COUNTRY HYDROMET DIAGNOSTICS

Informing policy and investment decisions for high-quality weather forecasts, early warning systems, and climate information in developing countries.

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Cambodia NMHS Peer Review Report

Reviewing Agency: Met Office

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Met Office

Ministry of Water Resources and Meteorology

THE WORLD BANK

SOFF
Systematic Observations Financing Facility

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Glossary

ADB	Asian Development Bank
APEC	Asia-Pacific Economic Cooperation
ASEAN	Association of Southeast Asian Nations
ASMC	ASEAN Specialised Meteorological Centre
AWLS	Automatic Water Level Stations
AWS	Automatic Weather Stations
BHA	Bureau for Humanitarian Assistance
BOM	Bureau of Meteorology
CCA	Climate Change Agreements
CCD	Climate Change Department
CDM	Comprehensive Disaster Management
CNMC	Cambodia National Mekong Committee
COMS	Communication, Ocean, and Meteorological Satellite
CREWS	Climate Risk and Early Warning Systems
DCC	Department of Climate Change
DIA	Department of Irrigated Agriculture
DHRW	Department of Hydrology and River Works
DoM	Cambodia Department of Meteorology
DRM	Disaster Risk Management
DRR	Disaster risk reduction
DWRMC	Department of Water Resources Management and Conservation
ECHO	European Civil Protection and Humanitarian Aid Operations
ECMWF	European Centre for Medium-Range Weather Forecasts
EWS	Early Warning System
FFGS	Flash Flood Guidance System with Global Coverage
FWUC	Farmer Water Users Community
GBON	Global Basic Observing Network
GCF	Green Climate Fund
GDA	General Directorate of Agriculture
GFDRR	Global Facility for Disaster Reduction and Recovery
GFS	Global Forecast System
GTS	Global Telecommunication System
ICT	Information and Communications Technology
IRI	University of Colombia Research Institute
JMA	Japan Meteorological Agency
KMA	Korea Meteorological Administration
KOICA	Korea International Cooperation Agency
MAFF	Ministry of Agriculture, Forestry and Fisheries
MEF	Ministry of Economy and Finance
MEM	Ministry of Energy and Mines
MFA	Ministry of Foreign Affairs of the Czech Republic
MoE	Ministry of Environment
MoH	Ministry of Health
MOWRAM	Ministry of Water Resources and Meteorology
MRC	Mekong River Commission
MRD	Ministry of Rural Development
NAPA	National Adaptation Programme of Action
NCAR	National Center for Atmospheric Research
NCCC	National Climate Change Committee
NCDM	National Committee for Disaster Management
NGO	Non-Government Organisation
NOAA	National Oceanic and Atmospheric Administration
NWRDMC	National Water Resources Data Management Center

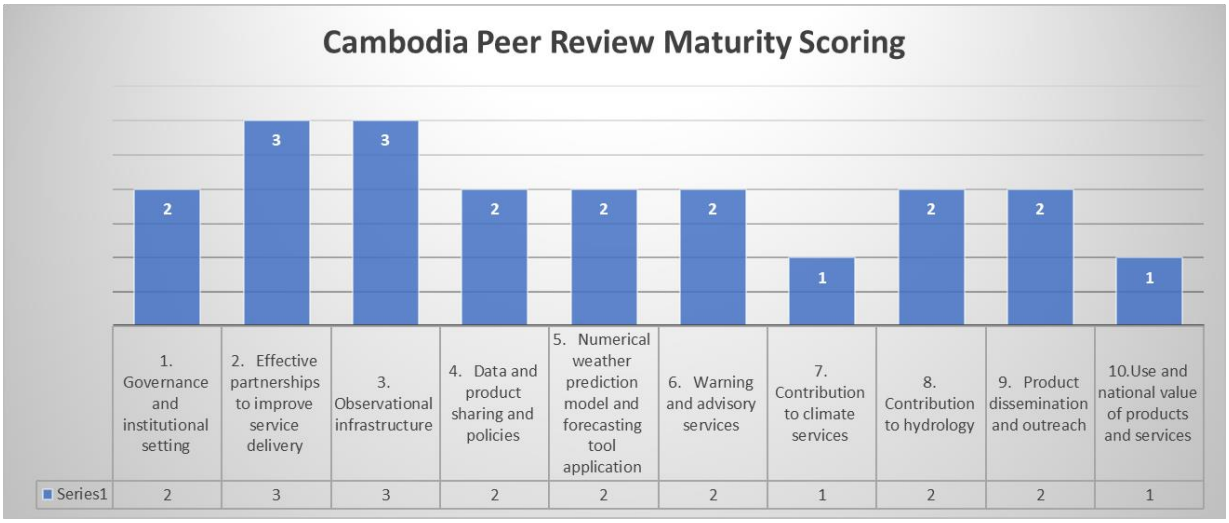
NWS	National Weather Service
PIN	People in Need
QA	Quality Assurance
RIMES	Regional Integrated Multi-Hazard Early Warning System for Africa and Asia
RRT	Rapid Response Teams
SDC	Swiss Agency for Development and Cooperation
SOFF	Systematic Observations Financing Facility
SWFP	Severe Weather Forecasting Programme
UNDP	United Nations Development Programme
UNFCC	United Nations Framework Convention on Climate Change
WFP	World Food Programme
WMO	World Meteorological Organisation
WRIS	Water Resources information System

Executive Summary

The Kingdom of Cambodia is a country in Southeast Asia, bordering several other nations and the Gulf of Thailand. The landscape is mostly low-lying plains, with mountains to the southwest and the north. The Mekong River is a major river flowing through the country, with Tonle Sap, a large lake in the centre of the country. Cambodia is located in the tropics, with one wet and one dry season and is susceptible to the climate crisis. In 2022, Industry was Cambodia's primary economic sector with approximately 38% contribution to gross domestic product. The Services sector contributed approximately 34% and Agriculture about 22% with rice being the main crop and staple food for the population.

The Cambodia Department of Meteorology (DoM) is a department within the Cambodia government system and part of the Ministry of Water Resources and Meteorology (MOWRAM). There is no specific legislation for DoM, with no clear mandates, sustainable funding or requirements for operations and services. DoM is a small and competent department, with good leadership, management and trained staff. The physical infrastructure and resource available are largely a consequence of development activity and require a coordinated improvement plan, with the implementation overseen by a capacitated leadership. Services provided include a good observations network and limited weather and seasonal products. DoM benefit from a good network of regional and global partnerships, providing a variety of development opportunities. Generally, across the national met service value-chain, there is scope for improvements.

DoM have benefitted from a variety of development projects over recent years, and notably SOFF, CREWS and GCF projects in their early stages or soon to initiate. They collectively aim to provide a wide range of benefits across the range of DoM's activities. The main recommendation from this analysis is to provide strong, coordinated and consistent support through close collaboration with the DoM leadership team.



Element	Maturity level score
1. Governance and institutional setting	2
2. Effective partnerships to improve service delivery	3
3. Observational infrastructure	3
4. Data and product sharing and policies	2
5. Numerical weather prediction model and forecasting tool application	2
6. Warning and advisory services	2
7. Contribution to climate services	1
8. Contribution to hydrology	2
9. Product dissemination and outreach	2
10. Use and national value of products and services	1

Chapter 1: General information

Introduction

Cambodia in southeast Asia shares borders with Thailand, Vietnam and Laos, and a maritime boarder with the Gulf of Thailand. Cambodia comprises a total area of 181,035 sq km. The terrain is mostly low, flat plains, with mountains in the southwest and in the north. The land is 32% agricultural and 57% forest. The major lake is the Tonle Sap and the major river is the Mekong.

Figure: Map of Cambodia. Source: Google maps

The population of ~17 million people is concentrated in the southeast, particularly in and around the capitol city of Phnom Penh, and also around the Tonle Sap Lake and the Mekong River. 25% of the population lives in urban areas.

Cambodia's climate is governed by the monsoon winds which brings two major seasons. May-October experiences a strong prevailing wind from the southwest monsoon, with heavy rains and high humidity. November-March experiences lighter and drier winds from the northeast monsoon, bringing cloudiness, infrequent precipitation and lower humidity. Maximum temperatures range from 28°C in January to 35°C in April. Annual precipitation varies from 500cm on the southwestern highlands adjacent to the sea, to 130cm in the central lowland region (*Britannica, 2024*).

Agriculture is an important, top 3, sector of the economy and employs a large proportion of the workforce. The major crop is rice, its principal food, which is grown on most of the cultivated land. Cambodia only produces one rice crop per year. Planting occurs during July and August, while the harvest period is from November to January. As there is very little irrigation, the amount of rainfall determines the size and quality of the crop. Other crops include cassava, maize, sugarcane, soy, coconut, banana, orange, and mango. Water buffalo are utilised in paddy fields and hogs are also bred (*Britannica, 2024*).

Millions of land mines remain in Cambodian fields from years of war, and this severely restricts the amount of land that is available for cultivation (*Britannica, 2024*).

CHD methodology

The approach taken has followed the Country Hydromet Diagnostics (2022) methodology. A desk review was undertaken, utilising information from the Cambodia Department of Meteorology (DoM). An in-country visit was also undertaken for direct discussions with DoM and for inspection of observation sites. These discussions were subsequently followed up via email as necessary.

Element 1: Governance and institutional setting

1.1 Existence of Act or Policy describing the NMHS legal mandate and its scope

The Cambodia Department of Meteorology (DoM) is part of the Ministry of Water Resources and Meteorology (MOWRAM) whose main objectives address political and scientific issues.

DoM has 7 missions:

1. To prepare short, medium and long term plans for rehabilitation and development of meteorology abilities throughout the country
2. To establish and manage the Cambodian meteorological stations
3. To provide weather forecast in short and long time range for all concerned sectors
4. To predict abnormal meteorological phenomenon and emit alert to enable the setting up of protective procedures
5. To raise knowledge and communicate with national and international actors on meteorology technologies
6. To strengthen and broaden Cambodian cooperation on meteorology with meteorological organisations, United Nation agencies and World Meteorological organisation (WMO)
7. To prepare annual reports on the situation of meteorology in the Kingdom of Cambodia

Currently, DoM does not have formal legislation or policy in place. It operates as a department of MOWRAM, under arrangements that were established through a sub-decree in 2006. MOWRAM's 5-year strategy does cater for support to DoM, including installation and/or rehabilitation of hydro-meteorological equipment and the training and development of its staff. In addition, the need for early warning services for meteorological hazards is identified in several government national policies.

1.2 Existence of Strategic, Operational and Risk Management plans and their reporting as part of oversight and management.

The government published the Cambodia Climate Change Strategic Plan (2014 – 2023)[1] in 2013. It recognises the threats and opportunities faced from climate change, there is very little recognition in its strategic objectives of the potential benefits DoM could bring to the nation through its membership of the global and regional meteorological community, especially WMO.

The DoM does not have active Strategic, Operational or Risk Management plans in place. It does feature to some extent in the MOWRAM Strategic Plan, which is out of date and in need of updating. DoM has limited institutional capacity and resources to establish its policy, strategy and operational plans, or even to influence those at MOWRAM in its favour, yet it's essential that they receive support to achieve these outputs and modernise the institution and provide benefits to the nation.

[1] https://www.cambodiaip.gov.kh/DocResources/ab9455cf-9eea-4adc-ae93-95d149c6d78c_007729c5-60a9-47f0-83ac-7f70420b9a34-en.pdf

1.3 Government budget allocation consistently covers the needs of the NMHS in terms of its national, regional, and global responsibilities and based, among others, on cost-benefit analysis of the service. Evidence of sufficient staffing to cover core functions

The 2023/24 budget was $500,000 for operations, maintenance and equipment. DoM apply for funding as needed and the annual budget proposals go to central Government in January/February.

The government budget allocation to DoM in 2022 was $450,000. Of this, $170,000 (37.7%) was used to pay for the maintenance of the radar (see adjacent image) and Synergie forecasting system, $100,000 (22.2%) for the maintenance of AWS and $50,000 (11.1%) for the maintenance of manual stations. The remainder was allocated to general office expenditure, such as stationery, repair of air conditioning, car maintenance, etc.

As outlined in element 1.1, the legal framework for DoM doesn't exist, or at best is poorly defined across a range of government policies, thus making it difficult to assess if the budget is sufficient for the needs of DoM. The nation needs to adapt to the climate crisis, and DoM has the potential to support this agenda. It is essential to support DoM to raise awareness of this situation to get the correct legislation, mandate and budget to enable them to provide these essential services for the nation.

1.4 Proportion of staff (availability of in-house, seconded, contracted- out) with adequate training in relevant disciplines, including scientific, technical, and information and communication technologies (ICT). Institutional and policy arrangements in-country to support training needs of NMHS.

As of March 2023, DoM has 49 staff in their Headquarters in Phnom Penh – see tables below.

In terms of field of study, 31 (63%) DoM staff have qualifications in meteorology (masters) (4), associate (16), or technical/vocational trainings (11)); 5 have degrees in business management, accounting and finance; 2 with degrees in law; while the rest have backgrounds in English, engineering and agriculture. DoM indicated that the majority of those with associate and technical/vocational trainings in meteorology are senior staff, whose training is associated with technologies, systems and processes from the past. For many new staff, professional and practical experience is limited. At present, there are no educational programmes or specialized/highly advanced technical training on meteorology in the country, except the occasional donor-assisted in-country training such as those provided by external institutions like Korea Meteorological Administration (KMA) and RIMES. Opportunities to join overseas technical training courses are limited to a few personnel.

DoM are unable to influence the national government's recruitment process, and while MOWRAM highlighted the relevance of trainings and workshops for capacity enhancement of staff, it is unclear whether budget will effectively cover the required administrative and technical capacity development of DoM staff. DoM do not have any human resource

development plan and this coupled with the lack of legislation and commensurate budget is a demotivating factor for DoM staff.

The Department of Meteorology Structure

The Department of Meteorology

Administrative Office

Role and Responsibilities

- Coordinate all activities in departments, provincial and ministries
- Prepare standard documents related to administrative work in the department
- Develop short-term, medium- and long-term planning strategies within the department
- Examine all documents, norms and regulations to implement and maintain documents
- Develop Project short, medium and long term training courses, including meetings, forums and seminars at home and abroad
- Disseminate circulars, directives, and

Technical Skills Requirements

- Administrative and human resources skills
- Finance and accounting skills
- Information Technology

Research and Weather Forecast Office

Role and Responsibilities

- Prepare regulations and circulars on weather and climate forecast documents
- Training and research on meteorological phenomena and weather forecasting
- Receive data from weather observations in cities and provinces for the whole country
- Analyze and forecast the weather
- Disseminate weather forecast information to the public for the whole country
- Produce timely announcements through bulletins, leaflets, radio, television, newspapers, magazines and newspapers, etc.
- Develop detailed reports and reports on weather and meteorological events.

Technical Skills Requirements

- Weather forecast experts
- Programmer and weather forecast model
- Geographic Information Systems (GIS) Specialist
- Expert analysis of data from stations: meteorology, radar, weather and meteorological satellites

Equipment and Management Office

Role and Responsibilities

- Prepare standard documents and documents related to meteorological equipment
- Train officers to use meteorological equipment
- Develop master plan to install and repair existing meteorological equipment in the cities and provinces of the Kingdom of Cambodia to meet the standards of the World Meteorological Organization.
- Monitor, manage and evaluate the quality and quantity of meteorological equipment
- Collaborate with development partners in national and international institutions and NGOs

Technical Skills Requirements

- Technical experts in managing, maintaining and operating computer system equipment
- Technical experts for maintenance, repair and operation of Satellite Reception System equipment
- Global Telecommunication System (GTS) Technical Manager for Maintenance and Repair
- Technical experts in managing, maintaining,

Climate Office

Role and Responsibilities

- Prepare standard documents and documents related to meteorological data
- Analyze and forecast the weather
- Disseminate weather forecast information
- Train office staff to prepare and correct meteorological data
- Collect meteorological data from all cities-province in the Kingdom of Cambodia
- Compile and manage perennial meteorological data systems (Data Bases)
- Correction and analysis of meteorological data
- Collaborate with development partners in national and international institutions and

Technical Skills Requirements

- Climatologist
- Programming and modeling experts
- Geographic Information Systems (GIS) Specialist
- Experts review and ensure data quality
- Experts compile, manage and maintain local meteorological data (Data Bases)

Observation Office

Role and Responsibilities

- Develop climate mapping
- Collect and record spatial, surface, water and weather data used in meteorology
- Coordinate data information and weather maps with the Office of Research, Analysis and Forecasting
- Prepare standard documents/ documents related to weather observations
- Regular management and maintenance of meteorological equipment in Synoptic Station
- Train office staff to use meteorological equipment and observe the weather, including reports of meteorological phenomena in climate change

Technical Skills Requirements

- Experts in monitoring and recording the weather

The Department of Meteorology Staffs Background

Nº	Degree	Male	Female	Total
1	Masters	07	02	09
2	Bachelors	10	05	15
3	Intermediate Technicians	13	02	15
4	Primary Technicians	06	00	06
5	Normal Skills	01	03	04
Total		37	12	49

1.5 Experience and track record in implementing internationally funded hydromet projects as well as research and development projects in general.

MOWRAM identified achievements for 2014 to 2018 as well as plans for 2019 to 2023 on the following aspects:

1. Management and development of water resources through:

    • Repair, maintenance, restoration and/or construction of irrigation systems, reservoirs and canals

    • Organizing farmer water-user groups/communities

2. Prevention and management of flood and seawater intrusion, and drought management

    • Repair of riverine flood and seawater prevention structures, including dams

    • Installation and/or repair of water pumps to manage drought impacts on rice

3. Protection and conservation of water resources through preparation of sub-decrees on the roles and responsibilities of FWUCs, and the management of river basins

4. Installation and/or rehabilitation of hydro-meteorological equipment

5. Improvements in administration and human resource through capacity enhancements in Cambodia and overseas

6. implementation GTS for the aviation forecasting.

The Covid pandemic caused interruptions to development so these objectives are still outstanding. Also see element 2.3 below.

Summary score and recommendations for Element 1

Cambodia is assessed as **Maturity Level 2** on the CHD scale – ***effort ongoing to formalize mandate, introduce improved governance, management processes and address resource challenges.***

In the absence of an act or policy, the links with Government and mandates for services need to be strengthened. We strongly recommend strategic and operational plans are commissioned.

Element 2: Effective partnerships to improve service delivery

2.1. Effective partnerships for service delivery in place with other government institutions.

The DoM has interactions with several agencies listed below:

Department of Water Resources Management and Conservation (DWRMC) - DWRMC has a strategy to design and implement development activities like hydropower, flood control, irrigation; watershed areas management and relevant programmes to ensure effective, sustainable use and conservation of water resources; and develops policies, legislations, and regulations on water resources conservation for policy-makers.

Department of Irrigated Agriculture (DIA) - DIA ensures the operation and maintenance of irrigation schemes, and steer the policy for operation and maintenance of irrigation systems.

Farmer Water Users Community (FWUC) - FWUC maintains the irrigation system as well as manages and allocates water to community members.

Cambodia National Mekong Committee (CNMC) - CNMC coordinates the management, preservation, conservation and development of water and other related resources in the Mekong River Basin. CNMC's website provides notifications on water release from reservoirs; posts Mekong River Commission's (MRC) water level bulletins; and provides link to MRC's real-time hydro-met monitoring. CNMC also has a DSS for 3S and 4P river basins.

National Committee for Disaster Management (NCDM) and Provincial CDM - NCDM issues policies, strategic plans, plans of action, regulations, guidelines, programmes and projects across the whole spectrum of disaster management from prevention, mitigation, preparedness, emergency response and recovery. It also leads, administrates and coordinates all disaster management activities required to respond to natural or human made disasters in Cambodia.

Ministry of Agriculture, Forestry and Fisheries (MAFF), General Directorate of Agriculture (GDA) - MAFF is responsible for ensuring food security, managing and controlling the quality and safety of agricultural products. GDA is responsible for promoting agricultural productivity through agricultural diversification; contributing to poverty reduction by increasing farmers' income and value added to agricultural products; and ensuring a market for agricultural products.

Ministry of Health (MoH), Department of Preventive Medicine - MoH governs the country's healthcare sector/industry, public health and health related NGOs, and regulates the activities of medical professionals, hospitals and clinics. It has its own Emergency Operation Centre and Rapid Response Teams (RRT) in the provinces, and recently collaborated with the WHO in gathering and analysing data on climate sensitive diseases.

Ministry of Energy and Mines (MEM) - MEM governs the energy and mining industry in the country. The Ministry is also responsible for monitoring of hydropower plants including sharing of information on release or withholding of water in reservoirs.

Ministry of Environment (MoE), Climate Change Department (CCD) - The MoE is the coordinating body for environmental issues, including climate change. The CCD leads the development and implementation of legal instruments, policy, strategic and action plans, programmes and projects relating to climate change. The agency is also responsible for reporting on Cambodia's commitments in the UNFCCC.

Whilst this list is extensive, the level of engagement is irregular and needs to be strengthened, and there's a significant gap between the agency's needs and the services being provided.

2.2. Effective partnerships in place at the national and international level with the private sector, research centres and academia, including joint research and innovation projects.

Media - Media is critical to the dissemination of forecasts and warnings on extreme weather events, floods, droughts and other hazards. Bayon TV, in particular, also has a program specific for agriculture sector. There is a need to strengthen links with the media, since it's such an important delivery channel.

At the national level, DoM need to strengthen their interactions and/or linkages with other agencies as well as the private sector. The monsoon forum process was a good venue for sustained interaction with key representatives from different sectoral agencies. But this was discontinued during the pandemic, and there is insufficient interest in leading the same despite the relaxation of restrictions. There appears to be hesitation and, therefore limited effort, from both DoM and DHRW to reach out and explore opportunities to collaborate with sectoral ministries and agencies such as the NCDM for enhanced early warning and DRM; MAFF/GDA for agro-meteorological advisory development; and the media to raise public awareness. Similarly, there is limited coordination between DoM and DHRW, with both agencies mostly looking up to MOWRAM for support and guidance.

2.3. Effective partnerships in place with international climate and development finance partners.

Asian Development Bank (ADB) is one of Cambodia's providers of official development assistance, with an average annual lending of $329.8 million from 2016 to 2021. This support is aligned with the country's National Strategic Development Plan 2019–2023, which outlines critical strategies relating to water resources management and meteorology under MOWRAM. The ADB's Irrigated Agriculture Improvement Project (Dec 2019 - Jun 2025) includes design and development of the National Water Resources Data Management Center (NWRDMC) and Water Resources information System (WRIS) 14, which integrates all water resources data including, but not limited to:

i) hydro-meteorological information

ii) land use, crop distribution and soil maps as well as maps of irrigated/non-irrigated areas

iii) topography and river basin boundaries

iv) population distribution map

v) map and information on water infrastructures such as pumping stations, reservoirs

vi) secondary data and products from modelling.

Korea Meteorological Administration (KMA) has been providing official development assistance and technical support to ASEAN countries, including Cambodia. In recent years, they signed agreements with MOWRAM to support DoM in its efforts to modernize the forecasting and warning system. KMA recently concluded a project (2020-2023)

focused on enhancing DoM's observation network, forecasting and early warning system through the installation of automatic weather stations (AWS), provision of ICT related equipment, and technical capacity building. The agency also supported DoM through its project "Support of the GEOKOMPSAT-2A Receiving and Analysis System in Cambodia" (2020-2023), which aimed to enhance satellite data reception, operation, analysis and use through installation of a satellite receiver, provision and installation of related equipment, and technical capacity building of DoM staff.

Other programs and projects include:

Piloting Flood Management Planning Tool at the Sangkat Level Phnom Penh -The aim of the project is to build the city's capacity to predict, manage, and mitigate the impact from floods at the local/commune level. 2021 - 2022. GFDRR involved.

Cambodia Southeast Asia Disaster Risk Management Project: Component 1 and 2 - Component 1: Resilient rural corridors. Resilient rural roads rehabilitation and maintenance (Activities include road safety training and disaster risk management, preparedness planning, and awareness raising for communities adjacent to rural roads.) Component 2: Financial planning for disaster resilience (This involves provision of technical assistance to strengthen MEF's capacity for financial planning for disaster resilience. 2017 - 2023. World Bank, MRD and MEF involved.

Strengthening Cooperation on Disaster Risk Management within the Association of Southeast Asian Nations -The KSTA aims to support the Association of Southeast Asian Nations (ASEAN) Secretariat and member states implement the ASEAN Agreement on Disaster Management and Emergency Response (AADMER) Work Programme 2021-2025 by supporting increased cooperation and enhancing capacity on disaster risk management (DRM). 2021 - 2023. ADB involved.

Building Disaster Resilient Infrastructure through Enhanced Knowledge-The TA aims to strengthen action-oriented disaster risk management (DRM) knowledge for disaster-resilient infrastructure in developing member countries (DMCs). 2020 -2022. ADB involved.

Installation of the Automated Weather Observation System for Forecasting and Warning of Natural Disaster in Cambodia. Key activities include: -Investigating the meteorological status and relevant infrastructure conditions, including weather stations in Cambodia

Installation of 27 Automatic Weather Stations (AWSs) and power system at the weather stations -Development of a data receiving system at MOWRAM in Phnom Penh, a data analysis and display system to support weather forecasting. 2019 -2022. KMA and KMI involved.

Support of the GEO KOMPSAT-2A Receiving and Analysis System in Cambodia. Key activities include: -Investigating the meteorological status and relevant infrastructure for meteorological satellite utilization in Cambodia -Selection of a service provider for the installation of GEOKOMPSAT-2A (GK2A) receiving and analysis system. GK2A44 is expected to provide nationwide meteorological information with high-resolution satellite images and high-speed data transfer. 2020 -2023. KMA and KMI involved.

Cambodia Agricultural Sector Diversification Project (Component 3: Improvement of agricultural information systems and quality control management) -The component has a sub-component on Agricultural Information System which will be developed to improve the use of soil/agro-ecological maps, agricultural early warning systems, food production and agricultural statistics/census data, etc. New technologies in ICT will be promoted to ensure broadcast dissemination and best use of available data and information for public

and private sector stakeholder's planning and decision-making. 2019 -2025. MAFF, MEF, MRD, MOWRAM, and The World Bank involved.

EWS1294 -The EWS1294 is a life-saving system that provides accurate and timely flood information to national and provincial authorities and allows them to easily and quickly disseminate reliable warning messages to at-risk communities regarding climatic or societal hazards. 2013 -2022. ECHO, SDC, MFA, UNDP, WFP, BHA, PIN involved.

Irrigated Agriculture Improvement Project -The project aims to enhance the efficiency and climate resilience of irrigation systems and to improve the water resource management in Cambodia. 2019 -2025. MOWRAM with ADB support.

Water Resources Management and Agroecological Transition for Cambodia (WAT4CAM) -The program consists of 4 components: (1) Rehabilitation and completion of irrigation and drainage infrastructures; (2) Improvement of irrigation management; (3) Support water resources monitoring and management. This component will provide specific modelling studies, capacity building to MOWRAM on IWRM processes, river basins planning and management, spatial hydrology and climatic services; (4) Support innovative farming practices and support to rice value chain. 2019 -2023. MOWRAM, MAFF, MEF involved with support from Agence Francaise de European Union.

Uplands Irrigation and Water Resources Management Sector Project -The project aimed to help the RGC increase agricultural production, modernizing, and climate-proofing selected irrigation systems in Kampong Thom and Battambang provinces. Subprojects were undertaken to (i) enhance efficiency and climate resilience of irrigation systems, and (ii) improve water resource. 2016 - 2022. MOWRAM and ADB involved.

Identifying Climate Adaptation Investment Priorities (Subproject 4) -The knowledge and support technical assistance (TA) cluster on Supporting the Implementation of ADB's Climate Change Operational Framework 2017-2030 (CCOF2030) was approved by the President on 7 December 2018 with an amount of $4.55 million. The TA cluster is aligned with the Asian Development Bank's (ADB) Strategy 2030 Operational Priority 3 on tackling climate change, building climate and disaster resilience, and enhancing environmental sustainability. 2022 - 2024. ADB involved.

Climate Change Adaptation through Protective Small-scale Infrastructure Interventions in Coastal Settlements of Cambodia -The main objective of the project is to enhance climate change adaptation and resilience of the most vulnerable coastal human settlements of Cambodia through concrete climate change adaptation actions, particularly in areas where ecotourism has the potential to sustain such interventions. To achieve this objective, the project focuses its actions on highly vulnerable settlements in Kep Province and Prey Nob District of Preah Sihanouk Province. 2021 - 2025. UN Habitat and Adaptation Fund involved.

DE-RISK Southeast Asia -The DE-RISK project will develop climate risk management systems, best practices and insurance products that will shield smallholder farmers and businesses engaged in producing coffee, sugar, rice, cassava, rubber, dairy, and grazing across the agricultural value chain in key Southeast Asian countries from physical and financial disaster associated with climate change. 2018 - 2022. WMO involved.

Enhancing Integrated Water Management and Climate Resilience in Vulnerable Urban Areas of the Mekong River Basin -Output 1. Inclusive assessment of water-related climate risks completed in the priority river Basins. -Output 2. Enabling environment for gender-responsive climate risk-informed integrated water resources management developed. 2021 - 2025. UNDP involved.

Flash Flood Guidance System with Global Coverage (FFGS) -FFGS is necessary to provide operational forecasters and disaster management agencies with real-time informational guidance products pertaining to the threat of small-scale flash flooding. Ongoing. WMO involved.

Feasibility Study on Water Supply Measure and Flood Mitigation for the Prek Neal River Basin, Svay Rieng Province, Cambodia -The project's objective is to make a basic plan for flood mitigation and water supply and carry out a feasibility study in Svay Rieng area. 2021 - 2023. KOICA involved.

2.4. New or enhanced products, services or dissemination techniques or new uses or applications of existing products and services that culminated from these relationships.

Through the 'Support of the GEO KOMPSAT-2A Receiving and Analysis System in Cambodia' project, GK2A, a next generation geostationary meteorological satellite, took over the meteorological roles of Communication, Ocean, and Meteorological Satellite (COMS) and performs meteorological and space weather observation tasks. It produces 52 types of primary and secondary products such as cloud detection and sea surface temperature and it allows observation of entire sectors at 10-minute intervals, enabling speedier monitoring of severe weather phenomena. It also has high performance meteorological sensors that provide more precise observations.

To date, DoM and DHRW do not have any research and product/service development initiatives. While DHRW developed flood and drought hazard maps in 2020-2021, this was not updated. On the other hand, DoM did not develop hazard maps/assessments or climate projections. The agencies suggest that this is because of the lack of staff, resources and technical capacity. Nevertheless, climate projections for Cambodia can be found at the Cambodia Climate Change Toolbox41, which was developed by the Department of Climate Change (DCC) with technical support from ICEM.

Summary score, recommendations, and comments for Element 2

Cambodia is assessed as **Maturity Level 3** on the CHD scale – ***Moderately effective partnerships but generally regarded as the weaker partner in such relationships, having little say in relevant financing initiatives.***

DoM has several longstanding relationships with departments across Government. We recommend strengthening this engagement by increasing regular dialogue to better understand the departmental needs and respond with appropriate services.

Element 3: Observational infrastructure

3.1. Average horizontal resolution in km of both synoptic surface and upper-air observations, including compliance with the Global Basic Observing Network (GBON) regulations.

Surface – 200km (stations to be upgraded under SOFF programme to comply with GBON regulations)

DoM's 86 Automatic Weather Stations (AWS) are comprised of 3 brands – SUTRON (35), ADCON (24) and WEATHEX (27). SUTRON and ADCON stations include information on wind speed and direction, temperature, humidity, rainfall, pressure, evaporation, soil temperature, soil moisture, and global radiation whereas WEATHEX do not have evaporation, soil temperature and moisture, and global radiation parameters. DoM said that KMA provided them with 1 mobile AWS, which they can use temporarily whenever any of their stations have some problems. 11 more AWS are proposed for installation under the ADB Irrigated Agriculture Improvement Project; however, there is some concern from DoM about getting additional stations given their limited budget for O&M. In fact, 11 of their existing 86 AWS have not been functioning during the last 2 years, and another 18 have problems.

There are currently no upper air observations in Cambodia. 1 upper air station will be commissioned in Cambodia under the SOFF initiative in order to contribute to GBON. The location of the proposed upper air station was identified by DoM and the peer advisor as an existing observation site on government owned land. This will provide 500km resolution for upper air observations in Cambodia.

3.2. Additional observations used for nowcasting and specialized purposes.

The 12 Manual stations are co-located with Mekong River Commission (MRC)-supported Automatic Water Level Stations (AWLS); DHRW receives financial and technical support from MRC for the operation (including observer allowance) and maintenance of the stations that would validate the water level data from the AWLS. MRC supports countries in the Lower Mekong River Basin (i.e., Cambodia, Lao PDR, Thailand, Vietnam) with near-real time hydro-meteorological monitoring as well as forecasting. To date, MRC installed 73 AWLS across China, Lao PDR, Thailand, Cambodia and Vietnam. Of these, 17 are located in Cambodia, and are now managed by DHRW with technical and financial support from MRC. Fifteen of the 17 AWLS in Cambodia are operational, 12 of which are co-located with manual stations for data validation.

3.3. Standard Operating Practices in place for the deployment, maintenance, calibrations and quality assurance of the observational network.

DoM currently undertakes scheduled preventative maintenance at all observation sites in their network, carrying out site inspections, instruments checks and routine maintenance on the observation equipment. The preventative maintenance includes checking the condition of anemometers and thermometer shelters for signs of physical deterioration, corrosion and dirt as well as ensuring that electrical systems are working correctly. The surroundings of the site are also assessed and any changes which may affect exposure recorded. This preventative maintenance is carried out largely by local staff at observations sites across the country.

SOPs for deployment, maintenance, calibration and QA are lacking and those which do exist are outdated and rarely used. Development of SOPs for all aspects of the observation network has been proposed through SOFF.

3.4 Implementation of sustainable newer approaches to observations.

The modernisation of the observation network and deployment of AWS across Cambodia has resulted in a substantial network of 86 AWS across the country. This will be supplemented by the SOFF investment which will implement new approaches to data processing and transmission as well as international data sharing. The network has been developed with the support of numerous funding sources but it is a significant challenge to DoM to maintain the network. Funding for maintenance, repair and replacement is lacking for many of the stations and, as a result, there are currently 11 non-functional stations and 18 which need repairs / sensor replacements. The SOFF programme will support the sustainability of a core subset of the network which will contribute to GBON.

3.5. Percentage of the surface observations that depend on automatic techniques.

77% of the surface observation network is automated. DoM owns and maintains 86 Automatic Weather Stations (AWS) under three different instrument manufacturers – SUTRON, ADCON and WEATHEX and 25 manual observation sites. Among the 86, only the 35 SUTRON stations are GBON-compliant. On the other hand, DHRW operates and maintains a total of 87 Automatic Water Level Stations (AWLS) and 12 manual stations monitored by onsite observers for manual gauge readings.

Summary score, recommendations, and comments for Element 3

Cambodia is assessed as **Maturity Level 3** on the CHD scale – ***Moderate network with some gaps with respect to WMO regulations and guidance and with some data quality issues.***

DoM operate a substantial surface network of AWS across Cambodia, though the long term sustainability of these stations is a challenge due to lack of funding for maintenance and operations, spare parts and repairs. A priority for the observation network in Cambodia is to draft and implement SOPs for the maintenance and operation of the network as outlined in the SOFF National Contribution Plan. In addition, some rationalisation of the network should be considered where maintenance is a challenge.

Element 4: Data and product sharing and policies

4.1. Percentage of GBON compliance – for how many prescribed surface and upper-air stations are observations exchanged internationally. Usage of regional WIGOS centres.

At present no data are shared internationally to GBON. As part of the SOFF project, 5 surface stations will be brought to GBON compliance and share data internationally, with the potential for more stations to be added in future if they can be sustainably maintained. Currently, there are no upper air stations in Cambodia and one is proposed through the SOFF investment phase.

4.2. A formal policy and practice for the free and open sharing of observational data.

DoM do not have a formal data policy. They share data with other government agencies, as required for the public good. Data is also sold on an ad-hoc basis to government agencies and public sector organisations. Weather and climate data is a valuable asset and DoM needs to develop its data policy, with support from a development partner.

4.3. Main data and products received from external sources in a national, regional and global context, such as model and satellite data.

DoM receives model and satellite products from a range of global centres including:

- ECMWF (European Centre for Medium-Range Weather Forecasts)
- JMA (Japan Meteorological Agency)
- Hong Kong
- NOAA (National Oceanic and Atmospheric Administration), NWS (National Weather Service) (GFS - Global Forecast System) and NCAR (National Center for Atmospheric Research)
- IRI (University of Colombia Research Institute)
- BOM (Bureau of Meteorology)
- APEC (Asia-Pacific Economic Cooperation)
- ASMC (ASEAN Specialised Meteorological Centre)
- KMA (Korean Meteorological Agency)

Summary score, recommendations, and comments for Element 4

Cambodia is assessed as **Maturity Level 2** on the CHD scale – ***A limited amount of GBON compliant data is shared internationally. The existing data sharing policies or practices or the existing infrastructure severely hamper two-way data sharing.***

DoM do not share GBON observational data fully internationally and receive web-based model and satellite data from global centres. Through the SOFF initiative it is anticipated that surface and upper air observation data will be provided sustainably, shared

internationally, helping to improve numerical weather prediction outputs. Recommend increased engagement with JMA SWFP.

Element 5: Numerical model and forecasting tool application

5.1. Model and remote sensed products form the primary source for products across the different forecasting timescales.

The different models and systems that DoM uses in the development of their forecast products include:

Synergie (MFI)

- ARP - GLOB/1.5 (up to 72 hours)
- ARP - SEA/0.5 (up to 72 hours)
- ECMWF/2.5 (up to 240 hours)
- GFS - GLOB/0.5 (up to 192 hours)
- JAPAN/1.25 (up to 72 hours)
- JAPAN/25 (up to 72 hours)

SWFP

- GSM (JMA)/0.5x0.5
- GMS (JMA)/0.25x0.25
- GFS (NCEP)/0.5x0.5
- WRF3km-IFS-DA
- IFS
- WRK3km-IFS
- Sreps (3-day)
- ECMWF-EPS (10-day)

Forecasters at the Forecasting and Research Office refer to models within Synergie and Tokyo RCC, satellite data from Himawari 8/9 when generating the daily and 3-day forecasts. It is unclear whether forecasters access and use the SFWP products when generating daily and 3-day forecasts.

Climate Office refer to the SeA-FFGS to provide flash flood guidance, where necessary.

For Medium-range (7-day), DoM had training on sub-seasonal forecasting, and has continued access to ASMC sub-seasonal weather outlook, but there is currently no initiative within the department to downscale and assess the performance of the sub seasonal forecasts. Forecasts are provided at regional level, with areas categorized as coastal, flood plain and mountain, using El Nino/La Nina outlook and Typhoon forecasts in the Pacific.

Long-range (seasonal) - Seasonal outlooks are generated at the beginning of each season (i.e., Apr/May for rainy season, Nov/Dec for dry season). Climate Office indicated the use of Climpact software in long-range forecasting but the outlooks appear to be generated by the Forecasting Office. El Nino/La Nina outlook and Regional models from JMA, ECMWF compared with historical observation data used. Between 2018 and 2019, DoM forecasters were trained to generate as well as statistically validate monthly forecasts and seasonal outlooks (i.e., 3-month) using RIMES' Forecast Customization (FoCus) Tool. In 2019, DoM used the tool to generate seasonal forecasts for the wet and dry season and presented this during the 7th and 8th Monsoon Forum held in June and November 2019 respectively.

Although DoM forecasters continue to have access to FoCus, there has been limited generation and/or update on the monthly and seasonal forecasts since 2020. This could be due to the limited staff and resources (e.g., lack of workstations, data management systems, forecasting tools) in the Climate Office.

Water level - Multi-regression Model for Mekong is used to develop 3-day forecasts of water level and flood for 8 stations along the Mekong-Tonle Sap-Basaac Rivers. 8 DHRW said that their regression model could provide up to 5 days lead time. However, the accuracy is lower for the last 2 days so they only publish 3-day water level forecasts. The agency does not conduct statistical verification on a regular basis,but said that a verification conducted years back indicated about 70 to 80% accuracy. Staff are looking for guidance in developing and testing new models that would further enhance the accuracy and lead times of their water level forecasts. DHRW staff were also trained on hydrological modelling and flood forecasting using HEC-HMS. But DHRW finds the multi-regression model more accurate in forecasting water levels in the Mekong given the limited data and the lack of updated rating curves.

5.2. a) Models run internally (and sustainably), b) Data assimilation and verification performed, c) appropriateness of horizontal and vertical resolution.

No models are run at DoM.

5.3. Probabilistic forecasts produced and, if so, based on ensemble predictions.

There is limited access to and use of probabilistic forecasting at DoM. There is a need for a paradigm shift – for forecasters to transition to statistical (probabilistic) mid and long-range forecasting, and to practice statistical verification of forecasts.

Summary score, recommendations, and comments for Element 5

Cambodia is assessed as **Maturity Level 2** on the CHD scale – ***Basic use of external model output and remote sensed products in the form of maps and figures, covering only a limited forecast time range.***

There is a great need to increase the access and use of forecasting data and tools for improved service delivery. We recommend stronger engagement with global and regional forecasting centres, in particular ECMWF and the JMA SWFP. All this needs to be underpinned by stronger government mandates (element 1) and stronger institutional partnerships (element 2).

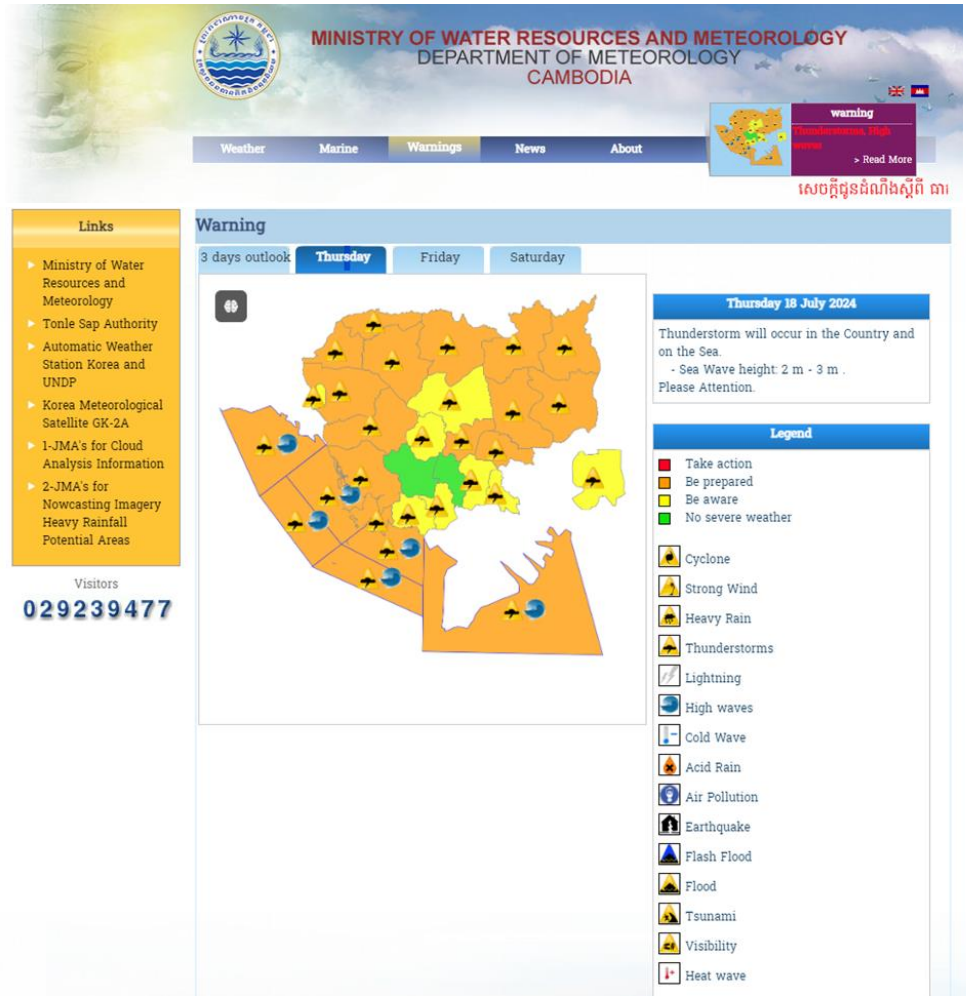
Element 6: Warning and advisory services

6.1. Warning and alert service cover 24/7.

Forecast products and severe weather warnings are disseminated via these channels: DoM's website (http://www.cambodiameteo.com/), MOWRAM's Facebook page, TV and radio, and are available 24/7. In general, forecasts are released immediately, but severe weather warnings need to be approved by MOWRAM Minister prior to dissemination.

Early warning information received by the National Committee for Disaster Management (NCDM) are relayed to the Emergency Coordinating Centre, the Disaster Management Working Groups, Provincial CDM and District CDM Secretariat, civil society and private sector, Commune CDM, Village Disaster Management Group and finally to affected communities. Warnings and advisories are disseminated through telephone, fax, email, mobile phone, radio, television, online (DoM and DHRW websites), social media and mobile applications (i.e., Facebook, Telegram, WhatsApp, Viber and Line). In addition, NCDM established the EWS 1294 with support from UNDP and People In Need (PIN). EWS 1294 allows NCDM to send a voice recording of warning messages to mobile phones of registered users in areas at risk of flooding.

6.2. Hydrometeorological hazards for which forecasting and warning capacity is available and whether feedback and lessons learned are included to improve warnings.



The image above shows the DoM warnings available on their website, covering a range of meteorological hazards. There is limited engagement with other government agencies and the public, so feedback and lessons learnt for warning improvements is limited.

6.3. Common alerting procedures in place based on impact-based services and scenarios taking hazard, exposure and vulnerability information into account and with registered alerting authorities.

DoM and DHRW do not have sufficient capacity and resources to provide impact-based forecasts and warnings.

Early warning information received by the National Committee for Disaster Management (NCDM) are relayed to the Emergency Coordinating Centre, the Disaster Management Working Groups, Provincial CDM and District CDM Secretariat, civil society and private sector, Commune CDM, Village Disaster Management Group and finally to affected communities. Warnings and advisories are disseminated through telephone, fax, email, mobile phone, radio, television, online (DoM and DHRW websites), social media and mobile applications (i.e., Facebook, Telegram, WhatsApp, Viber and Line). In addition, NCDM established the EWS 1294 with support from UNDP and People In Need (PIN). EWS 1294 allows NCDM to send a voice recording of warning messages to mobile phones of registered users in areas at risk of flooding.

Summary score, recommendations, and comments for Element 6

Cambodia is assessed as **Maturity Level 2** on the CHD scale – ***Basic warning service is in place and operational but with limited public reach and lacking integration with other relevant institutions and services.***

Similar to element 5, we recommend strengthening the engagement with Government (having legislation in place will enable this) to have a stronger mandate and enable increased engagement with important partners and the public, thus providing essential warning information for the nation.

Element 7: Contribution to Climate Services

7.1. Where relevant, contribution to climate services according to the established capacity for the provision of climate services.

The DoM in Cambodia do not provide climate services to the nation and there isn't currently a National Framework for Climate Service in place. There have been a range of policies, strategies and plans in recent years for climate adaptation, listed below, and these are all now expired. We recommend the co-development of a National Framework for Climate Services.

NCCC Sub-Decree No. 35 (2006): Basis for the establishment of the National Climate Change Committee (NCCC), a cross-sectoral and multi-disciplinary body with the mandate to prepare, coordinate and monitor the implementation of policies, strategies, legal instruments, plans and programmes related to climate change. With an amendment in 2014, the NCCC has functioned since its establishment as the ministerial mechanism for coordination of climate change response in Cambodia.

National Adaptation Programme of Action (NAPA) 2007 submitted to UNFCCC: Outlines Cambodia's main areas of concerns related to water management and agriculture, as well as the development challenges that compound the country's vulnerability to climate change. Identifies some of the primary needs and threats that the country faces with respect to adaptation, as well as priority sectors targeted for action, including agriculture, water resources, coastal zones and human health. It also notes the need for flood protection enhancement through initiatives like riverbank improvements, particularly in areas of the Mekong watershed; and for food security protection to address floods and adverse weather events.

Technology Needs Assessment and Technology Action Plans for Climate Change Adaptation (2013): Supports the national sustainable development objectives, and complements the Cambodian national policies and plans in adapting to climate change - Aims to assess technology needs and develop technology action plans for priorities in water resources, including agriculture and water, and the coastal zone.

Climate Change Action Plan for the Disaster Management Sector (2014-2018): its specific purposes are (1) to promote relationship between DRR and CCA; (2) to promote attention on disaster risk management by focusing on vulnerabilities, poverty and the causes of disasters; (3) to show the benefits of promoting capacities in adapting to climate change; (4) to promote management of unprecedented events and the uncertainty of climate change It further identifies activities to promote training programs that strengthen resilience to climate change.

Climate Change Action Plan for Water Resources and Meteorology (2014-2018): Identifies the priority actions required to tackle key issues such as irrigation expansion, flood, and drought.

Cambodia Climate Change Strategic Plan (2014-2023): -Sets the vision of the country to develop towards a green, low-carbon, climate resilient, equitable, sustainable, and knowledge-based economy. Captures the main strategic objectives and directions for a climate-smart development of Cambodia in 10 years.

Climate Change Financing Framework (2015): Identifies sources of climate finance and potential trends and uses the estimates to propose a realistic costing of the country's climate change response. It provides a first estimate of the impacts of climate change on the economy and analyses how climate-smart investments can help reduce these impacts Provides guidance to improve management of climate finance from domestic and international sources.

Second National Communication to the UNFCCC (2015): Identifies the impacts of and vulnerability to climate change, as well as the expected significant damage to economic development and natural resources -Presents the situation with respect to the implementation of climate change response in the country including measures to mitigate and adapt to climate change and related plans, programmes and projects in the following areas: financial commitments; technology transfer and international cooperation; systematic research and observation; education, training and public awareness; and constraints, gaps and related financial, technical and capacity needs.

Ministry of Environment: Climate Change Action Plan (2016-2018): Identifies the scope and needs for sustainable growth and utilization of natural resources.

Summary score, recommendations, and comments for Element 7

Cambodia is assessed as **Maturity Level 1** on the CHD scale – ***Less than basic Capacity for Climate Services Provision.***

We recommend the development of National Framework for Climate Services (NFCS) and a range of relevant products and services.

Element 8: Contribution to hydrology

8.1. Where relevant, standard products such as quantitative precipitation estimation and forecasts are produced on a routine basis according to the requirements of the hydrological community.

DoM and DHRW are both under MOWRAM and enjoy a strong working relationship e.g. DoM produces rainfall forecast products for the Mekong River. There is potential for DoM to provide more information to this sector.

8.2. SOPs in place to formalize the relation between Met Service and Hydrology Agency, showing evidence that the whole value chain is addressed.

The monitoring, forecasting and generation of warnings for hydro-meteorological hazards is the responsibility of the Department of Meteorology (DoM) and the Department of Hydrology and River Works (DHRW) in the Ministry of Water Resources and Meteorology (MOWRAM). DoM provides weather forecasts (i.e., daily, 3-day, weekly), severe weather warnings (e.g., thunderstorm, cold and heat wave, tropical cyclone, high wave) and seasonal outlooks (i.e., 6-month) while DHRW provides 3-day water level and flood forecasts for the Mekong River.

There are currently no SOPs in place.

8.3. Data sharing agreements (between local and national agencies, and across international borders as required) on hydrological data in place or under development.

No agreements currently in place.

8.4 Joint projects/initiatives with hydrological community designed to build hydrometeorological cooperation.

DoM and DHRW have a joint CREWS funded project aiming to improve the capacity of both organisations to improve hydrometeorology cooperation.

Products produced by DoM includes:

Severe weather forecasts can include an advisory on potential flash flood, as required.

Marine forecast (coastal, fishing and navigation), produced daily with 72 hours lead time - Forecast of the weather, sea state/wave height, sea surface temperature, visibility, wind direction, wind speed for 4 inshore locations and 2 offshore locations.

Products produced by DHRW:

Water level, produced daily from Jun to Nov, with 72 hours lead time. Flood bulletins are published daily during the months of Jun to Nov. The bulletin contains rainfall amount and information comparing the day's observed water level with yesterday's, last year's, the mean level and the warning level. It then outlines the 3-day water level forecast for 7 locations. DHRW also shows schematic and hydrograph for about 7-8 locations in the Mekong. Flood warnings are issued, as required.

Summary score, recommendations, and comments for Element 8

Cambodia is assessed as **Maturity Level 2** on the CHD scale – ***Meteorological input in hydrology and water resource management happens on an ad hoc basis and or during times of disaster.***

There is a need to increase DoM's capacity and cooperation with DHRW and the CREWS funded project is aiming to improve this situation.

Element 9: Product dissemination and outreach

9.1. Channels used for user-centred communication and ability to support those channels (for example, does the NMHS operate its own television, video or audio production facilities? Does it effectively use cutting-edge techniques?).

Forecast products and severe weather warnings of DoM are posted on their website (http://www.cambodiameteo.com), in MOWRAM's Facebook page, and disseminated through many other channels. In general, forecasts are released immediately, but severe weather warnings need to be approved by MOWRAM Minister prior to dissemination.

Early warning information received by the National Committee for Disaster Management (NCDM) are relayed to the Emergency Coordinating Centre, the Disaster Management Working Groups, Provincial CDM and District CDM Secretariat, civil society and private sector, Commune CDM, Village Disaster Management Group and finally to affected communities. Warnings and advisories are disseminated through telephone, fax, email, mobile phone, radio, television, online (DoM and DHRW websites), social media and mobile applications (i.e., Facebook, Telegram, WhatsApp, Viber and Line). In addition, NCDM established the EWS 129443 with support from UNDP and People In Need (PIN). EWS 1294 allows NCDM to send a voice recording of warning messages to mobile phones of registered users in areas at risk of flooding.

9.2. Education and awareness initiatives in place.

There are no formal or informal initiatives in place for this in Cambodia.

9.3. Special measures in place to reach marginalized communities and indigenous people.

None currently in place.

Summary score, recommendations, and comments for Element 9

Cambodia is assessed as **Maturity Level 2** on the CHD scale – ***Traditional communication channels and a basic dedicated website is used to disseminate forecasts and basic information.***

There is a great need to improve the products and services from DoM based on stronger engagement with Government, private sector and the public. Having legislation in place and development of strategic and operational plans will support these activities.

Element 10: Use and national value of products and services

10.1. Formalized platform to engage with users in order to co-design improved services.

Currently no formal platform exists to engage with users.

10.2. Independent user satisfaction surveys are conducted, and the results used to inform service improvement.

No independent user satisfaction surveys are currently conducted.

10.3. Quality management processes that satisfy key user needs and support continuous improvement.

No quality management system in place yet.

Summary score, recommendations, and comments for Element 10

Cambodia is assessed as **Maturity Level 1** on the CHD scale – ***Service development lacks any routine stakeholder feedback practice.***

DoM needs to strengthen its engagement with Government, the private sector and the public in order to co-develop relevant and useful products and services. Having legislation in place and developing a strategic and operational plan will support this ambition.

Annex 1 Consultations (including experts and stakeholder consultations)

(list major consultations and other activities during the CHD process)

Annex 2 Urgent needs reported

(this summarises information about needs that have been identified as particularly pressing. It could, for example, show significant matters that require immediate attention, or notable illustrations of country needs)

Annex 3 Information supplied through WMO

(This summarises information collected from WMO databases in response to questionnaires and other information gatherings. Furthermore, the feedback of the Peer-reviewers will be crucial for validating WMO self-reported data and collecting data from no-data countries)

Annex 4 List of materials used

(this may include WMO Guidance Materials, Data and Information, Review Reports, Database etc.)

CIA.Gov. The world Factbook. https://www.cia.gov/the-world-factbook/countries/cambodia/ 2023.

Britannica. Cambodia. Overton, L. Chandler, D. https://www.britannica.com/place/Cambodia/Transportation-and-telecommunications 2024.