

Technical Regulations, Basic Documents No. 2

Volume I – General Meteorological Standards and Recommended Practices

DEFINITIONS

Editorial note: Add a new definition, as follows:

Early warning service

Early warning service is an integral part of the national Multi-Hazard Early Warning System providing decision-support information and products on meteorological, hydrological, and climatological and related environmental hazards tailored to the needs of disaster risk management stakeholders and users, including the general public, enabling anticipatory action for saving life, livelihood, property, and strengthening of economic, social, health and environmental resilience.

PART IV. METEOROLOGICAL, HYDROLOGICAL AND CLIMATOLOGICAL SERVICES

6. EARLY WARNING SERVICES

Note: In the following provisions, the notion “meteorological, hydrological and climatological hazards” may include also related environmental hazards, as appropriate.

6.1. Objective and scope

6.1.1 Members **shall** ensure the provision of early warning services for meteorological, hydrological, and climatological and related environmental hazards affecting their respective territories.

Note: The meteorological, hydrological, and climatological and related environmental hazards applicable to the early warning services are listed in the WMO Catalogue of Hazardous Events (WMO-CHE).

Editorial note: The most recent list is included in Resolution 12 (EC-76); appropriate reference will be added as soon as the WMO-CHE publication is officially issued.

6.1.2 The objective of early warning services **shall** be to support disaster mitigation, risk management, and the protection of life, livelihoods, and property, while strengthening economic, social, health, and environmental resilience.

6.1.3 This objective **shall** be achieved by supplying the general public, national and local governments, disaster risk management organizations, media, and any other stakeholders concerned, with decision-support information and products necessary for the effective performance of their disaster risk management functions.

6.1.4 The early warning services for meteorological, hydrological, climatological, and related environmental hazards should be established and operated as an integral part of the national Multi-Hazard Early Warning System (MHEWS).

Note: The definition of Early Warning Systems and Multi-Hazard Early Warning Systems are provided in the United Nations Office for Disaster Risk Reduction (UNDRR) Terminology related to the Sendai Framework for Disaster Risk Reduction [<https://www.undrr.org/terminology/early-warning-system>]

6.1.5 Members **shall** determine the scope of the necessary early warning services for meteorological, hydrological, and climatological and related environmental hazards taking into consideration the disaster risks associated with the country-specific hazard event types, their severity, spatial and temporal characteristics, and potential impacts.

Note: The hazard event types to be included in the determination of the scope of the services are to be consistent with those defined in WMO Catalogue of Hazardous Events (WMO-CHE).

6.1.6 In case of identified capacity gaps impeding the provision of all or part of the required early warning services, Members should arrange for the provision of minimum viable service, prioritizing on safety of life with focus on most vulnerable communities. Such arrangements should be supplemented by timebound capacity development measures for resolving critical institutional and technical gaps, including through international cooperation.

Notes:

- 1) The minimum viable service includes a set of basic products and procedures allowing the generation of simple warning information and products on life-threatening hazards disseminated through available communication channels, including indigenous/traditional methods, with the aim to allow isolated and vulnerable communities to take life-saving action.

Editorial note: Details and examples of good practices to be provided in existing and forthcoming guides and guidelines.

- 2) The WMO Capacity Development Strategic Framework (WMO-No. 1133) provides guidance on the planning and implementation of effective actions to resolve critical capacity gaps engaging national and international development assistance resources.

6.2 Organization

6.2.1 Each Member **shall** designate one or more organizations to supply the required early warning services for meteorological, hydrological, and climatological and related environmental hazards as official provider(s) to meet the needs of the national disaster risk management.

6.2.2 Such designations should be made through appropriate legal or regulatory act and supported by suitable institutional arrangements at national and local levels for the organizations concerned, as well as allocation of appropriate resources needed for the effective provision of the services determined as per 6.1.5 above.

Notes:

- 1) Appropriate national level legal or regulatory act may include a law, a sub-law, a government order, or any other suitable act based on the national legal/regulatory circumstances.
- 2) Suitable institutional arrangements may include standard operating procedures (SOP), memoranda of understanding (MOU), protocols or agreements, etc., covering relationships and interactions between stakeholders in the process of early warning services provision.
- 3) Information about the designated official providers by the Members is maintained in the WMO Register of Alerting Authorities [<https://alertingauthority.wmo.int/>].

6.2.3 Members **shall** ensure that the institutional arrangements established as per 6.2.2 above provide for a close coordination between the designated official providers and stakeholders for the provision of early warning service for meteorological, hydrological, and climatological and related environmental hazards, including agreement

on standard operating procedures.

6.2.4 Members should ensure that the designated official provider(s) complies(y) with applicable national or international requirements in respect of qualifications, competencies, education and training of personnel providing early warning services for meteorological, hydrological, climatological and related environmental hazards.

Note: WMO requirements concerning the qualifications, competencies, education and training of meteorological, hydrological and climatological personnel in early warning service are given in the Technical Regulations Volume I – *General Meteorological Standards and Recommended Practices* (WMO-No. 49), Part V – *Qualifications and competencies of personnel involved in the provision of meteorological (weather and climate) and hydrological services*, Part VI – *Education and training of meteorological personnel*, Appendix A – *Basic Instruction Packages*, the Guide to Competency (WMO-1205) and the Compendium of WMO Competency Frameworks (WMO-No. 1209).

6.2.5 Members **shall** ensure that MHEWS stakeholders concerned are able to make use of the information and products issued by the designated official providers of early warning services as authoritative decision-support references in the execution of their respective functions.

6.2.6 Members should ensure that the designated official provider(s) referred to in 6.2.1 above establish and implement a properly organized quality system comprising procedures, processes and resources necessary to provide for the quality management of their services.

Note: Specifications about the quality system to be implemented are provided in Chapter VII, *Quality Management Systems* of these Technical Regulations. Implementation guidance is provided in *Guide to the Implementation of Quality Management Systems for National Meteorological and Hydrological Services and Other Relevant Service Providers* (WMO-No. 1100).

6.2.7 Members should ensure training, exercising and educational activities for the general public, users and stakeholders are in place to promote the objectives, effectiveness, and sustainability of the early warning services.

6.3 Early warning services information and products

6.3.1 Members designated official providers of early warning services for meteorological, hydrological, and climatological and related environmental hazards **shall** provide their services through defined types of information and products specifically designed for each hazard type as per 6.1.5 above and developed in collaboration with relevant stakeholders based on mutually agreed warning criteria.

6.3.2 The early warning service information and products should be developed in close coordination with the users concerned to ensure that they are fit for purpose, interoperable and facilitate straightforward and unambiguous interpretation.

6.3.3 (Addition from ET-DDS). The baseline information regarding to the climatological threshold of climate parameters to be used by the MHEWS should follow the standards described at WMO regulations, such as WMO-1310 (Guidelines on the definition and characterization of extreme weather and climate events) and WMO-1238 (Manual on the High Quality-Global Data Management Framework for Climate).

6.3.4 (Addition from ET-DDS). As per 6.3.3 and 6.3.1, the designated providers of MHEWS should seek collaboration of WMO members at national levels regarding to provision of relevant climate data information and its dissemination.

6.3.5 Early warning service information and products provided to the general public should consider the national and local contexts, including language(s) and other social and accessibility factors affecting the perception of the risk and warning information as received by communities and individuals.

6.3.6 The early warning service information and products should cover all phases of the hazard event, as appropriate. Monitoring the hazardous conditions and issuance of prompt updates to relevant stakeholders should be ensured based upon agreed criteria.

Note: The phases of a hazardous event evolution include the pre-hazard phase (before the event onset), the during-hazard phase (from the event onset until its cessation), and the post-hazard phase (after the cessation

of the event). The services for the during-hazard and post-hazard phase are vital for the rescue and disaster relief operations.

6.3.7 The early warning service information and products should incorporate information about the impacts of meteorological, hydrological, and climatological and related environmental hazards on individuals, communities, infrastructure, and relevant socio-economic sectors.

Notes: Guidance on incorporation of impact information in the early warning services is provided in the *Guidelines on Multi-Hazard Impact-Based Forecast and Warning Services*, WMO-No. 1150.

6.3.8 The early warning service information and products should be regularly reviewed to ensure fitness for purpose and continuous improvement based on users' feedback, evolving hazard and risk knowledge, and advancements in science and technology, to meet current and emerging societal needs for quality early warning services.

6.3.9 Members official providers of early warning services should utilize information and products supplied by designated regional and global centres to support the development and delivery of early warning services at national level. They should also provide feedback to those centers to facilitate continuous improvement of their production.

Note: Regional and global centres designated by the WMO with responsibility for provision of information and products in support of early warnings are defined in the *Manual on the WMO Integrated Processing and Prediction System* (WMO-No. 485)

6.4 Dissemination and communication

6.4.1 Members **shall** establish communication channels to ensure timely and resilient supply of early warning services reaching all end users.

Note: Technical regulations related to communication channels are provided in *Manual on the WMO Information System*, Volume I and Volume II (WMO-No. 1060); implementation guidance is provided in the *Guide to the WMO Information System*, Volume I (WMO-No. 1061)

6.4.2 Such communication channels should ensure that early warning service information and products are received, correctly understood, and acted upon appropriately.

6.4.3 The provision of early warning information and products to the general public should be realized through multiple channels with due consideration of national and local conditions. Such channels should maximize the reach and facilitate easy access to early warning service information and products by all citizens, including by utilizing traditional and indigenous communication means for isolated communities where appropriate.

6.4.4 Members should exchange early warning information and products on a bilateral or multilateral basis as necessary to deal with hazards affecting cross-border areas.

6.4.5 Official providers should routinely utilize the Common Alerting Protocol (CAP) of the International Telecommunications Union (ITU) for the dissemination of early warning service information and products for meteorological, hydrological, and climatological and related environmental hazards.

Note: CAP is contained in Series X: Data Networks, Open System Communications and Security of the Telecommunication standardization Sector of ITU. Information and implementation guidance on the CAP International Telecommunication Union (ITU) standard X.1303 is provided in *Guidelines for Implementation of Common Alerting Protocol (CAP)-Enabled Emergency Alerting* (WMO-No. 1109).

6.4.6 Members should exchange agreed early warning service information and products to regional and global facilities and systems for redistribution to enhance public

awareness on the occurrence of hazardous events.

Note: Examples of such facilities and systems include the European Meteoalarm, the WMO Severe Weather Information Centre (SWIC), relevant regional Climate Centers (RCC) and Regional Specialized Meteorological Centers (e.g., RSMCs on tropical cyclones), the Global Multi-hazard Alert System (GMAS). Such exchanges may be subject to applicable national and international data policy and intellectual property provisions.

6.4.7 Members **shall** ensure that the current capabilities of their early warning services are properly documented and made available to all stakeholders concerned.

6.5 Recording

6.5.1 Members **shall** arrange for systematic recording and cataloguing of the hazardous events included in the scope of the required early warning services as per 6.1.5 above.

Note: The WMO standard methodology for recording and cataloguing of hazardous events is provided in the annex of Resolution 12 EC-76 Implementation plan for the Methodology for Cataloguing Hazardous Events (CHE) with annexes.

6.5.2 Members should facilitate the systematic collection and sharing of supplementary hazard impact data among the stakeholders, including from non-official sources.

Note: Non-official sources may include the collection of hazard and impact data through crowdsourcing, citizen science, etc.