



Disaster Risk Knowledge

Observations & Forecasting

Dissemination  
& Communication

Preparedness & Response

## **Detection, Observation, Monitoring, Analysis, and Forecasting - WMO perspectives**

**Ian Lisk, President, WMO Commission for Weather, Climate, Hydrological, Marine and  
Related Environmental Services and Applications (SERCOM)**

**Cyrille Honoré, Director, DRR, MHEWS and Public Services Division**

# What is WMO and what do we do?

A specialized agency of the UN and the UN system's authoritative voice on weather, climate and water issues

**1873**

Vienna International Meteorological Congress calls for IMO rules to be drafted.  
**1950** a new inter-governmental constitution formed - WMO.



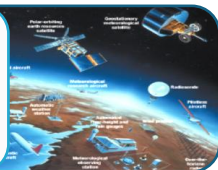
**1988**

WMO and UN Environment create the IPCC to provide governments science to support climate policy development. Currently on 6<sup>th</sup> report cycle.



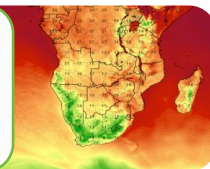
**Billions**

of observations freely exchanged daily between all WMO members to allow creation of global weather, seasonal & climate predictions



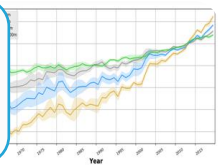
**TB ( $10^{12}$ )**

of advanced forecast model data are created, shared and made available worldwide, each day through WMO WIPPS to allow Members to create forecast and early warning services



**7**

agreed climate indicators, and 54 ECVs for best describing our changing climate to annual inform global understanding and climate policy



**US\$ 122M**

in capacity development projects carried out in 2020/2021 for enhancing national and regional hydrometeorological capacities



**193**

**Members**

**9 major  
programmes**

**500+  
experts**

**2 technical commissions  
1 research board**

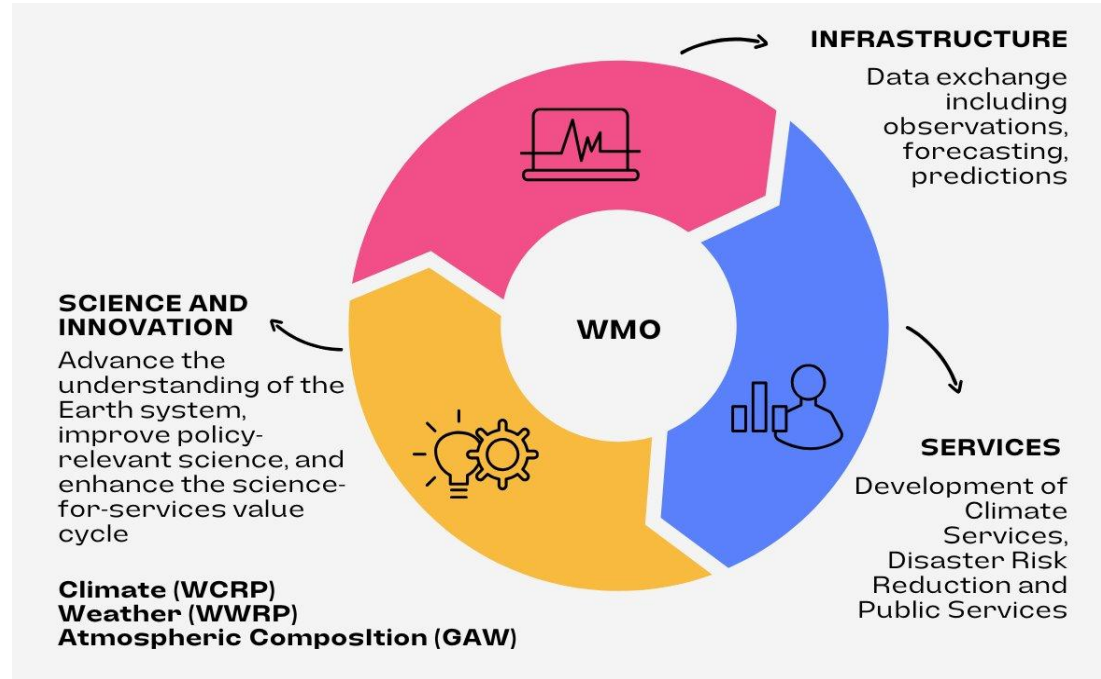
**5**

**long-term goals**

**1 vision**

# World Meteorological Organization (WMO)

- Coordinates work of 300,000+ national experts from meteorological and hydrological services, academia and private sector.
- Establishes standards, technical regulations to support coordination across its 193 Members
- Organizes supporting frameworks for operational cooperation and support between Members



WMO Research-Operations Departments

***"We must get serious about adaptation:  
Ensuring every person on earth is protected by an early warning system by 2027, and that early warning leads to early action"***

António Guterres,  
Secretary-General of the United Nations





# Early Warnings for All: Protecting everyone on earth with end-to-end early warning systems



## Disaster risk knowledge

Systematically collect data and undertake risk assessments

- Are the hazards and the vulnerabilities well known by the communities?
- What are the patterns and trends in these factors?
- Are risk maps and data widely available?



## Detection, observations, monitoring, analysis and forecasting of hazards

Develop hazard monitoring and early warning services

- Are the right parameters being monitored?
- Is there a sound scientific basis for making forecasts?
- Can accurate and timely warnings be generated?



## Preparedness and response capabilities

Build national and community response capabilities

- Are response plans up to date and tested?
- Are local capacities and knowledge made use of?
- Are people prepared and ready to react to warnings?



## Warning dissemination and communication

Communicate risk information and early warnings

- Do warnings reach all of those at risk?
- Are the risks and warnings understood?
- Is the warning information clear and usable?

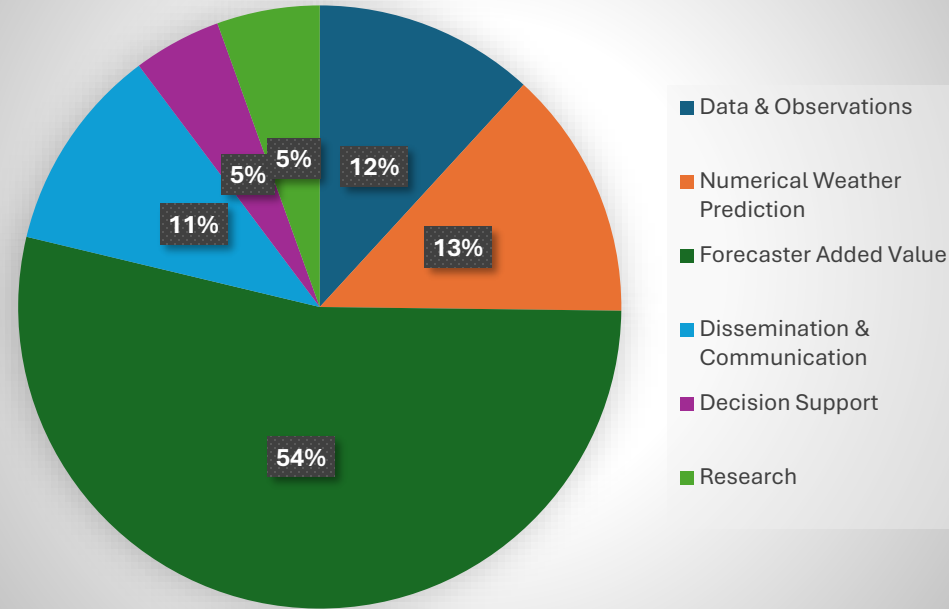
# WMO EW4ALL Roadmap

128 scientific and technical activities, covering essentially Pillar 2, but not only

Accelerating and leveraging the WMO existing frameworks, programmes, partnerships and systems :

- WIGOS ( GBON, RBON, SOFF)
- WIS
- WIPPS
- Tropical Cyclone Programme,
- Education and Training programme
- World Weather Research Programme
- Global Atmospheric Watch
- Joint Collaborative Board with IOC
- ...

Activity breakdown





# Detection, observation, monitoring, analysis, and forecasting: Global Challenges

**Only a third** of WMO Members and Territories report having multi-hazard monitoring and forecasting system

**Half of the 30 countries** initially selected for Early Warnings for All coordinated assistance operate with basic monitoring and forecasting capacity, and close to a quarter with less-than-basic capacity

There are critical gaps in surface and upper air meteorological observations across Africa, parts of the Pacific and West of Latin America

**Only 67% of WMO Members** report having warning and alerting services available 24/7

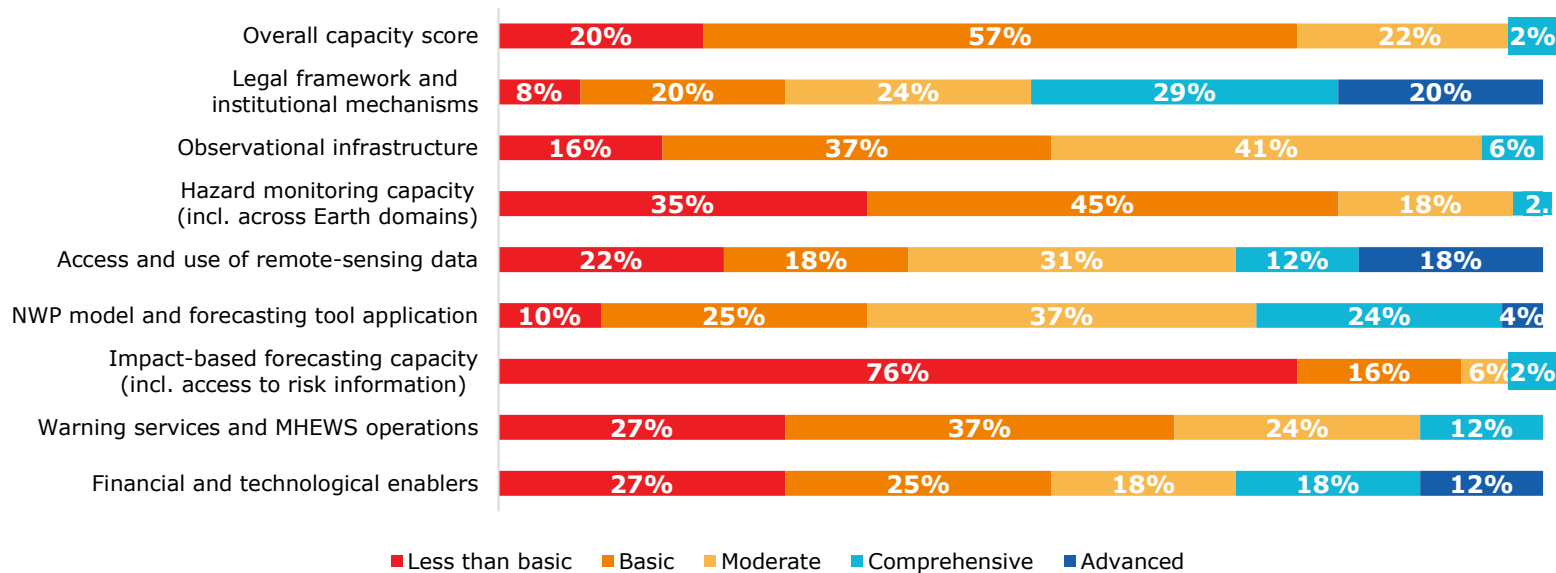
**Only 56% of countries** report using hazard, exposure and vulnerability data in their forecasts, delimiting the progress on impact-based forecasting and warning

**Only 38% of Members** report having legal arrangements to enable MHEWS

# Rapid Assessment of Country Capacity

Over half of the 51 NMHS operate with basic monitoring and forecasting capacity, and a fifth with less-than-basic capacity.

## Results



*EW4All Pillar 2 capacity levels of hydro-meteorological services in 51 developing countries, of which 40 are least-developed countries, small island developing states, or landlocked developing countries (data collected by WMO in 2023-2024).*

Biggest gaps: impact-based forecasting capacity (incl. skills, technical resources and risk component data) and insufficient observations (incl. lack of network maintenance, data management and access to monitoring data across Earth domains).





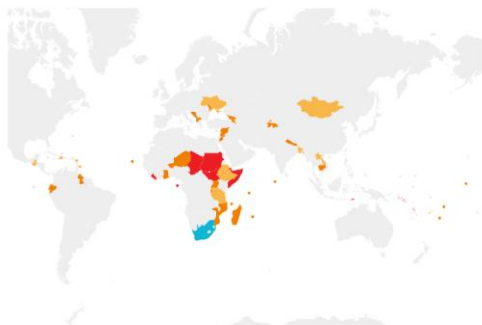
# Rapid Assessment of Country Capacity (Pillar 2)

- Conducted in **51 countries**, predominantly LDCs, LLDCs and SIDS
- A standardized methodology along the elements of the hydrometeorological value cycle
- A maturity score produced on a scale of 1-5, gaps identified
- All results and data available on [Early Warnings for All Dashboard](#) (see *MHEWS Capacity*)

## Hazard monitoring and forecasting capacity

This page presents an overview of the capacity for hazard monitoring and forecasting of the 30 countries initially selected for support under the Early Warnings for All Initiative, based on detailed data submitted to WMO by their National Meteorological and Hydrological Services. All underlying data is available in the [Country/territory page](#) of this report.

Overall capacity level: ● Less than basic ● Basic ● Medium ● Full ● Advanced



### Capacity level distribution

Use the buttons below to show the number of countries at each capacity level in the selected classification



The designations employed in this website are in conformity with United Nations practice. The presentation of material therein does not imply the expression of any opinion whatsoever on the part of WMO concerning the legal status of any country, area or territory or of its authorities, or concerning the delimitation of its borders. The depiction and use of boundaries, geographic names and related data shown on maps and included in lists, tables, documents, and databases on this website are not warranted to be error free nor do they necessarily imply official endorsement or acceptance by the WMO.

Source: WMO Monitoring System, 2024



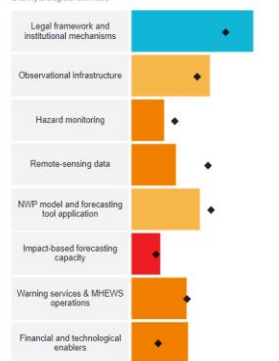
## Madagascar

This page presents detailed information on the capacity for monitoring and forecasting of the 30 countries initially selected for support under the EW4All Initiative, structured along eight elements of the hydrometeorological value chain, based on data submitted to WMO by their National Meteorological and Hydrological Services.

### Element Maturity Scores

Country ■ / Global average\* ● (●)

\*Based on the number of currently assessed National Meteorological and Hydrological Services



### Data View

Use the buttons below to switch between viewing the data on the priority hazards and the detailed data making up the overall element scores.

Priority Hazards

All data - by element



|   |                                     |                                     |                                     |                                     |                                     |
|---|-------------------------------------|-------------------------------------|-------------------------------------|-------------------------------------|-------------------------------------|
| Impact-based forecast and warning services produced                             | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> |
| Roles/responsibilities of all organizations generating/issuing warnings defined | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> |
| Self-assessed hazard monitoring capacity level                                  | ☆☆☆☆                                | ☆☆☆☆                                | ☆☆☆☆                                | ☆☆☆☆                                | ☆☆☆☆                                |
| Standard Alerting Procedures in place with authorities and stakeholders         | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> |
| Use of RS/MCA guidance products   | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> |
| Use of satellite data for hazard monitoring                                     | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> |

Source: WMO Monitoring System, 2024



## WMO Technical Commission Priorities

Technical Commissions working together with the Research Board, regional associations & other partners to support Members' timely access to the best available information to enable them to produce, disseminate and monitor warnings & advice for weather, climate, hydrological, marine, cryosphere and related environmental hazardous events

### **Infrastructure Commission** focusing on enhancing Global Infrastructure for building national Early Warning Systems & developing Members' capacities:

- Implement WIS2.0 (Information System) including CAP (Common Alerting Protocol) and WHOS (Hydro Observing System)
- Implement GBON (Global Basic Observing Network), supported by SOFF (Systematic Observations Financing Facility), and develop RBON (Regional)
- Enhance WIPPS (Integrated Processing/Prediction System) and satellite products for hazards, even using AI, including those from academia and private sectors

### **Services Commission** focusing on updating regulatory frameworks for Early Warnings Services (EWS) & supporting capacity development activities

- Global EWS Standards and Recommended Practices
- Cataloguing of Hazardous Events (in collaboration with UNDRR)
- Guidance, good practices & comms

# WMO Catalogue of Hazardous Events (WMO-CHE)

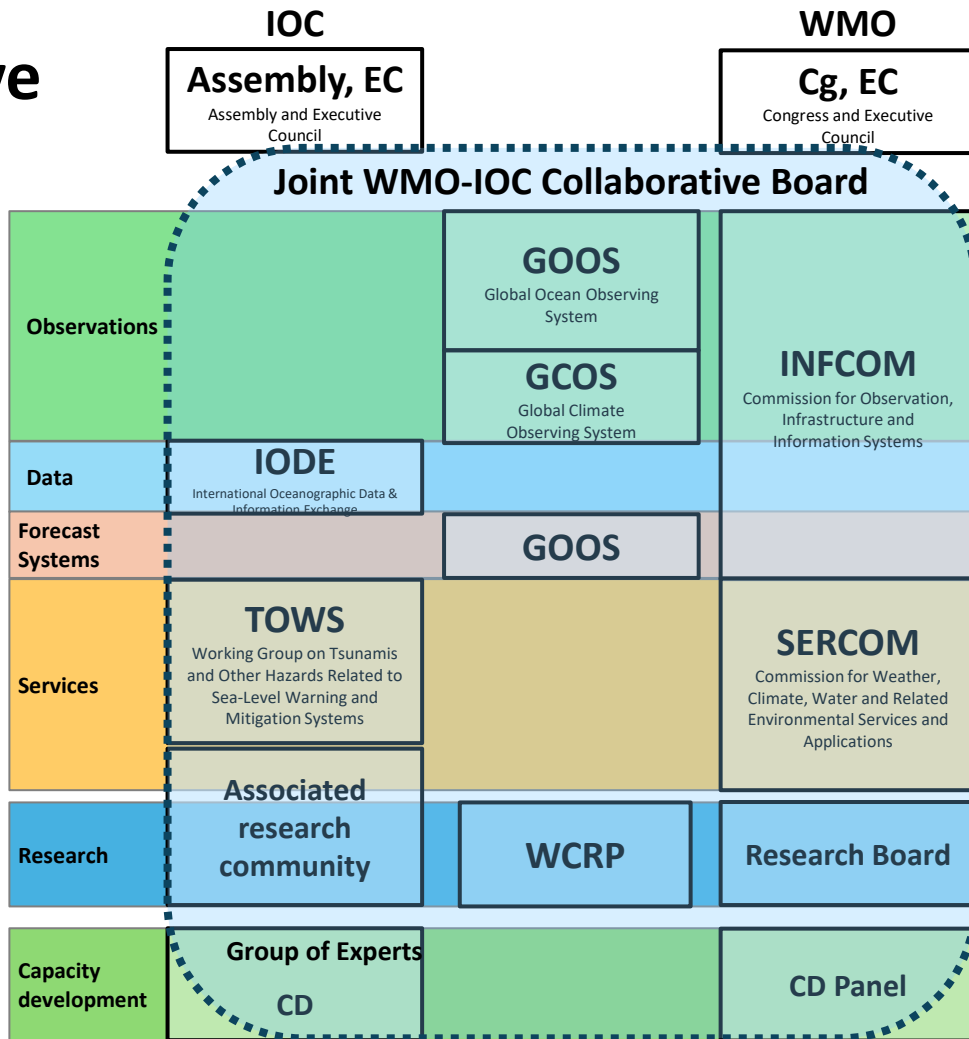


- **Systematic recording of physical parameters of hazardous events** by National Meteorological and Hydrological Services (NMHS) and other mandated agencies
- **Methodology approved** by WMO Congress in 2019,  
**Implementation plan and guidance approved** by WMO Executive Council 76 in 2023 (Feb)



# Joint WMO-IOC Collaborative Board (JCB)

- Advises both governing bodies and proposes joint decisions.
- Reps from both on Obs/Data/Forecasts/Services/Research/CD
- Strategy (2022–2025 extended to 2027) focuses on communication, standards, training, and regional cooperation.
- Key priorities including: strengthen coastal hazard resilience (e.g. tsunamis)
- Two Subgroups – Obs and Data





# EWS Technical Regulations development

- Drafted by the SERCOM experts,
- Widely shared for review
- Recommended by the SERCOM-Ext session last March
- Endorsed by WMO Executive Council
- Submitted for final approval on an Extraordinary Session of the World Meteorological Congress in October 2025

| Draft "0.2" SERCOM-EXT approved      |                                 | Practice |             |
|--------------------------------------|---------------------------------|----------|-------------|
| Subsection                           | Provisions                      | Standard | Recommended |
| 6.1 General                          | Hazard Warning Provision        | X        |             |
|                                      | Stakeholder Access              | X        |             |
|                                      | Risk-Based Services             | X        |             |
|                                      | Capacity Gaps & Continuity      | X        |             |
| 6.2 Institutional arrangements       | Designated Providers            | X        |             |
|                                      | Legal & Institutional Support   |          | X           |
|                                      | Coordination with Stakeholders  | X        |             |
|                                      | Provider Compliance             |          | X           |
|                                      | Decision-Support Use            | X        |             |
|                                      | Quality Management              |          | X           |
|                                      | Public Training & Education     |          | X           |
| 6.3 Information and derived products | Tailored Information            | X        |             |
|                                      | User Coordination               |          | X           |
|                                      | Contextual Information          | X        |             |
|                                      | Impact Integration              |          | X           |
|                                      | Phases & Updates                |          | X           |
|                                      | Continuous Improvement          |          | X           |
|                                      | WMO Support & Feedback          |          | X           |
| 6.4 Dissemination and communication  | Communication Channels          | X        |             |
|                                      | Coordination with Stakeholders  |          | X           |
|                                      | Multiple Communication Channels |          | X           |
|                                      | Warning exchange                | X        |             |
|                                      | CAP Routine Utilization         |          | X           |
|                                      | Documentation of Capabilities   | X        |             |
| 6.5 Recording and cataloguing        | Hazardous Events                |          | X           |
|                                      | Hazard & Impact Data            |          | X           |
| Total                                | 26                              | 12       | 14          |

# Thank you



WORLD  
METEOROLOGICAL  
ORGANIZATION

