## EWS4ALL Pillar II Implementation Strategy

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|  | Outcome 1: Observations meet the data requirements to monitor high-impact hazards | | | | | | |
| Output | | Scope | Indicative activities | Coordination | Contributions | Timeline | Indicators |
| Observation gap analysis for high-impact hydromet hazards | | Global | Inventory of data and products available to monitor specific hazards | WMO INF | CGMS Members, Satellite operators, etc. | 2023 heatwaves, flood, drought, and tropical cyclones  2024-27 gap analysis for four additional high-impact priority hazards per year | Observation gap analyses for high-impact hydromet hazards |
| For each high-impact hydromet hazard type, review the gaps in global frameworks for observation data provision to underpin early warning service delivery | WMO INF | WMO SERCOM, HCP |
| Review and catalogue the available global products from traditional and non-traditional sources for high-impact hydromet hazards and make pragmatic recommendations to bridge observation gaps in the short term to enhance capacity at the national level | WMO WWRP and INF | ITU, GSMA, UNESCO |
| Regional | Regional basic observing network design | WMO INF | WMO RAs, UNESCO, UNEP | Complete by end of 2024 | RBON design specifications for each WMO region |
| National | Assess observation capacities, gaps, and data availability related to national priority hazards through a commonly agreed approach | WMO Regional Technical Coordinators | Leveraging relevant exercises, such as the Country Hydromet Diagnostics (CHD), GBON Gap analysis, CDEMA MHEWS checklist, projects (e.g. CREWS) and other existing mechanisms | 30 countries by the end of 2023  50 countries per year through 2025 | Number of countries in which MHEWS Capacity Survey has been completed  Number of countries for which Country Hydromet Diagnostics has been completed  Number of countries for which a GBON Gap Analysis has been completed |
| Regional centres enhanced to support national observational and monitoring capacities | | Regional | Continue to improve coverage of Regional WIGOS Centres to assist Members in addressing issues and maintaining accurate metadata | WMO INF | RAs | 30 countries by the end of 2023  50 countries per year through 2025 | All Members are supported by Regional WIGOS Centres |
| Provide support to Regional Instrument Centres to maintain regional capability for calibration, verification and traceability | WMO INF | RAs, SOFF | 30 countries by the end of 2023  50 countries per year through 2025 | All Members are supported by Regional RICs |
| Development of regional hydrological centres | WMO INF | WMO HCP | 1 Regional centre established a year | All Members are supported by regional hydrological centres by the end of 2027 |
| Enhance RTCs’ capacities to provide training on basic monitoring, observation, maintenance, and calibration | MS/Regions (RTCs) |  | RTC training materials on basic monitoring, observation, maintenance, and calibration developed in 2024  RTCs training workshop in all regions twice a year | QA/QC measures from the observing network improve |
| National observation capacities strengthened to close capacity gaps | | National | Derive precipitation estimates from telecom signal attenuation (mobile networks, satellite reception ) | WMO INF | WMO Services, ITU | Guidance materials for deriving precipitation estimates from telecom signal attenuation | Number of members using telecom signal attenuation |
|  | |  | SOFF activities and investment assist LDC and SIDS in GBON implementation | SOFF | UNDP, UNEP |  | Number of Members GBON compliant |
|  | |  | Assist LDC and SIDS in closing the national hydrological observation capacity gaps | WMO INF | HydroSOS, FFGS, UNEP, UNDP, CREWS |  | National hydrology infrastructure improved |
|  | |  | Improve access to innovative monitoring approaches, incl. Low-cost monitoring/transmission technologies for observation stations, citizen science monitoring | WMO INF | CREWS, HydroHub, UNEP, UNDP, UNESCO |  | Number of Members including innovative monitoring approaches, incl. Low-cost monitoring/transmission technologies for observation stations, citizen science monitoring |
|  | |  | Implement Cataloguing of Hazardous Events (CHE) at national level | WMO Services | SERCOM, UNDRR, UNDP |  | Number of Members implementing CHE |
|  | |  | Train NHMSs staff on observation infrastructure operation, calibration, and maintenance | WMO Training Programme | WMO INF, SOFF, UNEP, UNDP | RTC reference materials on basic monitoring, observation, maintenance, and calibration available in national language  All Members participate in RTCs training workshops at least once a year | QA/QC measures from the observing network improve |
|  | Outcome 2: Enhanced global, regional and national data management and processing for forecasting and warning systems | | | | | | |
| Output | | Scope | Indicative activities | Coordination | Contributions | Timeline | Indicators |
| Increased availability and international exchange of hydrological, meteorological and other Earth system data  for early warnings | | Global | Accelerate the implementation of WIS 2.0 Global Services to support exchange of:   1. Satellite data 2. NWP data 3. Climate data 4. Hydrology-cryosphere | WMO INF | RAs, SOFF, development partners | 30 countries by the end of 2024  30 countries per year through 2025 | Number of Members exchanging data using WIS2.0 protocols |
| Implement dedicated WIS 2.0 Global Services to exchange warnings and alerts with the required low latency and resilience | WMO INF | WMO Services, UNESCO IOC | Warnings exchanged for 1 high-impact hydromet hazard through WIS 2.0 in 2023  Warnings exchanged for @ least two high-impact hydromet hazards per year through WIS 2.0 2024-2027 | Number of high-impact hydromet hazards exchanged over WIS 2.0  Number of countries exchanging their warnings over WIS 2.0 |
| Improve access to satellite data and products for all Earth System components, incl. from the new generation of satellites | WMO INF | CGMS, CEOS |  | Percentage of operating satellite instruments whose data is freely exchanged |
| Advocacy and policy efforts to promote data sharing at the international level across data types in support of the implementation of WMO Unified Data Policy | WMO INF | CGMS, WMC under guidance form WMO INFCOM supporting EWS service delivery requirements | Advocacy materials for WMO Members on the WMO Unified Data Policy | Number of countries meeting the data sharing requirements specified in the WMO Unified Data Policy |
| IImprove availability of core data of NWP through GDPFS/WIPPS | WMO INF | WMCs, RSMCs in the context of INFCOM guidance (WIPPS) supporting EWS service delivery requirements | xxx | xxx |
|  | |  | Establish global hydrological status and outlook systems (e.g. HydroSOS), aligned with WIGOS and WIS | WMO HCP | WMO INF and Services, SERCOM, INFCOM | Global HydroSOS Platform set up by 2024 | Number of Members contributing to established WMO Global Hydrological Status and Outlook System mechanism |
| Enhanced Regional Centre infrastructure, capacities, and processes for data operations | | Regional | Strengthen operational technology of regional centres as required to operate and analyse the volume of hydromet and environmental data | RAs | RSMCs, RTCs WIS, SC-IMT building on EWS service delivery requirements by SERCOM and RAs |  | Regional centres have the capacity to operate and analyse hydromet and environmental data |
| Increase data processing capacity at GDPFS/WIPPS centres as needed | WMO INF |  |  | GDPFS/WIPPS centres have the processing capacity to efficiently exchange products |
| Enhance staff capacities in regions for data operations (e.g. management, maintenance, security and sustainability) | WMO ETR | RTCs, CREWS, development partners |  | Staff competencies |
|  | |  | Establish regional hydrological status and outlook systems (e.g. HydroSOS), aligned with WIGOS and WIS | WMO HCP | SERCOM INF/Services, INFCOM, SERCOM | Regional implementation plans for hydrological status and outlook systems developed (all regions by end of 2023 | Regional hydrological status and outlook systems contribute to the Global HydroSOS Platform by 2025 |
| Accessibility of real time data for forecasting and warning enhanced | | National | Identify forecast data requirements for the priority hazards and support NMHSs access | WMO Services | WMO INF, Hydromet Alliance/ development partners,  WMO RTCs |  |  |
| Establish national hydrological status and outlook systems (e.g. HydroSOS), aligned with WIGOS and WIS | WMO HCP | WMO INF/Services, and SERCOM/INFCOM | Regional implementation plans for hydrological status and outlook systems developed (all regions by end of 2024) | Number of Members contributing to established WMO Global Hydrological Status and Outlook System mechanism |
| Train staff in analyzing available satellite data and products | WMO INF | ETR, Satellite operators WMO RTCs |  | Number of Members/users accessing GEONET/EUMETNET products (per satellite data providers’ monitoring)  NMHSs use satellite data to support monitoring priority hazards |
| Implement WIS2 nodes and foster the use of WIS2 box software | WMO INF | RAs, SOFF | WIS2 reference materials available in all UN languages  All Members participate in WIS2 training workshops at least once before end of 2025 | Number of Members transferring data using WIS 2.0 protocols |
| Support the establishment of WMO-compliant weather, water and climate data management systems | WMO INF | WMO Services, INFCOM/SERCOM, RAs |  | Number of Members implementing a WMO compliant CDMS |
| Conduct digitization and data rescue of historical data | WMO Services | UNEP, UNDP | 30 countries by the end of 2023  30 countries per year through 2025 | Number of Members indicating 100% digitization of historical data complete |
|  | Outcome 3: All priority hydromet hazards are forecasted | | | | | | |
| Output | | Scope | Indicative activities | Responsible |  | Timeline | Indicators |
| Strengthened global level models and products in support of regional and national work | | Global | WMCs provide the underpinning data through WIPPS to cover all priority hazards | WMO INF | WMCs/RSMCs/GPCs, SI/RB, INFCOM, HydroSOS | 2024 underpinning data for all priority hazards identified  By 2027 underpinning data for all priority hazards accessible through the GDPFS/WIPPS Web Portal | Catalogue of global forecast products  Percentage of mandatory products from designated GDPFS/WIPPS Centres directly accessible through the GDPFS/WIPPS Web Portal |
| WMCs provide the underpinning data through WIPPS to cover all priority hazards | WMO Services | WMCs/RSMCs/GPCs, SI/RB, FFGS, SERCOM | 2024 underpinning data for all priority hazards identified  By 2027 underpinning data for all priority hazards  accessible through the GDPFS/WIPPS Web Portal |  |
| Establish partnerships with traditional and non-traditional actors to generate/make available needed global forecast products by hazard (e.g., Google, Copernicus) | WMO INF | Partners (Google, Copernicus, etc) INFCOM, WMCs/RSMCs/GPCs, SI/RB, SERCOM, FFGS, HydroSOS, | xxx | xxx |
| Set standards for the forecasting of priority and compound hazards | WMO Services | Technical Commissions, RB, UNESCO-IOC, WHO, UNEP ? | Gap analysis on the existing WMO technical regulations and related guidance material on forecasting and delivery of services in support of DRR and EWS (completed by mid-2023) | WMO SERCOM approval of newly developed policy and standards for forecasting of priority and compound hazards |
| Develop and maintain guidance on forecasting high-impact priority hazards | WMO Services | WMO Technical Commissions,  RB | Guidance on forecasting high-impact hazards available for all priority hazards by 2025 | Currency of regulatory and non-regulatory guidance and publications for forecasting all high-impact hydromet hazards |
| Develop competency frameworks for forecasters for all priority hazards | WMO Services | WMO Technical Commissions | Competency framework for all priority hydromet hazards available | Number of Members reporting compliance with baseline international standards for priority hazard forecasting |
| Strengthened forecasting capacities at the regional level in support of countries | | Regional | Make available global and regional models and products for meteorological, hydrological and climatological applications | WMO INF | RSMCs,  INFCOM/SERCOM, S dept, Research Board, WMO research programmes, APFM and IDMP | All Members are covered by Global and Regional WIPPS Centres for priority hazards by 2025 | Percentage of Members covered by RCs providing tailored products and guidance on hazards, by hazard and region |
|  | |  | Evaluate regional centres’ capability to deliver accurate, timely, and spatially adequate forecasts for priority hazards | WMO Services | SERCOM, FFGS/HydroSOS  RSMCs, HYC | All RC meet minimum core capability requirements for forecasting priority hydromet hazards by 2025 | All RC meet minimum core capability requirements for forecasting their priority hydromet hazards |
|  | |  | Conduct trainings for Regional Centres on forecasting methodologies and approaches for priority hazards, incl. IBF | WMO Services | SERCOM, RSMCs, RTCs  FFGS/HydroSOS, TCP, SWFP |  | Number of RCs staff trained on IBF |
|  | |  | Increase exchange of regional knowledge and technical expertise in forecasting priority hazards among Members | WMO ervices | SERCOM, TCP, SWFP, RSMCs RTCs  FFGS/HydroSOS, TCP, SWFP, CIFI |  |  |
|  | |  | Expand RCs geographic and hazard type coverage, including establishment of new RCs, RSMCs/RSHCs, based on priority hazards criteria and needs | WMO RA, based on technical guidance by SERCOM/INF | FFGS/HydroSOS,TCP, SWFP, SDS-WAS, CIFI, |  | Number of Regional Hydrological Centres established  Number of regions/subregions covering interoperable platforms |
| Impact-based forecasts generated for all priority hazards | | National | Conduct trainings and raise awareness among NHMSs on regional products available and their usage | RCs  Advice by SERCOM INFCOM and pillar partners |  |  |  |
|  | |  | Identify forecasting tools and support installation and utilization for priority hydromet hazards | WMO Services | UNDP, SERCOM INFCOM , UNDP , Services |  |  |
|  | |  | Enhance network connectivity | WMO Member Services | CREWS, ITU | Network assessments conducted | Number of Members consistently accessing and using global and regional products for national forecasting |
|  | |  | Conduct IBF trainings for NMHS staff | WMO Services | SERCOM, UNEP, UNDP, development partners IDMP and APFM | IBF training for staff in all regions 2 training sessions per year in all WMO RAs | Number of Members producing/providing IBF (composite indicator) |
|  | |  | Evaluate capability to deliver accurate, timely, and spatially adequate forecasts for priority hazards | WMO Services | SERCOM, CREWS, development partners |  | Number of Members evaluating and assessing their performance |
|  | Outcome 4: Warnings produced and disseminated in an efficient and timely manner for each priority hazards | | | | | | |
| Output | | Scope | Activity areas | Responsible |  | Timeline | Indicators |
| Standards and procedures established for effective and inclusive warnings | | Global | Joint advocacy efforts to populate the Register of Alerting Authorities (RAA) | WMO, guided by SERCOM, in collaboration with ITU ( co owner of the register) | Development partners | 30 countries by the end of 2023  50 countries per year through 2025 | Number of Members with mandated agency in the RAA for all priority hazards |
| Develop and maintain CAP implementation guidance for all high-impact priority hydromet hazards | WMO Services | SERCOM | Guidance on issuing CAP messages for all high-impact priority hydromet hazards available by end 2024 | Currency of regulatory and non-regulatory guidance and publications for CAP messages |
|  | |  | Support the implementation of CAP warnings for all priority hazards | WMO Services | ITU, IFRC | CAP HelpDesk established end of 2023 | CAP HelpDesk |
| Set policy and standards to issue warnings for all high-impact priority and compound hydromet hazards | WMO Services | WMO Technical Commissions | Gap analysis on the existing WMO technical regulations and related guidance material on issuing warnings  (completed by mid-2023) | WMO SERCOM approval of newly developed policy and standards for issuing warnings for all high-impact priority and compound hydromet hazards |
| Develop and maintain guidance on issuing warnings for high-impact priority hydromet hazards | WMO Services | WMO Technical Commissions, RB | Guidance on issuing warnings for all high-impact hydromet hazards (available for all priority hazards by 2025) | Currency of regulatory and non-regulatory guidance and publications for issuing warnings for all high-impact hydromet hazards |
| Develop competency frameworks for warning dissemination for all priority hazards | WMO Services | WMO Technical Commissions, WMO Training Department | Competency framework for all priority hydromet hazards available | Number of Members reporting compliance with baseline international standards for priority hazard warning |
| Develop and maintain guidance on QMS for warnings of all priority hydromet hazards | WMO Services | WMO Technical Commissions, WMO Training Department | QMS guidance for all priority hydromet hazards available | Number of Members reporting compliance with QMS warning guidance |
| Regional products and capacities in place to support Members in issuing warnings | | Regional | Evaluate regional centres’ capability to deliver accurate, timely guidance products to assist National warning message preparation | WMO Services | FFGS/HydroSOS  RSMCs,  SERCOM, SC-HYD | All RC provide guidance products to warnings by 2025 | Evaluation |
| Conduct trainings for Regional Centres on issuing warning guidance in accordance with WMO policies and standards (including CAP) and maintaining QMS for warning messages for all priority hazards | WMO Services | RSMCs RTCs  FFGS/HydroSOS, TCP, SWFP |  | All RC meet minimum core capability requirements for issuing warnings |
| Increase exchange of regional knowledge and technical expertise in warning for priority hazards among Members | WMO Services | TCP, SWFP, RSMCs RTCs  FFGS/HydroSOS, TCP, SWFP, CIFI |  |  |
| Actionable impact-based warnings for all priority hazards produced | | National | Support the implementation of CAP warnings for all priority hazards | WMO Services | WMO regional coordinators | CAP FastTrack activities continue | Number of NMHSs active in publishing CAP formatted warnings |
|  | |  | Populate and maintain the registry of alerting authorities | WMO Services | Development partners | 30 countries by the end of 2023  50 countries per year through 2025 | Number of Members whose NMHS and other national alerting agencies authority are registered in the RAA |
|  | |  | Support that operational warning centres are maintained 24/7 by competent staff, according to national and international standards | WMO Services |  |  | Number of Members providing warnings 24/7 |
|  | |  | Conduct training on warning dissemination for priority hazards | WMO Services | ITU, UNDRR |  | Number of NMHS with standard alerting procedures in place |
|  | |  | Subject warnings systems to regular tests and exercises, including after-action reviews | WMO Services | WMO Technical Commissions, UNESCO | 30 countries by the end of 2024  50 countries per year through 2027 |  |
|  | |  | Support the production of Warnings and advisories to necessarily and appropriately cover the priority hazards | WMO Services | Development partners |  | Number of Members providing warnings for their priority hazards (incl. severe weather, heatwaves, drought, foods, flash floods, etc.) on SWIC |
|  | |  | Support the establishment and maintenance of warnings and forecast archival process and systems | WMO Services | Development partners |  |  |
|  | |  | Training on QMS for warnings of all priority hydromet hazards | WMO Services | Development partners |  | Number of Members implementing quality management system (QMS) for warnings |
|  | Outcome 5: Relevant policy, institutional mechanisms and stakeholder engagement processes are in place to support MHEWSs | | | | | | |
| Output | | Scope | Activity areas | Responsible |  | Timeline | Indicators |
| Coherent and coordinated MHEWS action supported | | Global | Convene Alliance for Hydromet Development meetings | WMO Member Services | Development partners | Annual high-level meetings aligned with other global events | Effective joint planning and implementation mechanisms with major partners and activities  Greater alignment of investments |
| Formalize partnership arrangements between specialized UN agencies to support agreements at the national level to support the exchange of exposure and vulnerability analysis as a basis for IBF | WMO | Specialized UN agencies | WHO, FAO | Develop technical guidance to strengthen data standards, leveraging hazard classification and catalogue, and disaster related statistics  Establish protocols to exchange socio-economic and sector specific data and develop standards and quality control measures to support impact-based forecasting |
| Regional | Co-convene regional disaster risk reduction meetings to facilitate stakeholder dialogue, share good practice in MHEWS and document user requirements in MHEWS | UNDRR and WMO | MS/RO  Ras/ development partners | Regional meetings held every other year | Establish/strengthen mechanisms for peer-to-peer learning and sharing of best practices in risk information production among countries |
| Establish mechanisms to support business continuity for EWS at regional and national levels | MS/RO | RAs/Regional Groupings | Supportive Agreements in place in agreas with limited warning capacity |  |
| Complement mapping of relevant national stakeholders and initiatives with regional stakeholders and initiatives for all priority hazards | WMO MS/RO | S, SI (RB, research programmes) | Regional contributions to stakeholder and initative mapping finalized end of 2023 |  |
|  | | National | Formal mechanism coordinating activities between NMS, NHS and National Disaster Management Organizations identified or established | WMO/UNDRR | Pillar partners, UNCTs | 30 countries by the end of 2023  50 countries per year through 2025 | *MHEWS coordination at the National level enhanced* |
| Partnership arrangements with national stakeholders holding exposure and vulnerability analysis formalized as a basis for IBF | WMO/UNDRR | UN specialized agencies |  | exposure and vulnerability data shared to support IBF |
| Establish mechanisms to support business continuity for EWS with regional centers | WMO/UNDRR | Pillar partners, UNCTs |  |  |
| Support the development of SOPs, including clear roles and responsibilities for MHEWS | WMO/UNDRR | Pillar partners, UNCTs |  |  |
| Mapping of relevant national stakeholders and initiatives for all priority hazards | WMO/UNDRR | Pillar partners, UNCTs |  |
| Enhanced national consultations/communication between forecasters and users | WMO/UNDRR | Pillar partners, UNCTs |  |  |