– Monsoon Forums</li> <li>– RIMES Ministerial Conference</li> </ul> </li> </ul> </li> </ul>	
<ul style="list-style-type: none"> <li>• Papua New Guinea <ul style="list-style-type: none"> <li>○ Capacity development: <ul style="list-style-type: none"> <li>– Training on multi-hazard risk assessment undertaken from 2017-2018</li> <li>– Agro-advisory DSS (named AMAMAS) developed in 2018</li> <li>– Seasonal forecast system developed in 2019</li> <li>– Flood forecast guidance system development is in progress</li> </ul> </li> <li>○ 6 Seasonal Forums conducted since Hub establishment</li> <li>○ Budget for 2020-2021 has been submitted for PNG government approval</li> <li>○ Resources mobilized: <ul style="list-style-type: none"> <li>– Partnership with BOM Australia and WMO to bring observations from 137 stations into a data integration system</li> <li>– Private-public partnership</li> <li>– WMO-CREWS project</li> <li>– GCF proposal: comments already received from GCF</li> </ul> </li> </ul> </li> </ul>	
<ul style="list-style-type: none"> <li>• Madagascar <ul style="list-style-type: none"> <li>○ New government came in 2019; commitment to host a Sub-Regional Hub already discussed</li> <li>○ Development of GCF proposal to build Hub capacity is in progress</li> <li>○ Current efforts are focused on development of NWP, agro-meteorology capacities</li> </ul> </li> </ul>	

#### Regional Collaboration

- Mozambique and India collaboration
  - National Meteorological Institute (INAM) exposure visit in Dec 2019 to: IMD on cyclone early warning and IMD linkages with disaster management (DM) agencies; Odisha on DM operations at state, district, and community levels
  - Identified following INAM capacity building activities:
    - Use of IMD satellite and NWP products
    - Training on NWP modeling and interpretation, nowcasting, cyclone track forecasting, cyclone warning
    - Development of integrated cyclone DSS

#### Participant Feedback on RIMES Portfolio of Services

- Uncertainty should be integrated into forecast products and climate change scenarios
- Appreciation of RIMES ocean services, as it supports the blue economy of countries, particularly Small Island Developing States (SIDS)
- Annual report should feature the performance of NWP and other forecast models

### 3. Establishing Climate Risk Management Capacities

Establishing climate risk management (CRM) capacity is a collaborative effort between the NMHS and the users of its products and services. It involves:

- a) User engagement for co-development of NMHS products and services
- b) Capacity to transform climate/ hydro-meteorological data into user-relevant information
- c) Capacity to apply climate services in planning, decision-making, and in guiding investments
- d) User feedback
- e) Policy that supports climate risk management for climate-resilient development

#### 3.1 Baseline Capacity and Capacity Development Requirements

Table 4 provides the baseline capacity of the countries in climate risk management and their requirements to build CRM capacity, summarized from the country statements.

**Table 4. CRM capacity in the countries: Baseline and requirements for capacity building**

Country/ current CRM capacity	Requirements	Needs for RIMES collaboration
<b>Afghanistan</b> <ul style="list-style-type: none"><li>○ Policy on disaster risk reduction</li><li>○ Afghanistan National Development Strategy – overall roadmap for national development</li></ul>	<ul style="list-style-type: none"><li>○ Capacities for managing hydro-meteorological hazards</li></ul>	<ul style="list-style-type: none"><li>○ NWP products</li><li>○ On-the-job training</li><li>○ Good practices</li></ul>
<b>Bangladesh</b> <ul style="list-style-type: none"><li>○ More than a decade of experience in climate risk management in collaboration with RIMES: NWP, Monsoon Forum, DSS development, capacity building of BMD, user agencies, and communities, dissemination and communication systems, community outreach</li></ul>	<ul style="list-style-type: none"><li>○ Establishment of the Bangladesh National Center for Climate Applications (BANCCA)</li></ul>	<ul style="list-style-type: none"><li>○ Technical support for establishing BANCCA</li></ul>
<b>Bhutan</b> <ul style="list-style-type: none"><li>○ 10 years of collaboration with RIMES on weather forecasting, climate prediction, hydrological modeling, and flow and flood forecasting</li><li>○ Institutional linkages with departments of disaster management, agriculture, public health, hydropower, and human settlements</li></ul>	<ul style="list-style-type: none"><li>○ Technical capacity development of NCHM</li><li>○ Mobilization of financial resources</li><li>○ Establishment of National Center for Climate Applications</li></ul>	<ul style="list-style-type: none"><li>○ Weather forecasting and seasonal prediction</li><li>○ Climate modeling and downscaling to improve climate services</li><li>○ Hydrological modeling, and flow and flood forecasting to enhance early warning services</li></ul>

Country/ current CRM capacity	Requirements	Needs for RIMES collaboration
		<ul style="list-style-type: none"> <li>○ Development of decision-support systems</li> <li>○ Technical support for establishing an NCCA</li> </ul>
<b>Cambodia</b> <ul style="list-style-type: none"> <li>○ Ongoing climate resilience capacity building projects with support from WMO, RIMES, UNDP, and other development projects</li> </ul>	<ul style="list-style-type: none"> <li>○ -</li> </ul>	<ul style="list-style-type: none"> <li>○ RIMES' further support is needed to build DOM and MOWRAM capacity</li> </ul>
<b>Comoros</b> <ul style="list-style-type: none"> <li>○ -</li> </ul>	<ul style="list-style-type: none"> <li>○ -</li> </ul>	<ul style="list-style-type: none"> <li>○ Training on remote station maintenance</li> <li>○ Customized products</li> <li>○ Localized ocean forecast products</li> </ul>
<b>Djibouti</b> <ul style="list-style-type: none"> <li>○ Access to GCF in collaboration with RIMES</li> </ul>	<ul style="list-style-type: none"> <li>○ -</li> </ul>	<ul style="list-style-type: none"> <li>○ DSS for fisheries, water, transport, disaster management, and infrastructure</li> <li>○ Marine forecasting</li> </ul>
<b>India</b> <ul style="list-style-type: none"> <li>○ Tools developed in collaboration with RIMES: <ul style="list-style-type: none"> <li>– Agromet DSS developed and in operation</li> <li>– DSSs for early warning and disaster management developed and in operation in Tamil Nadu and Odisha States</li> </ul> </li> <li>○ India's National Centre for Medium Range Weather Forecasting (NCMWRF) in collaboration with UK Met Office produced regional reanalysis datasets for 40-year period from 1978, covering 30°E to 120°E and 15°S to 45°N. These datasets will soon be available to RIMES countries.</li> <li>○ Severe weather forecast products from IMD are also available to RIMES countries</li> <li>○ IMD is also ready to respond to NMHS requests for products</li> </ul>	<ul style="list-style-type: none"> <li>○ 5-year MOES plan includes: <ul style="list-style-type: none"> <li>– Multi-hazard EWS</li> <li>– Impact forecasting</li> </ul> </li> <li>○ Establishment of a sub-unit at IMD headquarters to coordinate with State Governments on impact forecasting</li> <li>○ IMD forecast centers at State level</li> </ul>	<ul style="list-style-type: none"> <li>○ DSS for impact forecasting for all other States in the country</li> <li>○ Establishment and operationalization of coordinating office/ sub-unit to support State-level impact forecasting activities</li> </ul>
<b>Lao PDR</b> <ul style="list-style-type: none"> <li>○ DHM modernization project, supported by World Bank, includes capacity development in forecasting and service delivery, and investments in observing systems, telecommunication technology, and infrastructure</li> <li>○ WMO-CREWS project, which identified further critical capacity development needs</li> </ul>	<ul style="list-style-type: none"> <li>○ DHM strengthening for providing climate services, with support from development partners</li> </ul>	<ul style="list-style-type: none"> <li>○ -</li> </ul>
<b>Madagascar</b> <ul style="list-style-type: none"> <li>○ Collaboration with RIMES on development of climate change projections</li> </ul>	<ul style="list-style-type: none"> <li>○ Capacity development on forecasting</li> </ul>	<ul style="list-style-type: none"> <li>○ Flood forecasting</li> <li>○ Marine forecasting</li> <li>○ Agrometeorology</li> </ul>
<b>Maldives</b> <ul style="list-style-type: none"> <li>○ User engagement through NCOFs/ Monsoon Forums</li> <li>○ Impact-based forecasting activities in collaboration with user sector agencies: <ul style="list-style-type: none"> <li>– Developed matrix on likely impacts on various sectors</li> <li>– Collected data from transport sector</li> </ul> </li> <li>○ Identified all islands that are vulnerable to all types of weather hazards</li> </ul>	<ul style="list-style-type: none"> <li>○ Further requirements to develop impact-based forecasting capacity, which MMS will undertake with user sector agencies: <ul style="list-style-type: none"> <li>– Data collection for utility service, education, and health sectors</li> <li>– Establish thresholds for various hazards</li> <li>– Develop user-friendly terminology</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>○ Piloting of impact-based forecasting in 3 cities: one each in northern, central, and southern parts of the country</li> <li>○ Acquisition of detailed topography</li> <li>○ GIS training</li> </ul>
<b>Mongolia</b> <ul style="list-style-type: none"> <li>○ Policy on disaster protection</li> <li>○ Integration of science and technology in delivery of information services</li> </ul>	<ul style="list-style-type: none"> <li>○ Early warning capacity, particularly for cold episodes</li> </ul>	<ul style="list-style-type: none"> <li>○ Technological developments to assist in NAMHEM modernization</li> </ul>

Country/ current CRM capacity	Requirements	Needs for RIMES collaboration
<b>Mozambique</b> <ul style="list-style-type: none"> <li>Preparation of agreement between INAM and IMD ongoing</li> </ul>	<ul style="list-style-type: none"> <li>Impact-based multi-hazard early warning system</li> </ul>	<ul style="list-style-type: none"> <li>Integrated observation, forecasting and communication system that is suitable for the country</li> <li>Weather database, web-based platform, and DSS tools</li> </ul>
<b>Myanmar</b> <ul style="list-style-type: none"> <li>Long collaboration with RIMES on DMH capacity development, which includes impact-based forecasting, identification of hazard-specific thresholds, hazard and vulnerability assessment</li> <li>Collaboration with user sectors that include agriculture, water, energy, transport, and health</li> <li>SWFDP demonstration project</li> <li>World Bank-funded project to improve DMH services</li> </ul>	<ul style="list-style-type: none"> <li>CRM capacity development in user sectors</li> </ul>	<ul style="list-style-type: none"> <li>DSS tools</li> </ul>
<b>Nepal</b> <ul style="list-style-type: none"> <li>Aims to contribute in building climate-resilient Nepal toward prosperous Nepal by 2044/45</li> <li>DHM currently provides basic meteorological and hydrological services, including agro-meteorology, early warning for severe weather and floods, and monitoring of rivers, snow, and wind</li> <li>Project for upgrading DHM services, with focus on capacity development in observation and monitoring</li> <li>Collaborations with Finnish Meteorological Institute, UK Met Office, China Meteorological Administration, and RIMES (on NWP, flood forecasting, and NCOF)</li> </ul>	<ul style="list-style-type: none"> <li>Capacity development in the 5 pillars of national climate forecasting systems: observation and monitoring; research, modeling and prediction; climate services information system; user interface decision support service; capacity building</li> <li>Customized services to agriculture, tourism, health, energy, water resources, and multi-hazard disaster management</li> <li>Transit from basic services to impact forecasting and risk-based early warning services, including DSS</li> </ul>	<ul style="list-style-type: none"> <li>Support for developing capacity in the other 4 pillars, particularly in NWP and climate prediction, flow forecasting, development of customized products from NWP and climate models and DSSs</li> <li>Establishment of NCCA within DHM</li> </ul>
<b>Pakistan</b> <ul style="list-style-type: none"> <li>Specialized medium-range weather forecasting center: up to 10-day weather forecast, and up to 3-day 5km resolution flood forecast</li> <li>Collaborative projects: flash flood guidance system, GLOF EWS, tsunami EWS, AWS and AWLS</li> </ul>	<ul style="list-style-type: none"> <li>Forecast accuracies</li> <li>Computational resources</li> <li>Capacity development in climate application</li> <li>Risk assessment</li> <li>Impact forecasting <ul style="list-style-type: none"> <li>Legal framework</li> <li>Establishing hazard thresholds</li> <li>Communication strategy for areas at risk</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>Monsoon and post-monsoon forums</li> <li>DSS development</li> </ul>
<b>Papua New Guinea</b> <ul style="list-style-type: none"> <li>National multi-hazard early warning system that also functions as RIMES sub-regional hub</li> <li>Capacity development in multi-hazard risk assessment, agro-meteorological early warning, seasonal forecasting, seasonal forums in collaboration with RIMES</li> </ul>	<ul style="list-style-type: none"> <li>Development of capacities of user sectors on climate applications</li> </ul>	<ul style="list-style-type: none"> <li>Development of DSSs for other user sectors</li> </ul>
<b>Philippines</b> <ul style="list-style-type: none"> <li>Identified capacity development needs by PAGASA and user sectors for multi-hazard early warning through the WMO-CREWS project</li> <li>Impact-based forecasting for tropical cyclones</li> <li>Climatology and Agro-meteorology Division has impact forecasting functions. The Division is responsible for providing forecasts, outlooks, and advisories. It has the following Units: climate and agromet data section, climate monitoring and prediction, impact assessment and application, and farm weather services. The</li> </ul>	<ul style="list-style-type: none"> <li>-</li> </ul>	<ul style="list-style-type: none"> <li>Technical collaboration with and support from RIMES for further development of impact forecasting capacity</li> </ul>

Country/ current CRM capacity	Requirements	Needs for RIMES collaboration
Division is manned by 63 technical personnel. Impact forecasting activities are largely for farm weather services for rice and corn, for food security.		
<b>Seychelles</b> <ul style="list-style-type: none"> <li>○ On discussion with RIMES to serve also as RIMES Sub-regional Hub</li> </ul>	<ul style="list-style-type: none"> <li>○ Human capacity and resources</li> <li>○ Establishment of quality management system</li> </ul>	<ul style="list-style-type: none"> <li>○ RIMES as technical partner in capacity development</li> </ul>
<b>Somalia</b> <ul style="list-style-type: none"> <li>○ Flood, drought, sand dune problems, in addition to conflict</li> <li>○ Meteorological services is at infancy stage</li> </ul>	<ul style="list-style-type: none"> <li>○ Capacity development to provide basic services</li> </ul>	<ul style="list-style-type: none"> <li>○ Capacity development support</li> </ul>
<b>Sri Lanka</b> <ul style="list-style-type: none"> <li>○ SNCCA established</li> <li>○ Capacity development activities with RIMES: Monsoon Forum, FOCUS seasonal forecast system customization, downscaled climate projections, national training on forecast translation, SESAME development, and development of 3- and 10-day forecast system</li> <li>○ Initiated impact-based forecasting for weather scale</li> <li>○ Project for improving observation and communication network, and forecasting and warning systems</li> </ul>	<ul style="list-style-type: none"> <li>○ Technical support for SNCCA operationalization</li> <li>○ Forecast verification</li> <li>○ Improving forecast accuracies</li> <li>○ Development of hazard and vulnerability maps</li> </ul>	<ul style="list-style-type: none"> <li>○ Development of impact-based forecasting capacity for climate scale</li> <li>○ Development of decision-support systems for other user sectors</li> <li>○ Capacity building of users</li> <li>○ (To also include training on tsunami warning)</li> </ul>
<b>Vietnam</b> <ul style="list-style-type: none"> <li>○ Improved observation systems</li> <li>○ Quality assurance and control undertaken after forecasting</li> </ul>	<ul style="list-style-type: none"> <li>○ Disaster risk management, especially for floods</li> </ul>	<ul style="list-style-type: none"> <li>○ Calibration of observation systems</li> <li>○ Observation data quality assurance and control</li> <li>○ Data management system: technology and staff capacity development</li> <li>○ Data assimilation</li> </ul>

### 3.2 Scientific Advances and Technological Innovations

Scientific advances and technological innovations facilitate the generation of useful forecasts and the delivery of climate services to inform climate risk management. The European Centre for Medium-Range Weather Forecasts (ECMWF), India Meteorological Department (IMD), and RIMES Program Unit presented the advances and future strategies in forecasting, and tools for cyclone and storm surge prediction and flood forecasting. These are summarized in Table 5.

**Table 5. Technologies and tools for enhancing delivery of climate services**

Observation and monitoring	Prediction/ forecasting	Warning generation and dissemination
<b>ECMWF: advances and future strategies in forecasting</b>		
<ul style="list-style-type: none"> <li>○ 40 million daily observations</li> </ul> <p>Strategic areas of development:</p> <ul style="list-style-type: none"> <li>○ Exploiting diverse range of observations: new satellites, small satellites, IoT</li> </ul>	<ul style="list-style-type: none"> <li>○ SMOS neural network soil moisture assimilation</li> <li>○ Aeolus (wind lidar in space)</li> <li>○ Convective precipitation modeling</li> <li>○ Lightning assimilation</li> <li>○ Copernicus Atmosphere Monitoring Service (CAMS)</li> <li>○ Copernicus Climate Change Service (C3S): observations, climate data records, ECVs, and climate re-analyses; seasonal forecast data and products; climate model simulations; sectoral climate impact indicators</li> <li>○ GloFAS</li> <li>○ Fire forecast in Global Wildfire Information System (GWIS)</li> </ul> <p>Strategic areas of development:</p> <ul style="list-style-type: none"> <li>○ Focus on medium-range and extended-range NWP</li> <li>○ Monitoring anthropogenic CO<sub>2</sub></li> <li>○ Embedding AI (machine learning)</li> <li>○ Heterogeneous HPC technologies, cloud computing</li> <li>○ Open NWP data</li> </ul>	

Observation and monitoring	Prediction/ forecasting	Warning generation and dissemination
<b>IMD: cyclone and storm surge prediction</b>		
<ul style="list-style-type: none"> <li>○ Automatic weather stations</li> <li>○ Doppler weather radars</li> <li>○ High wind speed recorders</li> <li>○ GPS sondes</li> <li>○ Ocean buoys</li> <li>○ Satellite-based monitoring systems</li> </ul>	<p>Cyclone track prediction:</p> <ul style="list-style-type: none"> <li>○ New versions of global and regional deterministic and ensemble prediction systems (GFS(T1534), Unified Model, WRF (9km, 3km), UM®-4km, HWRF (18km, 6km, 2km)</li> <li>○ Dynamical statistical model: statistical cyclone intensity prediction, rapid intensification technique, decay model</li> <li>○ Ensemble prediction system</li> <li>○ Extended range forecast of cyclogenesis</li> <li>○ Short- to medium-range genesis forecast</li> <li>○ 120-hour forecasts of cyclone track and wind</li> </ul> <p>Storm surge and coastal inundation forecasting:</p> <ul style="list-style-type: none"> <li>○ Ghosh model: peak surge, shoaling factor, vector storm motion</li> </ul> <p>Flood forecasting due to cyclone:</p> <ul style="list-style-type: none"> <li>○ GIS-based customized rainfall information system, which generates up to 130 rainfall products on real-time basis</li> <li>○ River basin-wide spatial analysis of rainfall</li> <li>○ Sub-basin wise dynamical rainfall model</li> </ul>	<p>Cyclone warning:</p> <ul style="list-style-type: none"> <li>○ Impact-based forecast and warning using historical damage potential</li> <li>○ Post-landfall outlook; de-warning</li> </ul>
<b>RIMES Program Unit: seasonal forecasting and flood forecasting</b>		
	<ul style="list-style-type: none"> <li>○ FOCUS seasonal forecast customization system: web-based multi-model ensemble of GCMs for generating deterministic and probabilistic rainfall prediction at seasonal scale using MME methods</li> <li>○ Flood forecast system improvements: <ul style="list-style-type: none"> <li>– Use of satellite-based precipitation products in data-scarce regions</li> <li>– Integration of rainfall forecast at different lead times</li> <li>– Rainfall forecast bias correction</li> <li>– Evaluation of multiple hydrological models (lumped, hybrid lumped, semi-distributed, relatively distributed)</li> <li>– Ensemble flood forecasting</li> <li>– Error correction</li> </ul> </li> </ul>	

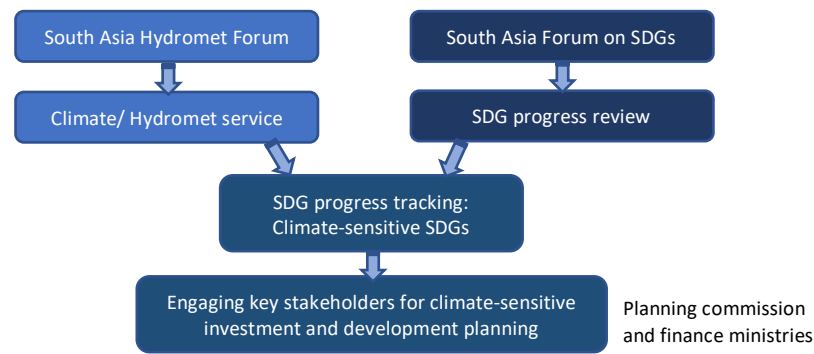
## 7.4 Partnerships

Support of technical and development partners is essential in building capacity on climate risk management. Below are innovative instruments from partner agencies/ organizations that have leveraged the RIMES mechanism to assist countries in building climate resilience.

### ***South Asia Forum on Sustainable Development Goals (SAFSD)***

The SAFSD, facilitated by ESCAP, is a sub-regional preparatory forum for the Asia Pacific Forum on Sustainable Development Goals, which in turn is a preparatory forum for the High-Level Political Forum on Sustainable Development that reviews and follows up on the 2030 Agenda for Sustainable Development at the global level. SAFSD's Working Group on Climate and Disaster Resilience looks into impacts of climate-related disasters in the region, and recommends actions for building climate and disaster resilience. The 3<sup>rd</sup> SAFSD in December 2019, held in Dhaka, noted that early warning systems have made significant difference in loss of lives, particularly for transboundary disasters, and need to be scaled up using emerging technologies. It also recommended that the South Asia Hydromet Forum (SAHF) should contribute to the SAFSD by establishing institutional linkages, and evolve an action plan to implement measures for enhancing climate and disaster resilience. Figure 2 illustrates the proposed strategy for SAHF-SAFSD coordination.





**Figure 2. Proposed SAHF-SAFSD coordination strategy** (source: ESCAP)

### ***Asia-Pacific Disaster Resilience Network (APDRN)***

The APDRN was established by ESCAP in 2017 at the 5<sup>th</sup> session of ESCAP Committee on Disaster Risk Reduction, to help align disaster risk reduction and resilience efforts of countries in implementing the 2030 Agenda for Sustainable Development with those being undertaken under the Sendai Framework for Disaster Risk Reduction. The APDRN aims to forge existing knowledge and capacities through 3 pillars: regional platform for multi-hazard early warning systems, regional space applications for disaster risk reduction, and regional hub for knowledge and innovation. Phase 1 implementation of APDRN's regional platform for floods and droughts shall be implemented with focus on South Asia through the SAHF partnership architecture. In this regard, ESCAP could leverage RIMES services by:

- Promoting RIMES services in operationalizing APDRN, starting with ESCAP's engagements in the SAHF;
- Using RIMES services to build knowledge and capacity for impact-based forecasting (e.g. translating climate/ seasonal outlook into economic and social impact outlooks);
- Actively encouraging the engagement and participation of various stakeholders in implementing APDRN through RIMES institutional mechanisms; and
- Proposing specific outputs and activities to be undertaken under APDRN, supported by RIMES mechanisms, to accelerate action to build resilience in the region's disaster risk hotspots.

### ***South Asia Hydromet Forum (SAHF)***

The SAHF, supported by the World Meteorological Organization (WMO) and the World Bank, was conceived to showcase and push ongoing national-level modernization efforts in hydromet service delivery to the next level through regional collaboration. The Forum aims to contribute to building climate resilience through development of weather and climate services. Emerging opportunities for collaboration include:

- Regional training program on operational forecasting and service delivery;
- Piloting of the Alliance of Hydromet Development;
- Provision of finance and advisory services through the Systematic Observation Financing Facility (SOFF) for regional data exchange through integrated global/ regional observing network (GBON/RBON) (noting that most developing countries do not have capacity to maintain and share data via GTS);
- Expansion of the Severe Weather Forecasting Demonstration Program (SWFDP) to address training in priority areas, such as impact-based forecasting, interpretation of outputs from numerical weather prediction (NWP) and ensemble prediction systems (EPS), and early warning systems; and

- Delivery of WMO advisory services through WMO Country Support Initiative.

### ***Climate Adaptation and Resilience for South Asia (CARE)***

The CARE project is a World Bank initiative aimed at creating an enabling environment for climate-resilient policies and investments across South Asia. The project shall ensure regional access to robust climate data, analytics, knowledge, and resilience guidelines, and support a whole-of-government approach to mainstream climate risk management in policy, planning, and sectoral investment design. The project shall be implemented in a phased approach, with Bangladesh, Nepal, and Pakistan as pilots in the first phase, focusing on climate-smart agriculture, integrated water resource management, and resilient infrastructure.

### ***Asia Regional Resilience to a Changing Climate (ARRCC) Programme and the UK Met Office Partnership (MOP)***

The ARRCC Programme aims to increase resilience of vulnerable groups and of economic growth to current and future climate and environmental impacts in Asia through better use of climate forecasts and services in planning and decision-making, delivery of new technologies and innovative approaches to get climate forecasts and warnings to vulnerable groups, and accelerating regional cooperation to build climate resilience. The ARRCC Met Office Partnership supports capacity development on impact-based forecasting, strengthening of seasonal forecasting and advisory services, and uptake and use of regional climate change information in South Asia. RIMES is one of the implementing partners of the ARRCC Met Office Partnership.

### ***Other Partnerships***

*World Meteorological Organization.* RIMES is a strong partner to WMO for the SWFP in South Asia, with support from ESCAP. Opportunities for further collaboration include RIMES increased involvement in country support initiatives (CSI) (RIMES is currently a delivery partner of the Myanmar CSI); and joint implementation of SAHF outcomes.

*World Food Programme (WFP).* WFP shared its work on risk and impact analytics, which combines remote sensing for hazard overview, demographics for identifying exposure, and vulnerability data through the PRISM web-based platform. WFP's focus in 2020, in partnership with RIMES, include:

- PRISM improvement and deployment in new countries (currently has base layers on drought and floods, and deployed in Cambodia, Indonesia, and Sri Lanka)
- User research to identify supply and demand needs for impact-based forecasts from key stakeholders from government and communities
- Research on vulnerability in the context of climate variability, identifying priority vulnerability indicators and thresholds
- New features on PRISM (e.g. integration of field data, last-mile services, etc.)

## **3.4 Funding**

The Green Climate Fund (GCF) is a financial mechanism of the United Nations Framework Convention on Climate Change (UNFCCC) for implementing climate action under the Paris Agreement. RIMES is partnering with United Nations Environment Programme (UNEP) in developing proposals for RIMES countries, in collaboration with National Designated Authorities, to modernize the NMHS, strengthen its climate services, enhance warning and dissemination systems, and improve preparedness and response capabilities. Currently:

In collaboration with UNEP:

- For Maldives: Concept Note is being revised, for submission to GCF Secretariat
- For Sudan: Concept Note has been cleared; project proposal under the Simplified Approval Process (SAP) is under preparation
- For Timor-Leste: Concept Note has been prepared and submitted to GCF Secretariat; project proposal is under preparation

Progress of other countries' Concept Note/ proposal preparation, in collaboration with RIMES and respective NDAs, is as follows:

- Nepal: Concept Note is under review
- Somalia: Concept Note is with the NDA for signature
- Sri Lanka: project proposal preparation is ongoing

#### 4. RIMES Annual Plan 2020 and Master Plan 2021-2025

RIMES work with the countries is guided by the 5-year Master Plan and the more focused Annual Plan. Participating countries shared their priorities for 2020, as summarized in Table 6.

**Table 6. Country priorities for 2020 under RIMES Master Plan 2016-2020**

Country	Master Plan Priorities			
	1. Enhanced understanding of risks and priorities	2. Increased availability of user-friendly forecasts and risk-based warnings	3. Improved responses to forecasts and warnings	4. Developing and sustaining user-centered early warning systems
<b>Member States</b>				
1. Afghanistan	○ Historical data management training and data rescue	○ Seasonal and sub-seasonal products ○ Climate prediction products ○ Drought monitoring tools (SPI, NDVI) ○ Tools and training to produce localized products		
2. Bangladesh				○ Monsoon Forums
3. Cambodia		○ Training on short- and medium-range forecasting, seasonal forecasting, and analysis of NWP products ○ Improved warning dissemination system		○ Monsoon Forums
4. Lao PDR				○ Monsoon Forums
5. Madagascar		○ Impact-based forecasting (flood, agriculture, health) ○ Improved capacity in sub-seasonal forecasting (heat waves, heavy rainfall) ○ Development of visualization tool for the forecasting department	○ Customization of TN-SMART	○ Monsoon Forums
6. Myanmar		○ Secondment training on hydrology, meteorology, seismology, tsunami, and ICT ○ Training on impact-based forecasting ○ DSS installation and capacity building	○ Climate risk management capacity	○ Monsoon Forums
7. Nepal		○ Impact-based forecasting (weather, flood) ○ Analysis tools for seasonal forecast (FOCUS) and climate change projection (CDAAS) ○ DSS for agromet service (SESAME), water resources (FloCAST) ○ Secondment training on NWP modeling and flood forecasting ○ Multi-model ensemble, data assimilation, forecast verification, and post-processing of NWP and hydrological model outputs	○ DSS for disaster management (SMART)	
8. Papua New Guinea	○ Integration of observations into the database, and creation of	○ Establishment of fiber link for Sub-Regional Hub, and HPC operationalization ○ Transfer and operationalization of AMAMAS (SESAME), FOCUS, WRF models, and DSS tools	○ Climate field school training for 2 climate officers	○ Seasonal Forums

Country	Master Plan Priorities			
	1. Enhanced understanding of risks and priorities	2. Increased availability of user-friendly forecasts and risk-based warnings	3. Improved responses to forecasts and warnings	4. Developing and sustaining user-centered early warning systems
	data management system	<ul style="list-style-type: none"> <li>○ ICT training for 4 ICT officers, on secondment to RIMES</li> <li>○ Impact-based forecasting training for 4 forecasters, in-country</li> <li>○ Hydromet and geohazard DSS tool training for 2 NWS and 2 DMPGM officers</li> <li>○ Tool development for tropical cyclone tracking and storm surge prediction</li> <li>○ Development of tropical cyclone SOPs</li> <li>○ 2<sup>nd</sup> draft of GCF-SAP proposal</li> </ul>		
9. Sri Lanka		<ul style="list-style-type: none"> <li>○ Forecast integration platforms/ DSS</li> <li>○ Capacity building on NWP-WRF</li> <li>○ Impact-based forecasting</li> </ul>		<ul style="list-style-type: none"> <li>○ Awareness program on NCCA for newly appointed Secretaries</li> <li>○ 1 Steering Committee meeting with NCCA stakeholders</li> <li>○ Monsoon Forums</li> <li>○ Ministerial Conference (Jun/Jul)</li> </ul>
10. Timor-Leste				○ Monsoon Forums
Collaborating States				
11. Bhutan		<ul style="list-style-type: none"> <li>○ NWP verification to improve weather forecasting and seasonal prediction</li> <li>○ Integrating medium-range and extended-range forecasting for agromet services</li> <li>○ Climate model downscaling to improve climate services</li> <li>○ Hydrological modeling for flow and flood forecasting to enhance early warning</li> <li>○ Development of Central Database System and Decision Support System for dissemination of hydro-meteorological information and services</li> <li>○ Training on hydrological modeling for inflow and flood forecasting</li> <li>○ Training on modeling for water resource assessment</li> <li>○ Training on climate model downscaling (RegCM and other global models), weather forecasting, medium-range forecasting and climate prediction</li> <li>○ Training on developing climate indices for different sectors, especially agriculture</li> <li>○ Development of platform to monitor extreme climate events (drought/dry spells, heat stress, etc.)</li> <li>○ Earthquake monitoring and attachment training at RIMES</li> </ul>		<ul style="list-style-type: none"> <li>○ Technical input to NCOF (bringing regional and global experiences into national context)</li> <li>○ South Asia Hydromet Forum</li> </ul>
12. Pakistan		<ul style="list-style-type: none"> <li>○ Training on developing and customizing hydrometeorological models, advance techniques for enhancing accuracy and performance of NWP models, techniques for downscaling global NWP models</li> <li>○ Trainings on cyclone tracking, storm surge, and wind and rain forecast modeling; seasonal forecasting; gridding satellite rainfall techniques</li> </ul>		
13. Sri Lanka	<ul style="list-style-type: none"> <li>○ GBON initiative</li> <li>○ Upgrading of calibration system</li> <li>○ Data quality assurance and control</li> </ul>	<ul style="list-style-type: none"> <li>○ Improvement of seasonal, sub-seasonal, and agro-met forecast products and coastal services (temporal and spatial skills)</li> </ul>		○

RIMES Program Unit presented the draft framework for RIMES Master Plan 2021-2025 as follows (Table 7). Activities, according to country priorities, are yet to be identified.

**Table 7. Draft framework for RIMES Master Plan 2021-2025**

Goal: Contribute to national efforts on climate- and disaster-resilient development through capacity development in climate and disaster risk management			
Priority Areas			
<b>1. Systematic and sustained NMHS-user engagement</b> <ul style="list-style-type: none"> <li>○ NMHS-user interface established</li> <li>○ Focal points within user institutions identified</li> <li>○ Active participation of institutions from climate-sensitive sectors</li> <li>○ Regular receipt of feedback from user agencies on climate application experiences, with recommendations to address constraints and fill gaps</li> <li>○ NMHS-user interface institutionalized and integrated into NMHS program and budget</li> </ul>	<b>2. Co-production and application of climate services</b> <ul style="list-style-type: none"> <li>○ NMHS capacity for generation of user-tailored forecast products and services</li> <li>○ User institutions participate in the development of decision-support systems that generate and disseminate impact forecasts and impact management advisories</li> <li>○ Decision-support systems are operated, maintained, and sustained</li> <li>○ End-users have capacity to understand risks and use advisories in planning and decision-making processes</li> <li>○ User institutions support end-users on application of climate services</li> <li>○ Climate application in user systems is monitored and evaluated</li> </ul>	<b>3. Institutional mechanism(s) that support climate application in climate-sensitive sectors</b> <ul style="list-style-type: none"> <li>○ Government policy and investment for establishing institutional mechanism(s) to support climate application</li> <li>○ Adequate, appropriate, and capacitated human resource</li> <li>○ Robust coordination with and participation of the NMHS and user institutions</li> <li>○ Regular monitoring and evaluation of the functioning of the institutional mechanism(s)</li> </ul>	<b>4. Influencing policy on climate- and disaster-resilient development</b> <ul style="list-style-type: none"> <li>○ Climate application experiences are documented and shared regularly to inspire replication</li> <li>○ Evidences of climate-resilient development are documented and disseminated regularly</li> <li>○ Evidence-based policy papers prepared and provided to planning and finance departments and ministries</li> </ul>

## 5. 4<sup>th</sup> RIMES Ministers Conference, Sri Lanka

Sri Lanka updated the Council on its preparations for the 4<sup>th</sup> RIMES Ministers Conference. The Conference is scheduled tentatively in June/July 2020.

## 6. Conclusion

At the conclusion of the meeting, the countries resolved to:

- Establish national institutional mechanisms, such as the NCCA, to create an enabling environment for climate-resilient policymaking and planning
- Replicate the SAHF in other regions
- Establish an Executive Management Group for SAHF, as a subset of the RIMES Council
- Own and integrate the CARE project into regional and national programs of the pilot countries
- Share appropriate data to ECMWF
- Contribute to the implementation of the GBON initiative

The signed meeting resolution is attached as Annex 5. Power point presentations may be accessed from [https://drive.google.com/drive/folders/13tFdr\\_0XYfc3i4i6bcDQMxDMIAcxToR?usp=sharing](https://drive.google.com/drive/folders/13tFdr_0XYfc3i4i6bcDQMxDMIAcxToR?usp=sharing)

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### 11<sup>th</sup> Meeting of the RIMES Council 20-22 January 2020

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## **Annex 2**

### **Remarks by Ms. Tiziana Bonapace, Director, ICT & DRR, ESCAP at the Opening Session of the 11<sup>th</sup> Meeting of the RIMES Council 20 January 2020**

Excellencies, ladies and gentlemen. I am very pleased to represent ESCAP at this 11<sup>th</sup> Session of the RIMES Council.

A decade has passed since the 66<sup>th</sup> Session of the Commission, which established RIMES through ESCAP Trust Fund for Tsunami, Disaster and Climate Preparedness. RIMES started with only three members: Comoros, Maldives, and Seychelles. All three Small Island Developing States in the Indian Ocean are a testament to how, at its very beginning, RIMES was focused on high-risk, low-capacity countries, and now a true reflection of the valuable work that RIMES has implemented. Its membership has expanded exponentially from 3 to 48 countries. I recall during the Buenos Aires Plan of Action 40<sup>th</sup> anniversary last year, the Government of Thailand, together with ESCAP, organized this side event on the Trust Fund. The Ambassador of Mozambique was introduced to RIMES, particularly since Mozambique was heavily impacted by Typhoon Idai, which was quite an exceptional event for Mozambique. This expanding membership, expanding geography of RIMES is really a reflection of the unique and value of its work.

ESCAP is very pleased to have been able to be a strong supporter of RIMES work in strengthening early warning systems in the Indian Ocean and Southeast Asian countries. In total, our Trust Fund has supported eight RIMES projects, with combined budget of more than USD 7 million, representing about half of the project portfolio of the Fund.

In this era of new risks that present with conflicts and dynamic uncertainties as our regional riskscape (2019 edition of the Asia-Pacific Disaster Report), we need to evolve new ways of cooperation among our institutions. RIMES has demonstrated its ability to adapt and respond to its Member States. Through the partnership with the South Asia Hydromet Forum, RIMES is leading the way on impact-based forecasting. We welcome the establishment of the National Center for Climate Applications in Sri Lanka, which will more effectively integrate the generators of climate information with the users across a wide range of sectors.

The South Asia Hydromet partnership was appreciated at the First South Asia Forum on Sustainable Development, which was held in Dhaka in December 2019. This ESCAP-led Forum serves as a sub-regional preparatory consultation that leads to the annual ESCAP-led Asia-Pacific Forum on Sustainable Development, a multi-stakeholder platform that brings together development and planning ministries, think tanks, academia and civil society to implement regional cooperation areas according to the SDGs. At the Forum, the Task Force on Risk Reduction identified key areas of regional cooperation, and Member States requested ESCAP to join the South Asia Hydromet Forum and to bring the two Forums together for the accelerated delivery of impact-based climate information. ESCAP has made considerable progress in this area:

First, the 2019 Asia-Pacific Disaster Report demonstrates that by adding climate-related slow-onset disasters to existing disasters, annual economic losses more than quadrupled to USD 675 billion or 2.4% of the region's GDP. The report projects that if unmitigated, disasters could put 190 million people in absolute poverty by 2030.

Second, our Asia-Pacific Disaster Resilience Network, which serves as a network of networks, mobilizes expertise and resources from existing networks, and focuses on the four disaster hotspots that have been identified. The network will be customized to deepen regional cooperation, promoting resilience to slow-onset disasters, especially for drought, as well as floods. We look forward to our envisaged work with the South Asia Hydromet Forum and ongoing partnerships with RIMES, WMO, the World Bank, UK Met Office, among others, in support of operationalizing climate and disaster resilience.

Excellencies, ladies and gentlemen, RIMES and ESCAP have worked successfully in the past to fill climate policy and development gaps and provide knowledge transfer throughout the region. This was demonstrated during the 2015 El Niño, where we prepared jointly El Niño impact outlooks. Moving forward, RIMES and ESCAP need to work together as partners through the South Asia Hydromet Forum, and to deliver much needed integrated services to support long-term risk reduction, development planning, and strengthened partnerships. Thank you.

### **Annex 3**

**Address by Dr. Madhavan Nair Rajeevan**  
**Secretary, Ministry of Earth Sciences, Government of India, and RIMES Council Chair**  
**at the Opening Session of the 11<sup>th</sup> Meeting of the RIMES Council**  
20 January 2020

Good morning to all of you. It is my privilege and honor to chair the RIMES Council Meeting at this 10<sup>th</sup> anniversary of its founding. I am very proud to reflect on the one decade of RIMES achievements, since its establishment in 2009, and to share our vision for the next decade 2020-2030. I am very happy to meet all of you, after probably a one-year gap, and I am also happy to see that many participants from National Meteorological and Hydrological Services of many countries are attending this session, including important representatives from international agencies, such as WMO, ESCAP, UK Met Office, and ECMWF.

I note that one of the underlying strengths of RIMES is in the increase in the number of participating countries, which started at 3 countries in 2009 to 48 countries as of today. While 21 countries signed the RIMES Cooperation Agreement, 27 collaborating countries are in various stages of completing formalities to sign the RIMES Cooperation Agreement, to become RIMES Member States. Sub-regional hubs of PNG for the Pacific sub-region and of Sri Lanka for South Asia have been established. I still remember when the PNG Sub-Regional Hub was inaugurated in 2017. I understand that with the establishment of RIMES Sub-Regional Hubs, the number of countries participating in RIMES programs could grow further.

RIMES serves as an interface institution between national meteorological and hydrological services that generate early warning information and user institutions that apply this information for decision-making purposes. RIMES developed a portfolio of services that could cater to the needs of all RIMES countries. RIMES' portfolio of services aims to provide a one-window service, ranging from data acquisition, management, processing, and dissemination; impact-based forecasting; customization of decision-support systems (DSSs) to aid decision-making processes; and user feedback instruments. This one-window service innovation has the following inherent advantages:

Firstly, development of DSSs enhances capacity within national meteorological and hydrological services. DSS development for a country involves customization of DSSs that have already been developed at RIMES, and uses open-source software. Hence development cost is greatly reduced, and recurring costs are avoided. Secondly, RIMES provides institutional back-up services, such as for the impact-based forecasting DSS for floods (FloCAST), which is already operational in few countries.

Another remarkable feature of RIMES innovation is in the development of national early warning systems in a sustained manner. Today, as we enter the next decade 2020-2030, establishment of national centers for climate application (NCCA) is a new initiative that will ensure an institutional mechanism in each country to enable national meteorological and hydrological services to generate impact-based forecasts and risk-based early warning information. Establishment of NCCAs will support climate-resilient investment and develop climate services in various climate-sensitive sectors in the countries through application of impact-based forecasts; monitor and document application experiences in planning and decision-making processes to provide evidence of socio-economic benefits derived from climate-informed plans and decisions, to influence policy and climate-resilient investment and development; and share climate application experiences to inspire and encourage replication.

I request all of you to provide inputs today and tomorrow to assist RIMES Program Unit in our efforts to establish NCCAs, and articulate your requirements for developing the RIMES Master Plan 2021-2025. Our development partners will be there in the coming years to help deepen and broaden our programs, such as ESCAP and the South Asia Sustainable Development Goals Forum and the World Bank-WMO-RIMES cooperation in the South Asia Hydromet Forum (SAHF), which have common goal of climate and disaster resilience. The World Bank Climate Adaptation and Resilience for South Asia (CARE) project, which aims to create an enabling environment for climate-resilient policies and investments across South Asia, will make a significant contribution to RIMES' program. World Bank and WMO have agreed to involve RIMES to implement Bank-supported country projects. UNEP has collaborated with RIMES in accessing resources from the Green Climate Fund.

RIMES portfolio of services could be leveraged in each country for mobilizing resources within the country, in collaboration with the disaster management agency and other sectoral agencies. Countries could associate RIMES Program Unit as technical implementing partner, as demonstrated by Bangladesh, Cambodia, Madagascar, and Myanmar.

ESCAP has been instrumental in RIMES' institutional development. We deeply appreciate ESCAP in establishing and supporting RIMES. We also appreciate the support provided by our good friend, Mr. Ali Shareef, DDG, Maldives Meteorological Services, as focal point for RIMES Secretariat. I deeply appreciate World Meteorological Organization's (WMO) significant contribution in leveraging RIMES technical resource in implementing WMO's Global Framework for Climate Services (GFCS) program to assist national meteorological and hydrological services through RIMES mechanism. We also appreciate the European Centre for Medium-Range Weather Forecasts (ECMWF) for its contribution in providing data streams to RIMES Program Unit to enable RIMES to provide customized early warning services in RIMES countries. We also appreciate the World Bank for associating RIMES in SAHF and the CARE project. We also appreciate UK Met Office for the Asia Regional Resilience to a Changing Climate (ARRCC) Programme.

I wish you all the best for productive and active discussions to ensure the success of this meeting. Before I conclude, I congratulate Dr. Subbiah and his young team for their excellent job in the last few years and for completing a decade of successfully implementing programs for the benefit of countries in Asia, Africa, and the Pacific. Thank you very much.

**Annex 4**  
**Agenda of the 11<sup>th</sup> Meeting of the RIMES Council**  
 20-22 January 2020, AIT Conference Center Auditorium  
 AIT Campus, Pathumthani, Thailand

Day 1 Jan 20, 2020

08:45 – 09:30	<b>Registration</b>	
09:30 – 10:00	<b>Opening Session</b> <ul style="list-style-type: none"> <li>• Welcome</li> <li>• Participant introductions</li> <li>• Remarks by Ms. Tiziana Bonapace, Director, ICT &amp; DRR, UNESCAP</li> <li>• Address by the Chair of the RIMES Council</li> <li>• Overview of the agenda</li> <li>• Secretariat's Report</li> <li>• Welcome to the new Member Countries – Afghanistan, Nepal, and Somalia</li> <li>• Tribute to Mr. John Arumba and Mr. Tun Lwin, late Council Members</li> </ul>	
10:00 – 10:30	Group photograph & Tea/Coffee break	
10:30 – 12:00	<b>Session 1: Portfolio of RIMES services</b> <i>This session takes stock of RIMES delivery of value-added services and its future plans to meet existing and emerging demands of the countries. This will help in setting the context of subsequent discussions.</i> <ul style="list-style-type: none"> <li>• Evolution and future directions – an overview: <i>Dr. G. Srinivasan, RIMES (10 min)</i></li> <li>• Forecast integration platforms – Impact forecasting and decision-support systems (DSS): <i>Mr. Itesh Dash, RIMES (20 min)</i></li> <li>• Flood forecasting services: <i>Dr. Anshul Agarwal, RIMES (20 min)</i></li> <li>• Longer term climate change: <i>Dr. S. Jothiganesh, RIMES (15 min)</i></li> <li>• Ocean and coastal services: <i>Ms. J Elaine Layug, RIMES (15 min)</i></li> <li>• Q and A (10 min)</li> </ul>	<i>Coordination/ Participation:</i> RIMES Program Unit
12:00 – 13:00	Lunch	

13:00 – 15:00	<p><b>Session 2: Institutional mechanisms to leverage services</b></p> <p><i>The session shares the experiences of selected countries that leveraged RIMES mechanism to establish impact forecasting services and risk- based early warning systems. Presentations in this session could help countries in establishing user interface institutional mechanisms within NHMSs or Disaster Management agencies by drawing experiences from Bangladesh, India, and Sri Lanka.</i></p> <p>1. Institutional innovations to leverage RIMES portfolio of services: <i>Ms. Carlyne Yu, RIMES (10 min)</i></p> <ul style="list-style-type: none"> <li>• National Climate Application Centers for Impact Forecasting and DSS <ul style="list-style-type: none"> <li>○ Sri Lanka: <i>Mr. Mohanarajah Seenithamby, Director General, Department of Irrigation, Sri Lanka (15 min)</i></li> <li>○ Bangladesh: <i>Mr. Shamsuddin Ahmed, Director General, Bangladesh Meteorological Department (5 min)</i></li> <li>○ Nepal: <i>Mr. Saraju Baidya, Director General, Department of Hydrology and Meteorology (5 min)</i></li> <li>○ Pakistan: <i>Dr. Muhammad Riaz, Director General, Pakistan Meteorology Department (5 min )</i></li> </ul> </li> <li>• Mozambique and India collaboration: <i>Director General, Mozambique National Meteorological Institute, Mozambique (10 min)</i></li> </ul> <p>2. Sub-regional Hubs/Centers: Status Reports <i>[Annual action plan for the Hubs and its operations (staffing and costs), requirements, mechanisms]</i></p> <ul style="list-style-type: none"> <li>• Sri Lanka: <i>Mr. Mohanarajah Seenithamby Director General, Department of Irrigation, Sri Lanka (5 min)</i></li> <li>• PNG: <i>Mr. Samuel Maiha/ Mr. Jimmy Gomoga, National Weather Service, PNG (5 min)</i></li> <li>• Madagascar: <i>Dr. Nirivololona Raholijao, Director General, Direction Générale de la Météorologie, Madagascar (5 min)</i></li> </ul> <p>Open discussion</p>	<p><i>Coordination/ Participation:</i></p> <p>BMD Bangladesh, DGM Madagascar, INAM Mozambique, DHM Nepal, PMD Pakistan NWS PNG, DOI Sri Lanka,</p>
15:00 – 15:30	Tea/Coffee break	

15:30 – 17:30	<b>Session 3: Country Statements</b> <i>This session communicates country expectations from RIMES in developing national mechanisms that will engage with and assist users in building climate risk management capacities, based on experiences by Bangladesh, PNG, and Sri Lanka</i>  1. Afghanistan, 2. Bangladesh, 3. Bhutan, 4. Cambodia, 5. China, 6. Comoros, 7. Djibouti, 8. Fiji, 9. India, 10. Kenya, 11. Lao PDR, 12. Madagascar, 13. Maldives, 14. Mauritius, 15. Mongolia, 16. Mozambique, 17. Myanmar, 18. Nepal, 19. Pakistan, 20. Philippines, 21. Seychelles, 22. Sri Lanka, 23. Somalia, 24. Sudan, 25. Thailand, 26. Timor Leste, 27. Tonga, 28. Uzbekistan, 29. Vietnam, 30. Yemen  Discussions	<b>Coordination/ Participation:</b> All DGs
17:30 – 17:35	Summary and Closure	
18:30	Welcome Dinner	

#### Day 2 Jan 21, 2020

09:00 – 10:00	<b>Session 4: Evolving institutional partnerships</b> <i>This session features innovative instruments by UNESCAP, WMO, World Bank and UKMO ARRCC that leverage RIMES mechanism to deliver sustained hydro-met services to the countries, with aim of encouraging countries and other development partners to replicate institutional best practices.</i>  <ul style="list-style-type: none"> <li>UNESCAP: South Asia Forum on Sustainable Development Goals (SDGs) – Disaster and Climate Resilience theme, linked with World Bank, WMO and RIMES South Asia Hydro-met Forum (SAHF) <i>Dr. Nagesh Kumar, Director, South and Southwest Asia/ Dr. Sanjay Kumar Srivastava, Chief, ICT and DRR, ESCAP (10 min)</i></li> <li>World Meteorological Organization (WMO) – World Bank: South Asia Hydro-met Forum (SAHF) <i>Mr. Abdoulaye Harou, WMO (10 min)</i></li> <li>World Bank: Climate Adaptation and Resilience for South Asia (CARE) <i>World Bank (tbd)/RIMES (10 min)</i></li> <li>UKMO ARRCC: <i>Dr. David Corbelli, UKMO (10 min)</i></li> <li>WFP, UNEP, and UNDP: TBD (10 min)</li> </ul> Discussions (10 min)	<b>Coordination/ Participation:</b> UNESCAP, World Bank, WMO, UKMO
10:00 – 10:30	Tea/Coffee break	



10:30 – 12:00	<b>Session 5: Science &amp; Technology Innovation</b> <i>This session updates participants on recent advances in forecasting and technologies that will shape future regional cooperation to enhance NHMS capacities to provide value-added services for risk management in user sectors, including potential support from leading global and regional centers.</i> <ul style="list-style-type: none"> <li>Recent advances and future strategies in forecasting by ECMWF: <i>Dr. Fabio Venuti, ECMWF (20 min)</i></li> <li>Advances in cyclone/typhoon track and storm surge prediction for the region by IMD: <i>Dr. Mrutyunjay Mohapatra, Director General of Meteorology, IMD (20 min)</i></li> <li>Development of FOCUS Seasonal prediction tool: <i>Mr. Itesh Dash / Mr. Jie Qiu, RIMES (15 min)</i></li> <li>Hydro-Met DSS and Climate services: <i>Dr. Anshul Agarwal/ Mr. Uttam Ghimire, RIMES (15 min)</i></li> </ul> Discussions (20 min)	<i>Coordination/ Participation:</i> ECMWF, IMD, RIMES
12:00 – 13:00	Lunch	
13:00 – 14:00	<b>Session 6: Discussions in Breakout Groups</b> <i>This session identifies country requirements that are common with other countries in the region, ongoing efforts to meet these requirements, and unmet needs and requirements that could be met through regional cooperation and/or support from development partners</i> <ul style="list-style-type: none"> <li>Group discussion breakout groups - Africa, Central Asia, South Asia, South East Asia, Pacific SIDS</li> </ul>	<i>Coordination/ Participation:</i> RIMES, WMO, World Bank
14:00 – 15:00	Breakout Group presentations <ul style="list-style-type: none"> <li>Africa</li> <li>Central Asia</li> <li>South Asia</li> <li>South East Asia</li> <li>Pacific SIDS</li> </ul> Open Discussions	<i>Coordination/ Participation:</i> RIMES
15:00 – 15:15	Tea/Coffee break	
15:15 – 16:00	<b>Session 7: Future Plans, Road Map for 2020-2030</b> <i>This session summarizes country requirements for building climate risk management capacities in user sectors, as inputs to RIMES' 5-year plan; provides inputs on immediate priorities for 2020; and updates on Sri Lanka's preparations for the 4<sup>th</sup> RIMES Minister's Conference.</i> <ul style="list-style-type: none"> <li>Master Plan 2021-2025 and Annual Plan 2020: <i>Ms. Lolita Bildan, RIMES</i></li> <li>4<sup>th</sup> RIMES Minister's Conference in Sri Lanka: <i>Mr. Mohanarajah Seenithamby, Director General, Department of Irrigation, Sri Lanka</i></li> <li>Open discussion</li> <li>Resolutions</li> </ul>	<i>Coordination/ Participation:</i> RIMES, DoI Sri Lanka
16:00 – 18.00	RIMES Meeting – Administrative Matters	by invitation

Day 3 Jan 22, 2020

09:00 – 10:15	<b>Session 8: Green Climate Fund (GCF) Initiatives</b> <i>This session highlights the salient features of UNEP and RIMES' partnership process for mobilizing resources from GCF through a tripartite institutional mechanism between UNEP, RIMES and NHMSs/NDAs.</i> <ul style="list-style-type: none"> <li>• Background <i>Ms. Carlyne Yu, RIMES (5 min)</i></li> <li>• UNEP collaborative proposals <i>Mr. Jochem Zoetelief, UNEP (20 min)</i></li> <li>• Best practices <i>Ms. Hanan Magzoub Hag Ahmed Rabbah, Director General, Sudan Meteorological Authority; Mr. Terencio Fernandes Moniz, Director, NDMG, Timor-Leste (10 min)</i></li> <li>• Discussions on possible replication in Afghanistan, Bangladesh, Kenya, Lao PDR, Madagascar, Maldives, Mongolia, Myanmar, PNG, Seychelles, Sri Lanka, and Uzbekistan: <i>Director General of NHMSs (3 min each)</i></li> </ul>	<i>Coordination/ Participation: UNEP, RIMES</i>
10:15 – 10:30	Tea/Coffee break	
10:30 – 12:00 (Parallel Session)	Visit to RIMES EWS Center and Bilateral Meetings	
10:30 – 12:00 (Parallel Session)	Meeting of the executive management group: South Asia Hydro-met Forum on operational forecasting and service delivery	<i>Coordination/ Participation: RIMES, World Bank, WMO, NHMSs of South Asia</i>
11.30 – 12.00 (Parallel Session)	Meeting of ARRCC project countries	<i>Coordination/ Participation: RIMES, UKMO, ARRCC project countries</i>
12:00 – 12:30	Summary	
12:30 – 13:30	Lunch/ Close for the day	

## Annex 5



### RESOLUTION OF THE ELEVENTH MEETING OF THE RIMES COUNCIL

22 January 2020, Pathumthani, Thailand

**We**, heads/representatives of National Meteorological and Hydrological Services of / national scientific/technical agencies that generate early warning information for Afghanistan, Bangladesh, Bhutan, Cambodia, Comoros, Djibouti, India, Lao PDR, Madagascar, Maldives, Mongolia, Mozambique, Myanmar, Nepal, Pakistan, Papua New Guinea, Philippines, Seychelles, Somalia, Sri Lanka, Uzbekistan, and Vietnam, met from 20-22 January 2020 in Pathumthani, Thailand to articulate our priority capacity development needs toward building climate and disaster resilience, and discuss how RIMES institutional mechanism, services, and partnerships could be leveraged to help meet these needs. We hereby:

**Welcome** Afghanistan, Nepal, and Somalia as new RIMES Member States;

**Welcome** the portfolio of services that is available from RIMES Program Unit, which includes impact forecasting tools that are co-developed with NMHSs and user sectors;

**Resolve** to establish national institutional mechanisms, such as the National Center for Climate Applications (NCCA), inspired by the experiences of Bangladesh and Sri Lanka, that aim to create enabling environment for climate-resilient policies through data availability, data analytics, decision-support systems for impact forecasting, climate applications, and evidence-based policy-making;

**Request** RIMES Program Unit to work with us in our efforts to develop climate and disaster risk management capacities in user sectors and in establishing national institutional mechanisms in the likes of NCCAs, with country priorities in these areas articulated for the preparation and implementation of the RIMES Master Plan 2021-2025;

**Appreciate** Papua New Guinea on significant progress made in developing capacities of RIMES Sub-Regional Hub for the Pacific; Sri Lanka on progress made in establishing RIMES Sub-Regional Hub for Climate Applications; and Madagascar for keeping its commitment to establish RIMES Sub-Regional Hub for Africa;

**Appreciate** the World Bank and World Meteorological Organization (WMO) in operationalizing the South Asia Hydromet Forum (SAHF), and **resolve** to own the SAHF as part of the RIMES institutional mechanism;

**Resolve** to replicate the SAHF in other regions, and **request** development partners to support and help sustain this institutional mechanism;

**Support** the linking of SAHF with the South Asia Sustainable Development Goals Forum that is led by the United Nations Economic and Social Commission for Asia and the Pacific (ESCAP), which have common goals of climate and disaster resilience and risk-sensitive investment and development planning, as recommended by the latter at its meeting in Dhaka in December 2019;

**Resolve** to establish an Executive Management Group for SAHF, as a subset of the RIMES Council, comprising of Afghanistan, Bangladesh, Bhutan, India, Maldives, Myanmar, Nepal, Pakistan, and Sri Lanka, for guiding the design and oversight of capacity development programs under SAHF;

**Welcome and endorse** the World Bank's project on Climate Adaptation and Resilience for South Asia (CARE), which aims to create an enabling environment for climate-resilient policies and investments across South Asia;

**Resolve** to own and integrate the CARE project into regional and national programs of the pilot countries, sustain the CARE project beyond the project period, and leverage enhanced capacities to broaden and deepen the program to assist all participating countries in South Asia;

**Request** RIMES Program Unit to transfer best practices from RIMES projects, including the CARE project, to other countries, on demand;

**Appreciate** ESCAP for leveraging RIMES services, including SAHF, in ESCAP regional cooperation mechanisms, such as the Asia-Pacific Disaster Resilience Network;

**Appreciate** UK Met Office (UKMO) for invaluable support to the WMO-RIMES South Asian Climate Outlook Forum (SASCOF) process and for impact-based forecasting through the Asia Regional Resilience to a Changing Climate (ARRCC) project;

**Appreciate** World Food Program (WFP), United Nations Development Programme (UNDP), and Office of Foreign Disaster Assistance of the United States Agency for International Development (USAID/OFDA) for partnerships and activities in support of capacity development of NMHSs and users;

**Appreciate** United Nations Environment Programme (UNEP) for UNEP-RIMES partnership to mobilize resources from the Green Climate Fund for implementing country priority projects;

**Appreciate** the European Centre for Medium-Range Weather Forecasts (ECMWF) for their invaluable support in providing products that are needed for tool development, making NWP data open, and for updating us on recent advances in and emerging forecast technologies and strategies;

**Request** ECMWF to extend the current license agreement for RIMES' access to ECMWF products, for the benefit of RIMES Member and Collaborating States;

**Entrust** RIMES Program Unit to undertake verification of RIMES NWP products and bring out annual verification reports, and **resolve** to digitize and share data to enable RIMES Program Unit to undertake such verification;

**Resolve** to also share appropriate data to ECMWF, through RIMES Program Unit to enable RIMES Program Unit to improve decision-support systems for applications;

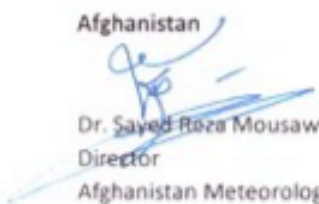
**Resolve** to contribute to the implementation of WMO Global Basic Observing Network (GBON) initiative;

**Appreciate** India Meteorological Department (IMD) and National Centre for Medium Range Weather Forecasting (NCMRWF) for their operational support to RIMES Program Unit, and for updating us on advances in cyclone track and storm surge prediction for the South Asian region; and

**Appreciate** Sri Lanka's preparations and support for the 4<sup>th</sup> Conference of Ministers.

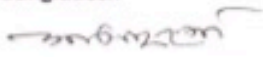


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**Cambodia**



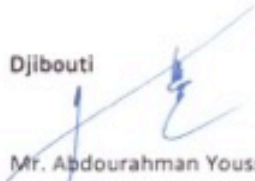
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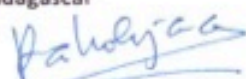
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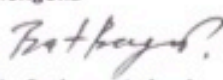
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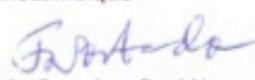
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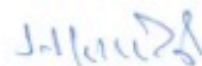
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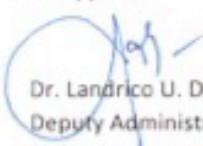
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**Sri Lanka**



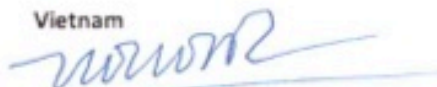
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