

**Call for Submissions from Baku Climate Conference 2024****Global Goal on Adaptation (GGA)****Submission from WMO****31 March 2025****Views on Matters Relating to the GGA**

In 2024, the World Meteorological Organization (WMO) submitted its perspectives on advancing the Global Goal on Adaptation (GGA) within the UAE–Belém Work Programme framework. The submissions in April and July 2024 emphasised the need for robust, science-based indicators to measure progress in climate adaptation, focusing on key areas such as water security, food resilience, cultural heritage protection, and climate services. The submissions proposed a series of indicators to track adaptation efforts across multiple sectors, ensuring that climate actions are data-driven and effective.

Purpose and rationale of the 2025 submission

Considering the proposed set of indicators for the GGA framework, the 2025 submission aims to respond to Decision FCCC/PA/CMA/2024/L.20, para 32, which calls for stronger indicators, metrics, and existing available methodologies to assess adaptation efforts, while also identifying capacity gaps and challenges, especially in developing countries.

This submission addresses the comments of the Expert Group reviewing indicators for tracking adaptation progress under the GGA which identified key gaps and challenges in measuring early warning systems and climate services. Particularly, the UNFCCC progress report (November 2024) identifies relevant indicators for multi-hazard early warning systems, climate information services, and systematic observation, and highlights key gaps including the lack of centralized tracking guidance systems or the lack of indicators needed to measure the establishment and accessibility of climate services for decision-making and their integration into risk assessments and National Adaptation Plans (NAPs).

This submission focuses on refining indicators to ensure they effectively track adaptation progress, particularly under target 10, which emphasizes climate information services, risk reduction, and systematic observation, focusing on existing, well-established, and authoritative metrics, methodologies, data-sources and tools for monitoring, measuring, and reporting on the following indicators.

Revised set of indicators proposed by WMO

Considering the aforementioned gaps, this submission suggests a set of indicators that address Paragraphs 9 and 10 of decision 2/CMA.5:

FCCC/PA/CMA/2023/L.18, para. 9

1. Enhancing Climate Resilience to Water-Related Hazards
2. Indicator on Climate Services for Agriculture

FCCC/PA/CMA/2023/L.18, para. 10

3. Indicator on Sustained Systematic Observation Readiness for Adaptation
4. Indicator on Established Multi-hazard Early Warning Systems
5. Indicator on Science-based Climate Hazard, Risk and Vulnerability Assessments
6. Indicator on Established Climate Services
7. Indicator on Investments for Climate Services Delivery

To enhance the effectiveness and accessibility of climate services and early warning systems (EWS), there is a focus on developing or refining targeted indicators that specifically measure the operational effectiveness and accessibility of these services, assessing how well these services are reaching and benefiting end-users. Secondly, efforts are being made to propose indicators that can evaluate adaptation outcomes rather than tracking general climate trends. This shift ensures that the indicators reflect real-world impacts, such as how well communities are adapting to climate change, rather than merely monitoring environmental changes.

Indicators under FCCC/PA/CMA/2023/L.18, para. 9**1. Enhancing Climate Resilience to Water-Related Hazards****Formulation**

"Percentage of population protected by water-related hazard monitoring and forecasting".

Potential sub-components of this indicator

- Level of countries' provision of impact forecasting and warning services.
- Hazard intensity compared to the severity of related impacts over time to measure the effectiveness of adaptation measures.

Relevance of the indicator

Protecting the population from water-related hazards depends on timely and effective monitoring, forecasting and warning services that allow people to prepare and respond to the hazards. Increasing access to Impact forecasting and warning services (IFWS) contributes to reducing the exposure and vulnerability of at-risk populations, thus playing a crucial role in climate change adaptation efforts and strengthening overall national resilience to climate-induced water-related hazards.

IFWS mean moving from what the weather will be to understanding what the weather will do. To provide impact forecasting and warning services, we must understand what kinds of impacts a hazard is causing.

How to establish the indicator

To produce impact forecasts and warnings, historical data on hazards and their impacts are regularly collected in an impact database. The impact data could include human impacts (such as lives lost, people missing or injured, and loss of livelihoods), economic impacts (such as agricultural loss, loss of productive assets and utilities, damaged and destroyed infrastructure), and service impacts (such as disruptions to transport, energy and water infrastructure). Most countries already have some level of impact data, even if they may not be collecting or utilizing it for IFWS purposes.

How to monitor the indicator

Because impact-based forecasting and warning services identify the sectors and vulnerable groups that are most impacted, the data would also provide information on the impact, specifically on these vulnerable groups and sectors, and the data would be applicable on multiple scales since impact data is often collected on a local level.

Methodologies used to provide impact-based forecasting and warning services (IBFWS) provide valuable insights to understanding the progress in climate-resilience and effectiveness of adaptation measures.

By comparing the impact of a hazard before and after the implementation of an adaptation measure (such as NBS and flood barriers), you can evaluate the effectiveness of that adaptation measure. Once sufficient data has been collected, this methodology can also be used to forecast the potential impacts of different adaptation measures, and it can support decision-making and planning. By verifying the forecasted impacts against actual impacts, the impact forecast can be continuously improved.

Countries could utilize their national impact data to report on the effectiveness of the adaptation measures. For example, if the number and intensity of hazards keep increasing, while the human, economic and service impacts decrease, the country must improve their climate-resilience and adaptation. This would not necessarily measure if adaptation measures have been implemented but whether the implemented measures have been effective in increasing climate resilience.

Methodologies used for impact-based forecasting and warning services could be applied not only to provide information on climate-resilient water supply and sanitation but also on agriculture, infrastructure, health and other sectors, whichever are deemed relevant.

Potential for aggregation and applicability of the indicator at national and subnational levels

Many countries are already working on developing and improving their impact forecasting and warning services. In fact, developing the countries' capabilities in IBFWS has been recognized as one of the priorities of the Early Warnings for All initiative. Although impact data may already be collected, some capacity gaps for countries to fully implement IBFWS remain. To address this gap, WMO is currently developing guidelines for countries to implement IBFWS for floods and droughts, which, for a number of countries, are among the most critical hazards.

Measuring and reporting countries' level of provision of impact-based forecasting and warning services could already be a useful indicator; however, developing towards reporting the hazard intensity/frequency against related impact data would provide more direct information on the progress and effectiveness of adaptation and resilience measures.

2. Indicator on Climate Services for Agriculture

Formulation

"Number or proportion of people (disaggregated by gender, indigenous status, disability status, age group) receiving tailored climate services for the agriculture sector, to inform agricultural resilience and adaptation actions."

Relevance of the indicator

In 2024, WMO suggested the inclusion of various indicators related to climate services in the agriculture sector.

Sub-indicators

- *No countries providing tailored climate services for the agriculture sector to inform agricultural resilience and adaptation actions.*
- *The level of use of climate forecasts by crop and livestock farmers*
- *The level of integration of climate services into agriculture-related policies, plans and investments.*
- *The benefits of the use of climate services for farmers (e.g. through increased or stabilized incomes, yields).*

How to establish/measure the indicator

It was noted that, most simply, information can be gathered at the national level through simple yes/no questions added to the Checklist for Climate Services Implementation to some of the above. Further details can be requested about the level of provision of these services (national to local level), timescales and types of services provided. For issues around use and usefulness of the services provided, surveys to users or analysis of available policies, plans and investments would need to be done. Aggregating relevant questions within ongoing surveys and methodologies, like the WMO Climate Services Checklist or the work of partners like FAO, would be ideal and aid with standardization.

FCCC/PA/CMA/2023/L.18, para. 10 - (a) Impact, vulnerability and risk assessment

3. Indicator on Sustained Systematic Observation Readiness for Adaptation

Formulation

"Basic weather and climate data are collected and internationally exchanged to underpin effective development and climate policy and implementation of adaptation responses".

Relevance of the indicator

Sustained Systematic Observation Readiness is an indicator jointly proposed by WMO and GCOS under the GGA to support the delivery of the Convention on Article 4: (Paragraph 1.g), "Promote and cooperate in scientific, technological, technical, socio-economic and other research, systematic observation and development of data archives related to the climate system [...]." The Paris Agreement (Article 7, Paragraph 7.c)

states, "Strengthening scientific knowledge on climate, including research, systematic observation of the climate system and early warning systems, in a manner that informs climate services and supports decision-making." An indicator on Systematic Observation Readiness for Adaptation is also in line with the GCOS Implementation Plan to address the observational gaps, in particular for what concerns the sustainability of the monitoring networks and the availability of long-term observations in global climate data repositories as fundamental prerequisites for successful climate change adaptation.

All weather forecasts and climate predictions depend on observational data from the current and past state of the earth. As weather and climate do not know boundaries, all forecasts beyond three days require data from across the globe.

Strengthening weather and climate-sustained observations, particularly in data-sparse regions, is vital for improving forecasts, early warning systems, and climate services, ultimately enhancing climate change adaptation efforts. The lack of such observations limits countries' capacity to inform climate adaptation plans and successively adapt to climate change and build resilience.

Well-maintained and upgraded observational networks systematically collecting both ongoing and historical observations can provide information for policy and decision-making to develop effective and robust local services.

How to establish the indicator

In 2021, the Extraordinary World Meteorological Congress established the Global Basic Observing Network (GBON), requiring all 193 WMO members (countries and territories) to generate and share essential surface-based observations. This landmark agreement mandates the generation and international exchange of essential surface-based observations to ensure a reliable supply of data for global Numerical Weather Prediction (NWP) centres, which support all WMO members with model products.

GBON sets key requirements for measuring the most important variables with sufficient spatial density and reporting them at sufficient temporal frequency. These essential surface-based observations cover atmospheric pressure, air temperature, humidity, horizontal wind, precipitation, and snow depth observed from surface land stations. For the upper-air station, it covers temperature, humidity and horizontal wind, with a vertical resolution of 100 m or higher.

How to monitor the indicator

GBON data must be transmitted internationally through the WMO Information System 2.0 (WIS 2.0). WIS 2.0, which replaced the Global Telecommunication System (GTS), is the WMO's data sharing framework, facilitating the sharing of increasing variety and volume of real-time data. SOFF support includes the implementation of WIS 2.0 to ensure that GBON data is received by global NWP centers and monitored through the WIGOS Data Quality Monitoring System (WDQMS).

Country compliance with GBON requirements is already monitored by WMO on a global level. Since 2024, WMO has assessed a country's or territory's GBON compliance and contribution to global data sharing through the WMO GBON Compliance App, which monitors and reports surface and upper-air station performance quarterly.

Concrete suggested measurements and sub-indicators:

- **Number of Global Basic Observing Network (GBON) compliant surface stations in a country.** This will be captured by the [WMO GBON Compliance App](#). A

station needs to have reported, as monitored by [WDQMS](#), at least 80% of expected observations on at least 80% of days during the quarter. And deducting from that, the measurement of the "GBON gap" indicates the difference between the target number of stations and the number of stations meeting the temporal reporting requirement.

- **Number of countries that are fully GBON compliant.** The GBON compliance app will indicate a country as GBON-compliant if it meets the GBON standard requirements (200 KM for surface land and 500 KM for upper-air stations), with each station reporting at least 80% on a quarterly basis according to the GBON temporal resolution.

Potential for aggregation and applicability of the indicator at global, national and subnational levels

As GBON is mandatory for all WMO members already. It is well established in the meteorological space. Including the relevance of basic weather and climate data collection and international exchange in national policies, particularly Adaptation Plans, would contribute to the first part of the meteorological value chain and inform better, science-based decision-making and policy design down the line.

4. Indicator on Established Multi-hazard Early Warning Systems

Formulation

"Number of Parties with Established Multi-hazard Early Warning Systems in place".

Relevance of the indicator

The GGA aims to enhance adaptive capacity, strengthen resilience, and reduce vulnerability to climate change. Early Warning Systems (EWS) play a critical role in achieving this goal by minimizing exposure and impacts, ultimately reducing climate-related losses and damages. A key indicator in the GGA framework is the number of countries with EWS in place, serving as a measure of global progress. However, beyond tracking coverage, it is essential to assess the effectiveness of these systems in driving adaptation and averting losses. This note outlines established methodologies for monitoring EWS coverage and highlights available complementary approaches for further assessing global progress on expanding EWS capabilities and coverage. It also underscores how these efforts support national adaptation planning and the operationalization of the GGA.

How to measure the indicator

The measurement of EWS coverage is anchored in internationally recognized frameworks and reporting mechanisms:

- Sendai Framework Monitor (SFM) Target G – Provides a standardized approach to tracking the number of countries with Early Warning Systems, ensuring consistency and long-term data availability.
- EW4All Theory of Change and Monitoring & Evaluation (M&E) Framework – Developed under the Early Warnings for All (EW4All) initiative, these tools, led by WMO and UNDRR with partners, define impact pathways and key indicators across the four MHEWS pillars and inter-pillar elements, including on number of countries reporting the existence of functioning EWS.

- EW4All Dashboard– Offers visual insights into global indicators, implementation metrics, and national measures of progress on EWS, helping identify gaps and opportunities for system strengthening. This dashboard aligns with the EW4All M&E framework and the SFM.
- Annual Multi-Hazard Early Warning Systems (MHEWS) Reporting – Conducted in collaboration with UNDRR to assess global progress and effectiveness of EWS implementation.
- Climate Risk and Early Warning Systems (CREWS) Monitoring, Evaluation, Accountability and Learning (MEAL) framework and Reporting – conducted on an annual basis with technical input from CREWS implementing partners, WMO, UNDRR and World Bank and soon with ITU and IFRC; aligned with the Sendai framework; key indicator aiming to quantify access to early warning; online results tracking being put in place.

How to monitor the indicator

Beyond counting the number of countries with EWS, WMO employs multiple methodologies and tools to assess global progress on expanding EWS capabilities and coverage, ensuring they contribute effectively to adaptation outcomes. These include:

- Pillar Assessments – Evaluating the four core components of EWS (risk knowledge, monitoring and forecasting, dissemination and communication, and response capability) to measure system performance. WMO focuses on pillar 2.
- Country Hydromet Diagnostics (CHD) – Conducting system-wide evaluations to assess hazard impacts, warning effectiveness, and response outcomes.
- Financing Tracking – Jointly with UNDRR, monitor investments in EWS to ensure resources are effectively allocated for long-term sustainability.
- Partnership Tracking – Utilizing a coordination and self-reporting platform to document regional partnerships working on common EWS objectives.
- Results Tracking in collaboration with CREWS – utilizing an online system to capture key data such as access to early warning, enabling governance for effective and sustainable early warning system, efficient delivery of early warning services and integration of people-centred and gender-responsive approaches.

Potential for aggregation and applicability of the indicator at global, national and subnational levels

For sustained progress, the GGA indicator on EWS must be integrated into national adaptation strategies, including NAPs, Nationally Determined Contributions (NDCs), and other policy frameworks. The EW4All initiative supports this effort by facilitating national roadmaps that align EWS implementation with broader adaptation planning, ensuring coherence and long-term impact. Achieving a robust measurement system requires a dynamic feedback loop, where global tracking informs national actions, and national progress contributes to global reporting. This coherence across processes will be critical in operationalizing the GGA and advancing adaptation efforts worldwide.

5. Indicator on Science-based Climate Hazard, Risk and Vulnerability Assessments

Formulation

"Number of national adaptation plans (NAPs) that integrate and reflect the best available weather, water and climate science information, by analysing and interpreting climate

science information for national, sub-national and sectoral adaptation policy, planning and investment."

Relevance of the indicator

Recalling that the Conference of the Parties, serving as the meeting of the Parties to the Paris Agreement (CMA), invited WMO, through its Global Framework for Climate Services (GFCS), to regularly inform the Subsidiary Body for Scientific and Technological Advice about its activities aimed at improving the availability and accessibility of comprehensive climate information, including observational data, and about how it facilitates the provision and dissemination of the most up-to-date climate model predictions and projections (Decision 11/CMA.1/III para 19).

Furthermore, the Global goal on adaptation, Decision 2/CMA.5, para. 10: Impact, vulnerability, and risk assessment: by 2030, all Parties have conducted up-to-date assessments of climate hazards, climate change impacts, and exposure to risks and vulnerabilities and have used the outcomes of these assessments to inform their formulation of national adaptation plans, policy instruments, and planning processes and/or strategies.

This indicator aims to measure (as worded at COP28):

1. Whether a country has conducted climate change vulnerability or risk assessments.
2. Whether these assessments have informed the formulation of national adaptation plans and policies.

How to establish the indicator

This is an outcome-oriented indicator to track the integration of climate science data and information into National Adaptation Plans (NAPs) and Nationally Determined Contributions (NDCs) and monitor whether and how climate science, data and information have informed the formulation of climate hazards, risk and vulnerability assessments, increasing resilience and adaptation.

How to measure the indicator

This indicator is underpinned by the WMO-GCF methodology for [Developing the Climate Science Information for Climate Action \(WMO-No. 1287\)](#), which describes a four-step methodology to integrate climate science information into policies, plans and investments, offering data sources, tools and associated technical resources for enhancing the climate science basis for NAPs and NDCs. The technical guidance on climate science information for climate action points to a variety of technical resources that support the formulation and implementation of climate action policies, plans and investments based on measurable climate indicators and indices.

The [Step-by-step Guidelines for Establishing a National Framework for Climate Services \(WMO-No. 1206\)](#) explains how to initiate and develop a functional NFCS that will serve as a key coordination mechanism to bring together the local, national, regional and global stakeholders needed for successful generation and delivery of co-designed and co-produced climate services with and for users, effectively linking climate knowledge with action on the ground at national and local levels.

To be measured and monitored, the indicator should track the number of NAPs including climate data and risk information. In order to assess that, the NAP should include the

following headings and categories for establishing a robust climate science foundation and these elements can be used as benchmarks to assess and measure the indicator.

A. Science-based climate data and risk information

- Climate model selection and methodology – Selecting appropriate climate models, scenarios, and analysis techniques to ensure accurate and policy-relevant projections.
- Historical climate analysis – Examining past climate trends (temperature, rainfall, sea-level rise, extreme events) to establish baselines and identify vulnerabilities.
- Extreme event analysis – Documenting historical and projected climate extremes such as heatwaves, tropical cyclones, droughts, and strong winds.
- Projected climate changes – Forecasting future climate risks, including temperature changes, precipitation shifts, and sea-level rise.
- Multi-hazard correlation – Assessing how climate variables interact with environmental factors like erosion, wildfires, and water scarcity.

B. Climate science application to key sectors

- Sector-specific risk analysis – Applying climate projections to critical sectors such as agriculture, water resources, urban planning, and public health.
- Adaptation and mitigation synergies – Identifying opportunities where adaptation actions can also support mitigation efforts.
- Scenario-based planning – Comparing different climate scenarios (e.g., SSP2-4.5, SSP1-2.6, SSP3-7.0) to assess policy implications.
- Disaster risk reduction and early warning – Integrating findings into national disaster preparedness strategies and early warning systems.

C. Data quality, homogeneity, and rescue

- Historical data inventory and assessment – Evaluating climate records for completeness, accuracy, and consistency.
- Use of complementary datasets – Supplementing station data with gridded datasets (e.g., CRU, ERA5) for improved spatial coverage.
- Climate variability and sectoral impact assessment – Linking climate trends to socioeconomic sectors such as food security, health, and migration.
- Climate data rescue and management – Identifying gaps in data collection and proposing actions for data recovery and preservation.

D. Interpretation for policy integration

- Risk prioritization and vulnerability assessment – Identifying high-risk areas, sectors, and communities to guide adaptation priorities.
- Stakeholder engagement and co-design – Collaborating with local, regional, and international experts to validate findings and ensure relevance.
- Data communication and accessibility – Translating scientific data into clear, actionable insights for policymakers using maps, graphs, and visual comparisons.
- Integration with national and global goals – Aligning findings with the country's national priorities, the Paris Agreement, and sectoral adaptation strategies.

These categories provide a structured approach to integrating climate science into climate policies such as NAPs and NDCs, ensuring that policy decisions are backed by robust data, risk assessments, and clear communication strategies.

How to monitor the indicator

The [Climate Services Dashboard](#) has been operational since 2022 and works in synergy with flagship WMO dashboards, including the EW4All Dashboard, which tracks the advancements in early warning systems; the WMO Hydrology Dashboard, which provides more insights into hydrological observation, forecasting, and governance of National Hydrological services; and the WMO Energy Dashboard, which provides insights in the integration of climate information into energy planning and decision-making. The Climate Services Dashboard is a key tool for monitoring whether countries have included climate science and risk information and for tracking the specific indicators on NAPs, NDCs and climate services, as requested by the Global Goal on Adaptation (GGA) Group of Experts.

The Climate Services Dashboard is based on the WMO Climate Services Checklist, which has been regularly completed by WMO Members since 2018 to assess their progress in implementing climate services and documenting associated socio-economic outcomes and benefits. This is done under the guidance of the WMO Governance structure and inter-governmental appointed experts, ET-CDC: Capacity Development for Climate Services.

Availability and implementation of NAPs

- Identifies which countries have developed NAPs and whether they include climate services for risk-informed decision-making.
- Assesses how climate information is incorporated into adaptation planning, ensuring alignment with national priorities.

Integration of climate science into NAPs

- Tracks how scientific climate data and risk information are used in adaptation strategies.
- Helps assess whether NAPs are based on observed climate trends and future projections, ensuring informed decision-making.

Potential for aggregation and applicability of the indicator at global, national and subnational levels

The indicator is based on the aggregation of scientific findings from global data sets and assessments of WMO and IPCC global processes and enriched by regional, national, and local data sets and assessments. As better data and information are made available through globally aggregated data sets and models, these can be enhanced by national and local data and processes and improve national and local decision-making, hereby generating a virtuous cycle of both local and global benefits for policy and action.

Sustainability

The data is collected from WMO Members and undergoes validation and audits conducted by WMO's Expert Team on Capacity Development for Climate Services, ensuring accuracy and reliability in alignment with the Roadmap on QMS. Additional validation is done through WMO Regional Offices, Working Groups on Climate Services, and Regional

Association Expert Teams on Climate Services. As this process does not require financial resources, the audits remain highly sustainable.

5. Indicator on Established Climate Services

Formulation

"Number of Countries with Established Climate Services".

Relevance of the indicator

This indicator quantitatively assesses the number of countries that have operational, quality-checked climate services that effectively support national policymaking, planning processes, and decision-making within climate-sensitive sectors (e.g., agriculture, water, health, energy, and disaster risk reduction). It further ensures alignment with broader climate policy objectives across various thematic areas within NAPs and NDCs.

[Global goal on adaptation, Decision 2/CMA.5](#): Impact, vulnerability, and risk assessment: by 2030, all Parties have conducted up-to-date assessments of climate hazards, climate change impacts, and exposure to risks and vulnerabilities and have used the outcomes of these assessments to inform their formulation of national adaptation plans, policy instruments, and planning processes and/or strategies, and by 2027 all Parties have established multi-hazard early warning systems, climate information services for risk reduction and systematic observation to support improved climate-related data, information, and services

Recalling that the Conference of the Parties, serving as the meeting of the Parties to the Paris Agreement (CMA), invited WMO, through its Global Framework for Climate Services (GFCs), to regularly report on the State of Climate Services with a view to "facilitating the development and application of methodologies for assessing adaptation needs" ([Decision 11/CMA.1, 2018](#)), as part of the Methodologies for assessing adaptation needs with a view to assisting developing countries without placing undue burden on them (Decision 11/CMA 1/III para 19).

How to establish the indicator

Underpinning Methodology

- WMO [Checklist for Climate Services Implementation](#): to self-assess progress concerning climate services implementation and identify areas where support is needed;
- WMO's [Resolution 1 \(EC-75\)](#) on the use of the climate services checklist as a basis for identifying capacity development priorities and needs by WMO Members;
- WMO's [Resolution 21 \(Cg-18\)](#) on regular assessments of service delivery at global, regional, and national scales and publishing "the State of climate services" regularly.

Data Availability

- Data is consistently updated every 2 years and currently covers 179 out of 193 WMO Member countries as of March 2025.
- The WMO [Climate Services Dashboard](#) updated annually is a tool under the auspices of the WMO Standing Committee on Climate Services of the Commission for Weather, Climate, Hydrological, Marine and Related Environmental Services and Applications (SERCOM), provides a measurable, transparent, and accessible tool to track global

progress and identify progress in climate services establishment as well as gaps requiring additional support.

How to monitor the indicator

Means of Verification

- The [Climate Services Dashboard](#): The dashboard has been in operation since 2022 and serves as a complement to other WMO dashboards, including EW4All, Hydrology, and Energy dashboards. It is built on the WMO Climate Services Checklist, which WMO Members have consistently filled out since 2018 to evaluate their progress in delivering climate services and recording related socio-economic impacts and benefits. This is done under the guidance of the WMO Governance structure and inter-governmental appointed experts, [ET-CDC: Expert Team on Capacity Development for Climate Services](#)
- Quality management audits: Conducted by WMO's Expert Team on Capacity Development for Climate Services to ensure accuracy and validity guided by the [Roadmap on QMS](#). Additional validation is also done through the WMO Regional Offices, WMO [Working Groups on Climate Services](#), and WMO [Regional Association Experts Teams on Climate services](#).

Potential for aggregation and applicability of the indicator at global, national and subnational levels

This indicator is relevant and applicable at global, regional, and national levels, providing flexibility to aggregate and adapt to various geographic scales of implementation and different sectoral needs. In particular, at the global level, it provides an overview of trends, gaps, and needs for climate services globally; within the regions, the indicator can further detail the regional status and how the region can pool resources to fill the regional gaps. At the national level, the indicator can provide baselines to feed into NAPs and NDCs development.

Sustainability

The data is gathered from WMO Members and verified through validation and audits by [WMO's Expert Team on Capacity Development for Climate Services](#) to ensure accuracy and reliability in line with the Roadmap on QMS. Additionally, WMO Regional Offices, Working Groups on Climate Services, and Regional Association Expert Teams on Climate Services conduct further verification. As this process does not require financial resources, the audits remain highly sustainable.

7. Indicator on Investments for Climate Services Delivery

Formulation

"Total financial investment mobilized for climate services delivery, across the hydro-meteorological (hydromet) systems value chain, by International Financing Institutions."

Relevance of the indicator

This indicator tracks global/regional/national trends in financial investment for climate services by monitoring:

- Investments across the climate services value chain, including observation and monitoring, user engagement, climate services information systems, capacity

development, governance, and monitoring and evaluation of socio-economic benefits of climate services.

How to establish the indicator

Means of Verification

The [Climate Services Dashboard](#): The climate services-related investments are extracted from the [Global Observatory for EWS Investments](#), an official WMO-UNDRR tool to track progress and investments in climate services and EWS across the value chain on a global scale.

The methodology is provided by the WMO-No. 1365 [The Role of National Meteorological and Hydrological Services \(NMHSs\) in Mobilizing Climate Finance](#) that guides National Meteorological and Hydrological Services (NMHSs) to integrate climate science into financial planning, ensuring that funding is directed toward evidence-based solutions.

How to monitor the indicator

Data Availability

- The main source is the Global Observatory for EWS Investments, which is tracked via WMO's Climate Services Dashboard and updated regularly to reflect new projects.
- [Climate Services Dashboard](#)

Launched in 2024, the upgraded [WMO Climate Services Dashboard](#) is a useful and informative tool to track and assess global climate service capacities. This interactive platform helps decision-makers, countries, and development partners by offering valuable insights into climate policy, service capacities, and investment trends. It helps align resources and strategies to enhance global climate action. This tool is developed under the guidance of the [SC-CLI](#) of SERCOM, and it is very sustainable since no additional financial needs are needed to maintain it.

This tool supports climate action by tracking progress against the [Global Goal on Adaptation](#) and enhancing climate services across sectors such as agriculture, health, energy, and other climate-sensitive sectors.

Potential for aggregation and applicability of the indicator at global, national and subnational levels

This indicator links effectively with the Indicator on the Number of Countries with Established Climate Services, facilitating an assessment of where investments are being targeted and evaluating the effectiveness of financial allocations. It further identifies financial gaps, providing valuable insights for directing future investments toward critical climate resilience and adaptation initiatives. This indicator is relevant and applicable at global, regional, and national levels, facilitating comprehensive and consistent tracking of climate services investments across different scales. It allows identifying geographical financing gaps and trends at the global and regional levels. At the national level, it can provide financing baselines for NAP and NDCs' further development.