

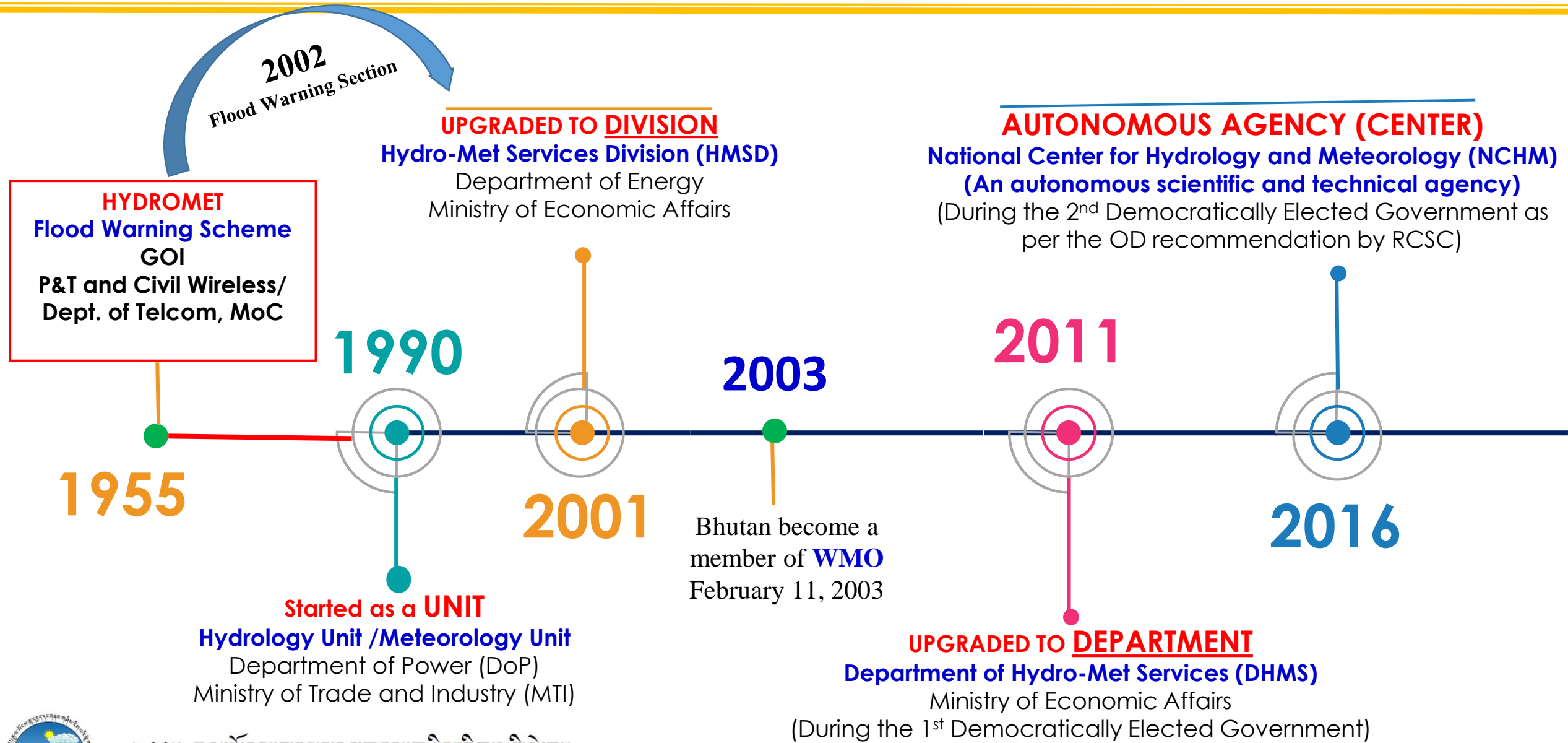


An Overview of National Center for Hydrology and Meteorology (NCHM) *(An Autonomous Scientific and Technical Agency of RGoB)*

**National Center for Hydrology and Meteorology (NCHM)
Royal Government of Bhutan
Thimphu: Bhutan**



Organizational Development of Hydro-Met Services in Bhutan



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NATIONAL CENTER FOR HYDROLOGY AND METEOROLOGY

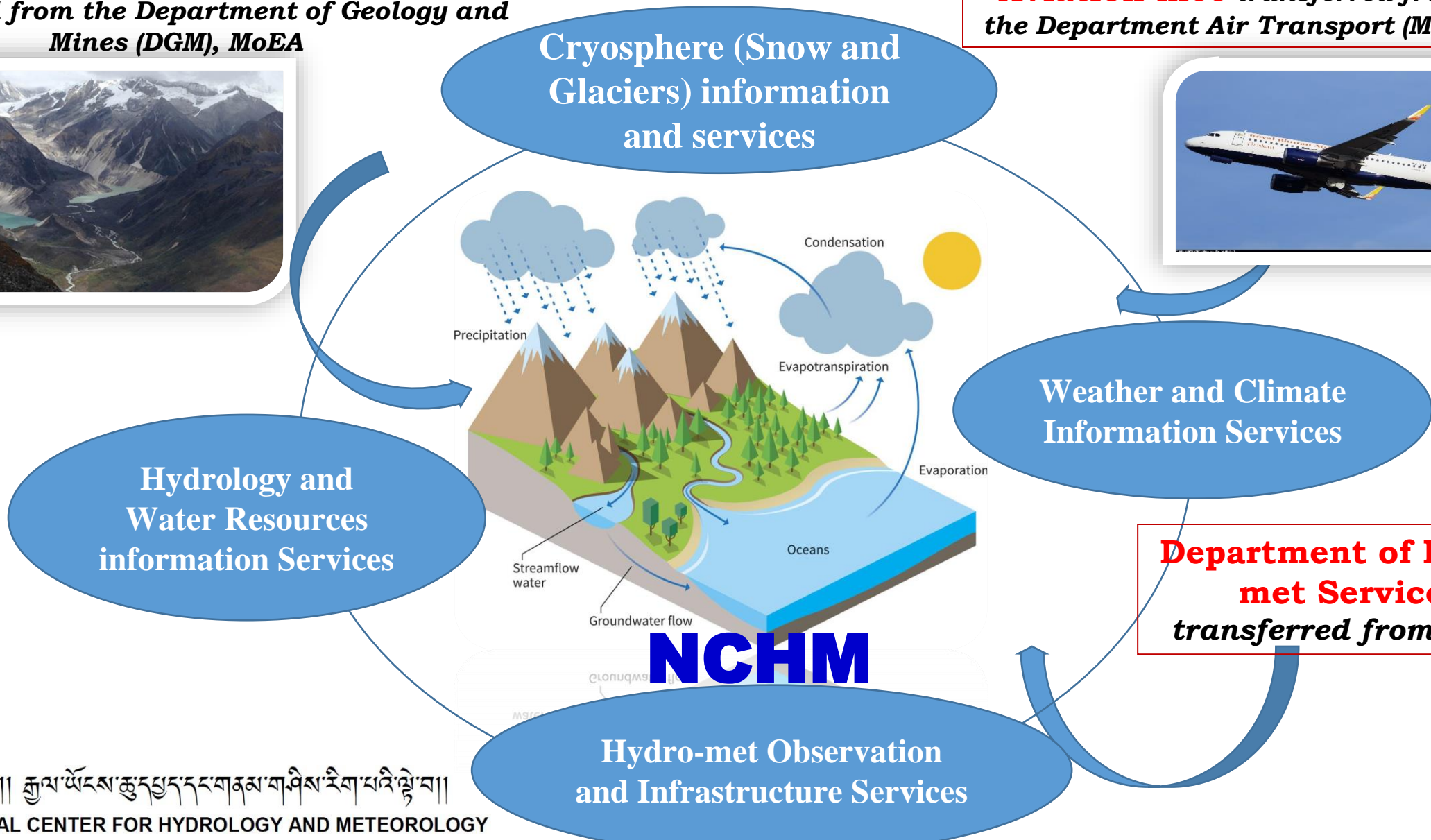
Restructuring Hydro-met Services from Department to Autonomous Agency (NCHM)

Glaciology Division

transferred from the Department of Geology and Mines (DGM), MoEA



Aviation met transferred from the Department Air Transport (MoIC)



Cryosphere (Snow and Glaciers) information and services

Weather and Climate Information Services

Hydrology and Water Resources information Services

Department of Hydro-met Services transferred from MoEA

Hydro-met Observation and Infrastructure Services



Vision, Mission and Mandates

NCHM is the Scientific and Technical Autonomous Agency of RGoB with:

VISION

Center of Excellence in Hydrology, Meteorology and Cryosphere Science and Services

MISSION

Monitoring and understanding of hydrology, weather, climate and cryosphere, for timely provision of information and services to protect lives and property and support national needs for ecologically balanced sustainable development.

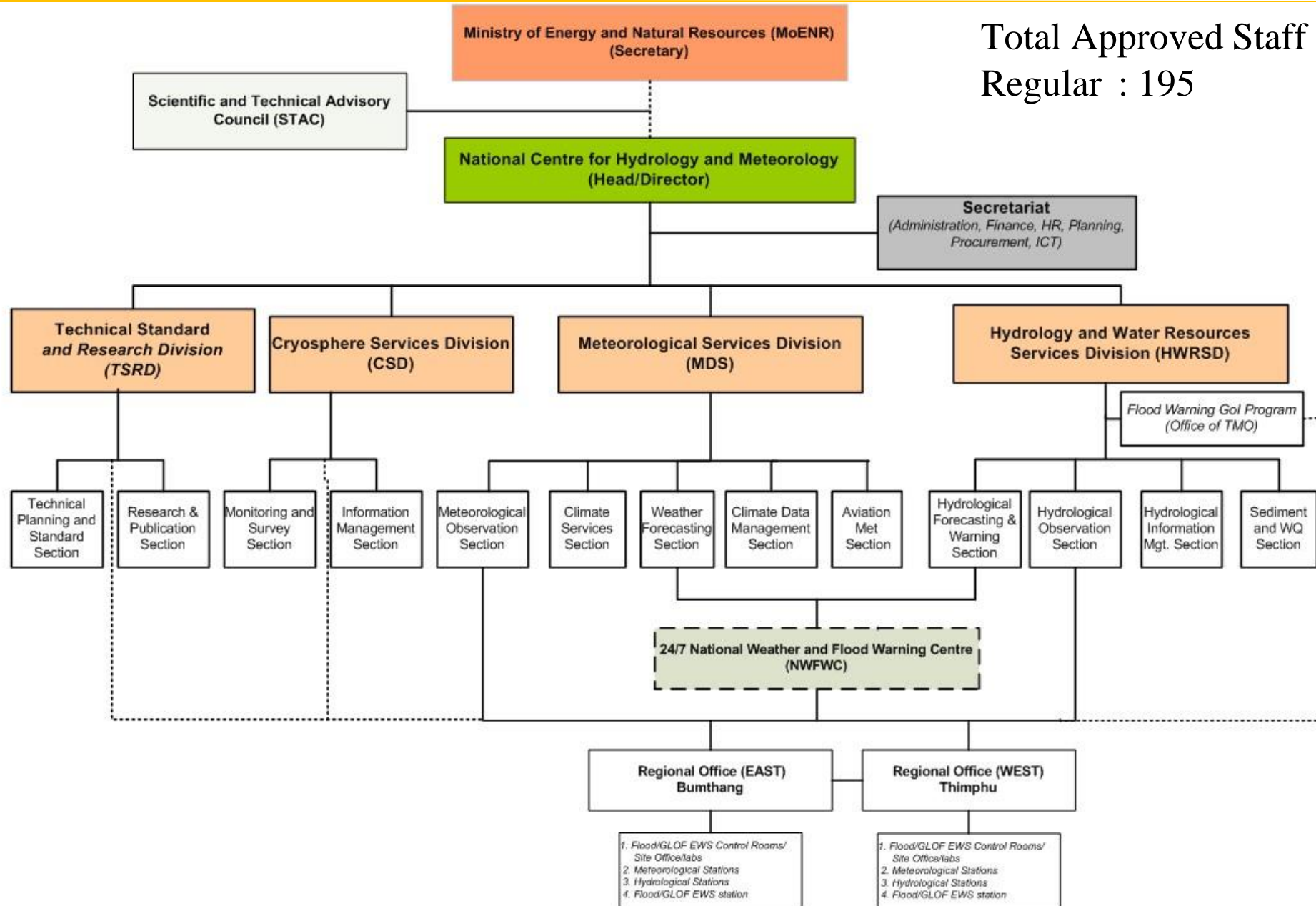
MANDATES

Provide scientific and technological services in hydrology, water resources, meteorology, climatology, and cryosphere to ensure the safety and socio-economic well-being of society and to support national and international needs.



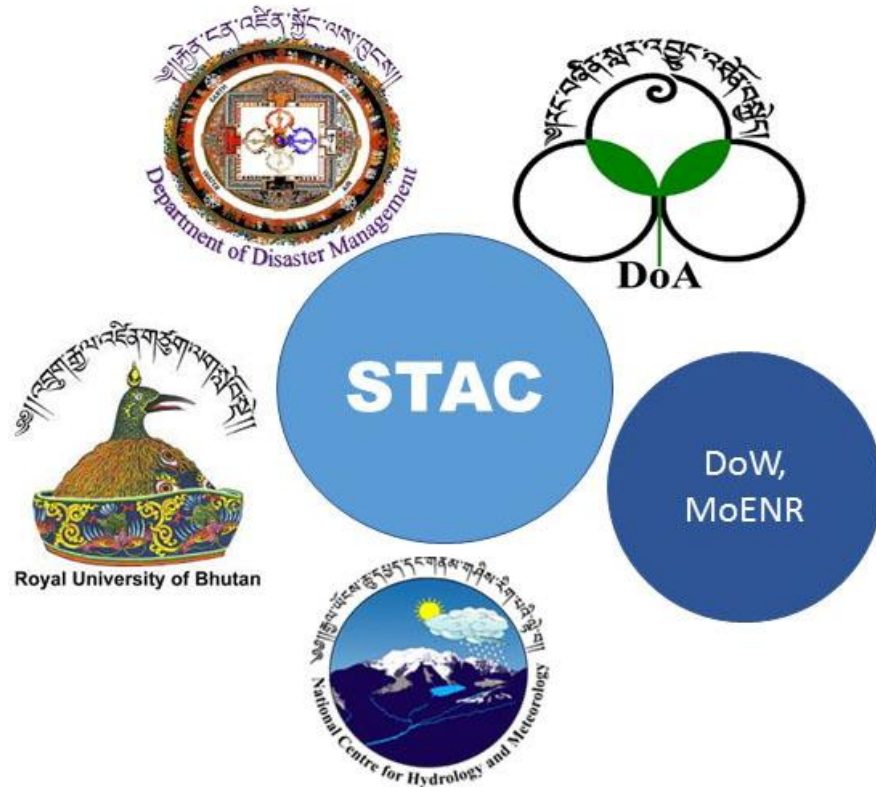
NCHM Organogram 2023

Total Approved Staff : 220
Regular : 195



NCHM, Scientific and Technical Advisory Committee (STAC)

NCHM being a scientific and technical agency, it is proposed to established Scientific and Technical Advisory Committee (STAC) to advise and provide directives to the Centre in implementation of its technical mandate in weather, climate, water, cryosphere and related sciences, its applications and services.



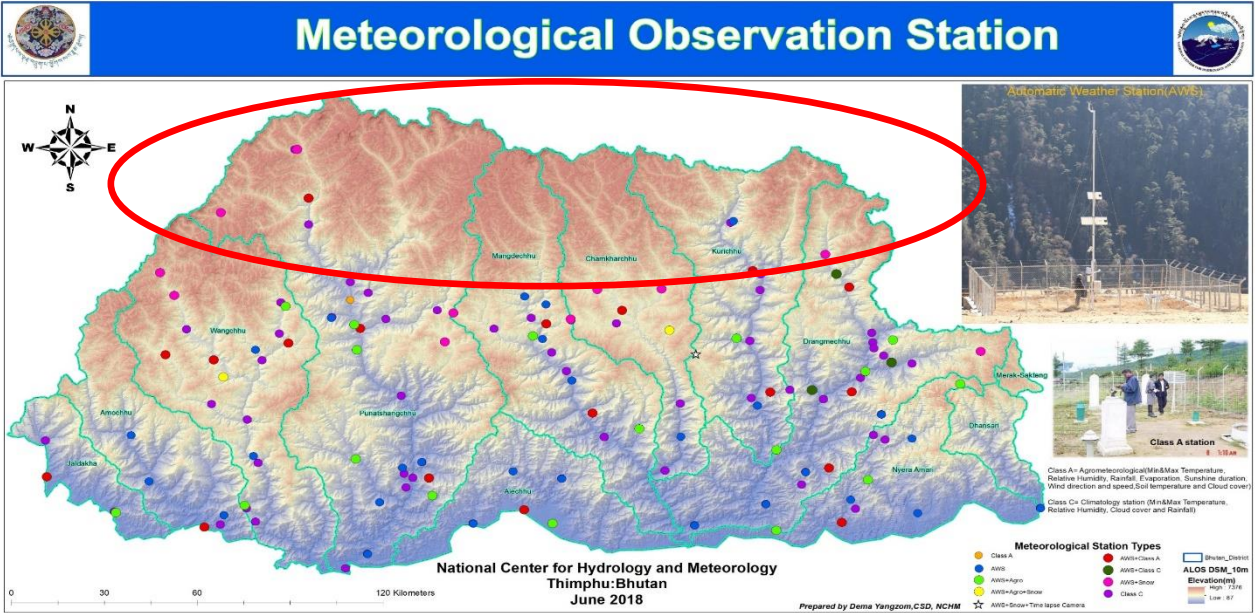
STAC composition:

1. Director Department of Disaster Management (DDM), MoHCA - Member
2. Director, Department of Agriculture (DoA), MoAF
3. Director, Department of Water, MoENR
4. The Director General, Department of Research and External Relations, Royal University of Bhutan
5. Director, National Center for Hydrology and Meteorology (NCHM)- Member Secretary

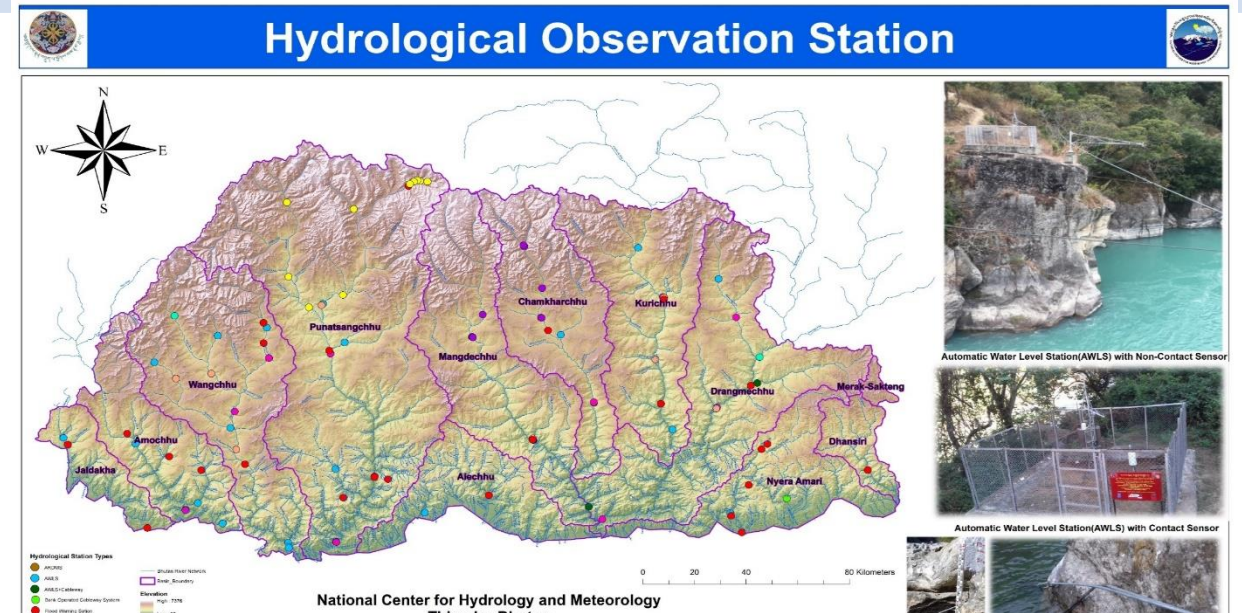


National Hydro-met Observation Network

Type of Monitoring Station	Number	Remarks
1. Meteorology/Climate Station	155	
2. Cryosphere (Snow and Glaciers) monitoring Station	20	
3. Hydrological/Flood Observation Station	59	
4. Sediment Sampling Station	16	
Total	250	



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PGS- Water Level, Water Temperature, River Discharge and Suspended Sediment
AWLS- Water Level, Water Temperature, Air temperature & Relative Humidity and Rainfall

Automatic River Discharge Measurement System (ARDMS)
Water Level Sensor Bank Operated Cableway for River Discharge Measurement
Staff Gauge
Contact Water Level Sensor (Bubbler Type)
Water Level Sensor

NCHM Mandates in the Policies and Legislation

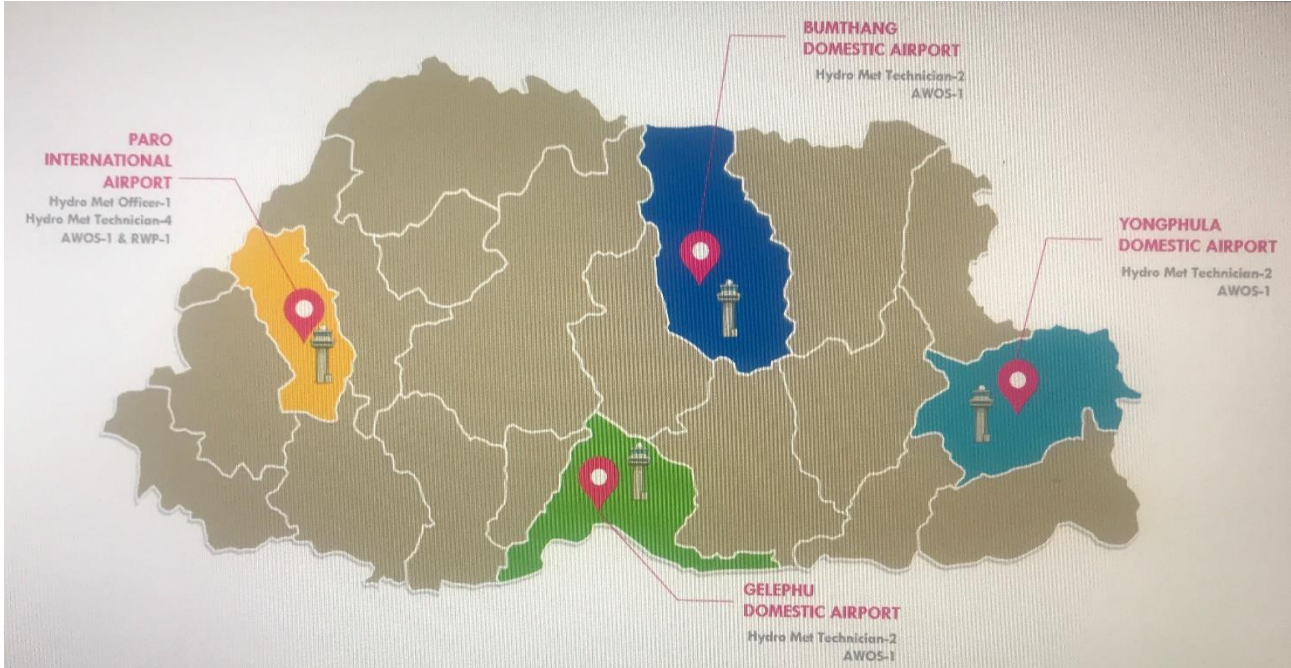
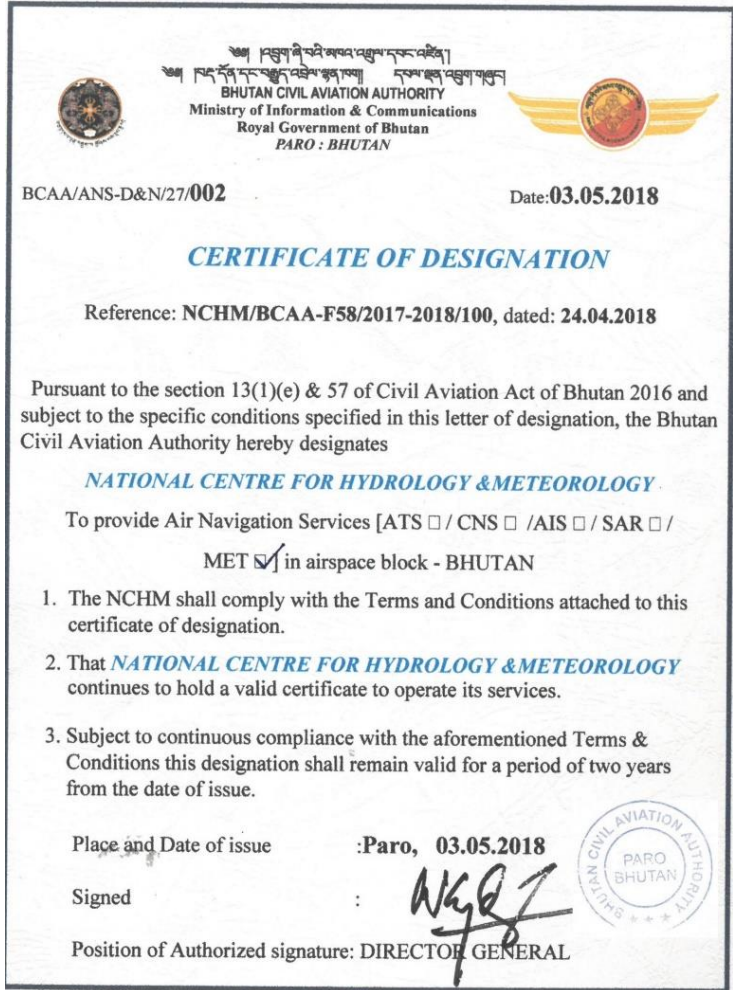
Climate Change Policy of the Kingdom of Bhutan (2020) mandates NCHM:

- National Hydromet data repository & related information
- Focal agency climate projections and other early warning services.



Aviation Meteorological Services

- BCAA designated NCHM as the National Aeronautical Meteorological Service Provider (AMSP) within Bhutan vide letter BCAA/ANS-MET/010/196 dated August 29, 2017.

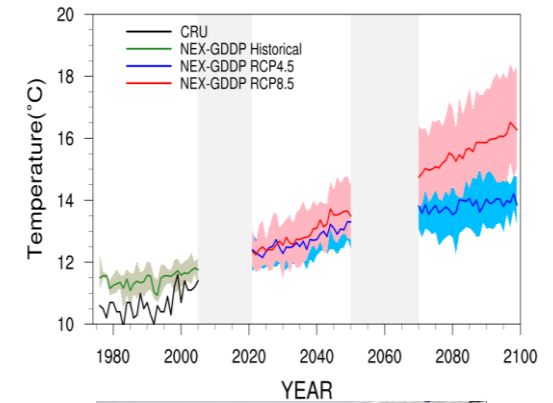
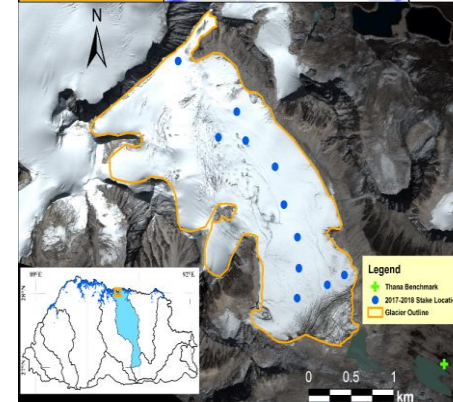
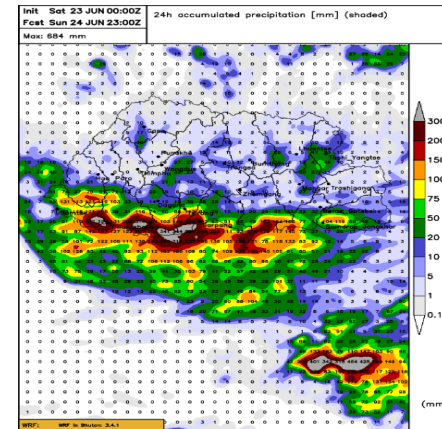


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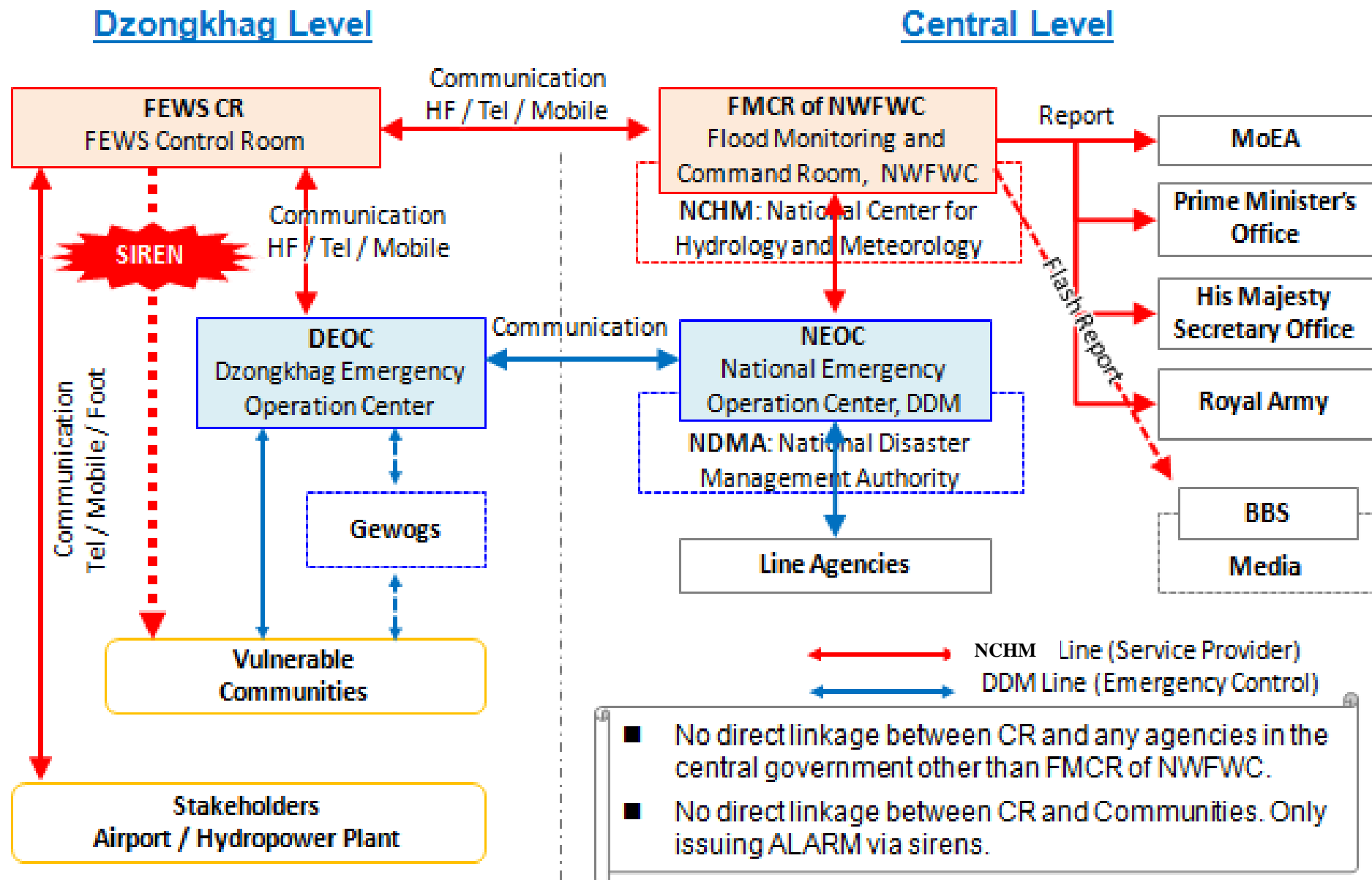
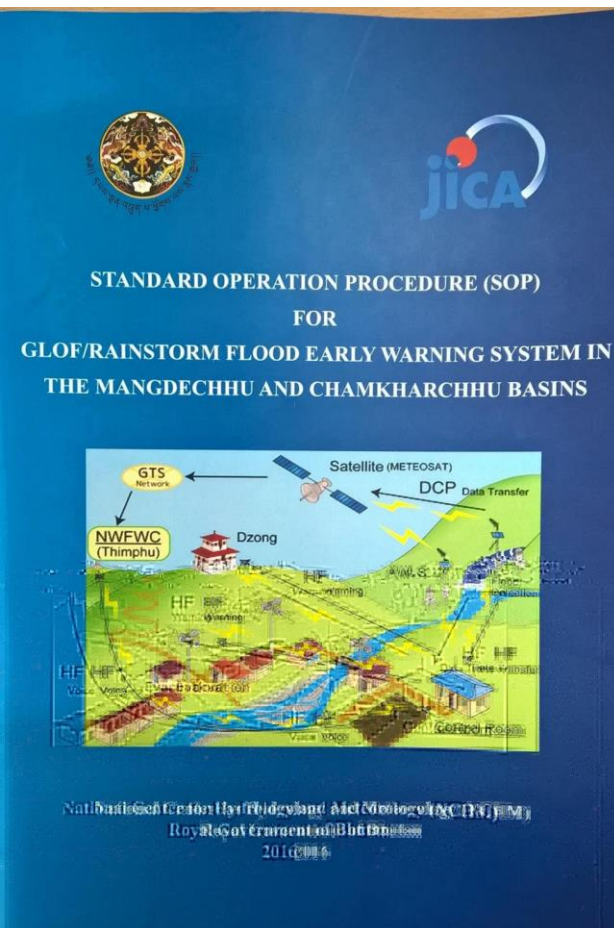
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Services

- a. Weather, Climate, Hydrological data and information
- b. Weather forecasting/aviation Met/AgroMet Services
- c. Advisories for extreme events
- d. Climate Projection
- e. River Flow Forecasting
- f. Flood/GLOF EW
- g. Cryosphere Services
 - inventories on glaciers and glacial lakes
 - mass balance/ recession information
 - GLOF hazard from PDGLs
- h. Global data sharing
 - GBON : 1 station
 - GTS : 1 existing, 5 in plan



General Communications and Information Flow in the Central and Dzongkhag Levels



NCHM Roles and Partnership at International Level



- Center is the designated national focal point with World Meteorological Organization (WMO)
- Head of the Center is designated as the **Permanent Representative (PR) of Bhutan with WMO;**
- Center is closely working with WMO and National Meteorological and Hydrological Services (NMHS) of its member States through MFA



- NCHM is the designated national focal point for IPCC



With ICAO as the aeronautic meteorological services provider of Bhutan



NCHM Roles and Partnership at Regional level



BIMSTEC Centre for Weather & Climate

To provide leadership in the weather and climate through improved specialized forecasts in the region

Center is the designated focal point for BIMSTEC Center for Weather and Climate (BCWC)



FOR MOUNTAINS AND PEOPLE

With **International Center for Integrated Mountain Development (ICIMOD)**, Kathmandu, Nepal in the areas of : Cryosphere monitoring program and regional flood information;



Regional Integrated Multi-hazard Early Warning System (RIMES), Bangkok, Thailand, System development and flood modelling, technical backstopping and capacity building services




South Asian Hydromet Forum (SAHF)- a pathway for regional collaboration among NMHS and stakeholders promoted by World Bank in partnership with World Meteorological Organization (WMO) and regional organizations



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NCHM Partnership with National Agencies

Agency	Area/Services
National Environment Commission (Department of Environment and Climate change)	Climate projections , Hydrological modelling for e-flow, Hydro-met data, GHG emissions, TNA, NAP etc. (Ambient Air and Water quality monitoring ?)
Department of Disasters Management (DDM), MoHCA	Extreme weather, flood/GLOF EWS, flood hazard mapping
Department of Public Health, MoH	<div style="display: inline-block; vertical-align: middle;">  </div> <div style="display: inline-block; vertical-align: middle; margin-left: 10px;"> Installation of weather stations, vector borne diseases surveillance and early warning with changing climate </div>
Department of Energy (DOE)/Hydropower	Installation of hydro-met Stations, sediment lab, hydromet data for planning and designing, Flow forecasting
Department of Agriculture (DOA), MoAF	Hydro-met data/information, Agro-met services
Bhutan Civil Aviation Authority (BCAA) and DoAT, MoIC	Aviation meteorological Services e.g. (METAR/SPECI), Monitoring of aerodrome weather conditions and reporting to ATC for updating the pilots for landing and take-off.
Department of Engineering Services (DoEs), MoWHS	Hydro-met data/information, river surveying, flood modelling, flood hazard mapping

NCHM Partnership at Bilateral level

With Government of India

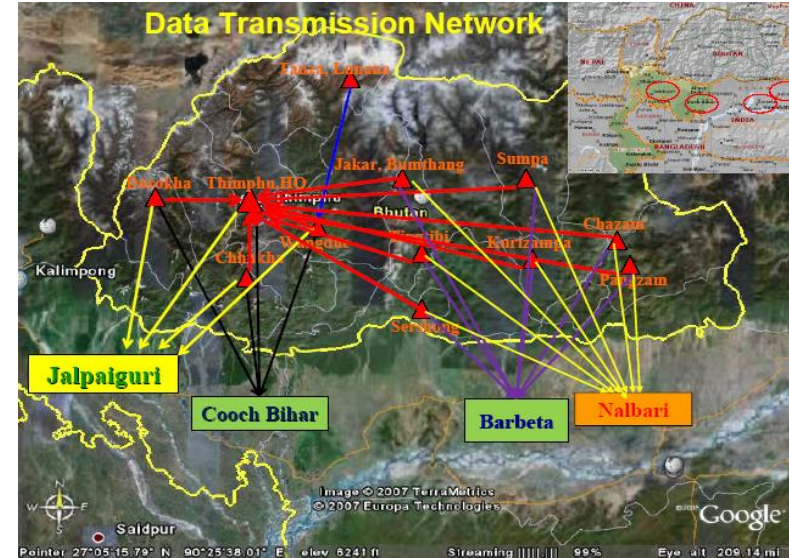
1. Coordinate the **Joint Expert Team (JET) Meeting** between Bhutan and India to review the “Comprehensive Scheme for Establishment of Hydro-meteorological and Flood Forecasting Network on Rivers Common to India and Bhutan”

- Central Water Commission (CWC), Ministry of Water Resources, GOI
- **Technical Maintenance Officer (TMO)** is on deputation from GOI to Bhutan (NCHM) for 2 years
- GoI Program Support operation of more than 33 sites + 45 Regular staff

2. Coordinate the **Joint Expert Group (JGE) Meeting** for Flood Management between India and Bhutan (2004) to *“Discuss and assess the probable cause and effects of the recurring floods and erosion in the southern foothills of Bhutan and adjoining plains in India and recommend to both Government, appropriate and mutually acceptable remedial measures”*.

3. With NMHS of RA-II like IMD, JMA, KMA

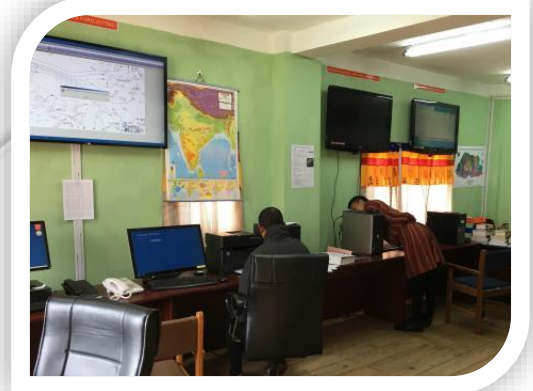
- Training, Satellites data and services



24/7 National Weather and Flood Warning Center (NWFWC), NCHM



Satellite image receiver
(HimawariCast)



2nd floor:
Weather forecasting room/
GTS/MSS Operation room



Ground floor:
Day-care center



1st floor:
Flood Monitoring Command Room/
Emergency Meeting Room



Awareness and Education/Mock Drill

Evacuation planning and drills in Flood Prone Communities



The Project for Capacity Development of GLOF and Rainstorm Flood Forecasting and Early Warning in the Kingdom of Bhutan
Project Completion Report



Wangdicholing Community Evacuation Mock Drill



Chokhortoe Primary School Evacuation Mock Drill



Gangrithang Primary School Evacuation Mock Drill

MoU with Colleges and Climate Sensitive Sectors

- To strengthening partnership in hydro-met observation and research the Centre signed MoU with
 - Sherubtse College, signed on 15 April, 2019
 - College of Natural Resources (CNR), RuB, signed on 23 March 2021
 - Colleges of Science and Technology (CST), RuB, signed on 13 April, 2022
 - Department of Forests and Park Services (DoFPS), signed on 27 April, 2022



Institutional linkages and Collaboration



NCHMS has MoU with
-Sherubtse College
-College of Science and Technology
-College of Natural Resources
for Joint Research,



One-on-one Meeting with Sectors (May-August, 2018)

- a. Department of Air Transport Services (DoAT) Paro International Airport, Paro;
- b. Bhutan Civil Aviation Authority (BCAA), Paro
- c. Thimphu IT Paro and Data Center,
- d. Department of Public Health, Ministry of Health,
- e. Druk Green Power Corporation Limited (DGPC), DHI
- f. Department of Agriculture (DoA), Ministry of Agriculture and Forest (MoAF)
- g. Department of Engineering Services (DoES), MoWHS
- h. Department of Roads, MoWHS,
- i. Department of Disaster Management, Ministry of Home and Cultural Affairs
- j. Tourism Council of Bhutan (TCB)
- k. Royal University of Bhutan and representatives of Colleges under RuB and
- l. Nature Conservation Division (NCD), Department of Forests and Park Services, MoA.



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Internship at NCHM

- 5 Students B.Sc. Environmental and Climate Studies and Sustainable Development from the College of Natural Resources (CNR), Lobesa and
- 5 Students from Sherubtse (*Assignment: Climate and Flood Data Analysis of Kurichhu Basin*)_
- 2 Student from CST completed their internship in the Center.



Challenges

1. No Hydro-met Policy and Legal Framework
2. Lack of dedicated Center's office space and scientific facilities
3. Limited Professional Capacity
4. Limited climate station in northern high alpine areas
5. Inaccessibility & Remote for station maintenance
6. Difficult to provide reliable weather and hydrological forecast due to natural topography
7. Flood/GLOF EWS is based on flood detection system rather than forecasting
8. Short time series historical record



Way Forward

- Strengthening through policy instrument
- Road Map
- Infrastructures and capacity building

SELF SUSTAINING



***“If you want to know your past life,
look at your present condition.
If you want to know your future life,
look at your present actions.”***

— Padmasambhava

