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| WEATHER CLIMATE WATER | **World Meteorological Organization**  **COMMISSION FOR OBSERVATION, INFRASTRUCTURE AND INFORMATION SYSTEMS**  **Third Session** 15 to 19 April 2024, Geneva | **INFCOM-3/Doc. 8.5(3)** |
| Submitted by:  Chair of TT-Hydro  27.II.2024  **DRAFT 1** |

**AGENDA ITEM 8: TECHNICAL DECISIONS**

**AGENDA ITEM 8.5: Cross-systems**

# Recommendations of the TAsk Team Hydrology

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| **Summary** |
| **Document presented by:** Chair of TT-Hydrology  **Strategic objective 2024–2027:** 2.1, 2.2, 2.3  **Financial and administrative implications:** within the parameters of the Strategic and Operating Plans 2024–2027.  **Key implementers:** INFCOM  **Time frame:** 2024–2027  **Action expected:** review and adopt the proposed draft decision |

# DRAFT DECISION

## Draft Decision 8.5(3)/1 (INFCOM-3)

### Recommendations of the Task Team on Hydrology

THE COMMISSION FOR OBSERVATION, INFRASTRUCTURE AND INFORMATION SYSTEMS,

**Decides:**

(1) To take note of the final report of the Task Team on Hydrology (TT-Hydro) and its recommendations presented in [Annex 1](#Annex_1) to the present decision;

(2) To accept the recommendation to establish an Advisory Group on Hydrology with the terms of reference presented in [Annex 2](#Annex_2) to the present decision, which will be adopted as part of draft [Resolution 6.2/1 (INFCOM-3);](https://meetings.wmo.int/INFCOM-3/English/Forms/AllItems.aspx?RootFolder=%2FINFCOM%2D3%2FEnglish%2F1%2E%20DRAFTS%20FOR%20DISCUSSION&FolderCTID=0x0120004D58D6EBC5C7054898FF36E91D58C193&View=%7B84F6CC21%2D2DD6%2D403B%2DB16A%2D97A4B833DE2B%7D)

(3) To request the Management Group of the Commission and Standing Committees to implement relevant recommendations;

(4) To request the president of the Commission, in consultation with the president of the Commission for Weather, Climate, Hydrological, Marine and Related Environmental Services and Applications and the chair of the Hydrological Coordination Panel, to engage with stakeholders as needed in order to develop and implement relevant recommendations.

Annexes: 2

See [INFCOM-3/INF.  8.5(3)](https://meetings.wmo.int/INFCOM-3/InformationDocuments/Forms/AllItems.aspx) for the full report of TT-Hydro.

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Decision justification: The Task Team Hydrology (TT-Hydro) objective was to propose a new approach for dealing with hydrological activities within INFCOM, including overall coordination and better uptake by Members, and in particular their National Hydro-Meteorological Services (NHMSs).

## Annex 1 to draft Decision 8.5(3)/1 (INFCOM-3)

## Task Team on Hydrology

## Final report and recommendations

The Task Team on Hydrology (TT-Hydro) was established in Summer 2023 by the Management Group of the Commission for Observation, Infrastructure and Information Systems (INFCOM) with the objective to propose a new structure and approach on hydrological matters within INFCOM. This is in order to ensure the effective implementation of the infrastructure component of the WMO Plan of Action for Hydrology (Cg-Ext(2021)) in the context of the WMO Earth system approach.

TT-Hydro met virtually 4 times in September 2023, December 2023, and January 2024. The focus was set to different structure options around an Advisory Group for Hydrology, and additional recommendations related to the connections to other INFCOM activities. Due to a shortage of time, it was considered that the elements of the TT-Hydro ToRs that could not be addressed before INFCOM-3 would be considered after the session, taking into account the revised structure if adopted.

The main outcome is a full report under [INFCOM-3/INF. 8.5(3)](https://meetings.wmo.int/INFCOM-3/InformationDocuments/Forms/AllItems.aspx), and a list of key recommendations to be considered by INFCOM-3.

**Introduction**

TT-Hydro acknowledged that the world is changing dramatically: on the one hand, the geophysical dynamics of our planet; and on the other, there are new opportunities to improve the observational and modelling techniques to better predict future events. In addition, the manner and pace at which we are working to address WMO domain challenges are changing in response to increasing demands for reliable, free and timely data. This evolution, in turn, affects the roles of National Meteorological and Hydrological Services (NMHSs) and of WMO.

It is then more important than ever for INFCOM to support Members and guide them into this new era and stress the value of the Earth System (ES) Approach for all Members, across all scientific and disciplinary domains. WMO must be attentive to new opportunities to engage with any new data or science that can bring benefits to the public and WMO Members and consequently adapt current practices and priorities.

It is recognized that WMO fundamentally adheres to an ES-based vision in outlining future research and operational support for monitoring and prediction systems. The flow of water, carbon and energy through all ES components therefore requires that INFCOM must recognize and represent all major ES components, including atmosphere, ocean, sea ice, and land surface – *including* its hydrological components (e.g., surface water, snow, ice, soil moisture, groundwater), its major fluxes (e.g., runoff, discharge, sensible and latent heat, and evapotranspiration), and even its anthropogenic activities (e.g., reservoirs, groundwater extraction, trans-basin diversions). The hydrological ES components are often those that have the greatest impact and value to society, given their fundamental role in water and energy security, and extreme events such as floods and droughts.

At the same time, non-traditional sources and providers of ES information and services emerge (e.g., Artificial Intelligence, crowdsourcing, …). WMO should take into account these innovations in the areas of data collection, modelling, prediction, and product dissemination while developing Earth System observation and modelling infrastructure.

Last, but not least, TT-Hydro recalls that the most precious resources are time and energy of the people and volunteers who believe in WMO’s mission and look to it for guidance. WMO must use it wisely and efficiently and motivate participation by staying abreast of the cutting edge in ES science and practice.

Further, TT-Hydro identified and listed the main challenges and opportunities for INFCOM-Hydrology. Key points exposed in the INFCOM-3/INF. 8.5(3) document are summarized here.

**Challenges for INFCOM-HYDROLOGY**

* Different ways of working – INFCOM is to a high degree a successor of the former Commission for Basic Systems (CBS) (scope and expertise). It also continues CBS’s multiple task teams practice, while the former Commission for Hydrology (CHy) used to operate with a single Advisory Working Group that looked after the whole hydrological value chain. It creates challenges in harmonizing approaches.
* Cultural and sense of membership issues: currently all Standing Committee (SC) chairs are working for meteorology services, as are the majority of experts. Can INFCOM without any hesitation agree that any SC such as Earth System Modelling and Prediction (ESMP) might be chaired or co-chaired by experts representing different ES aspects, including hydrology, provided they have a qualifying knowledge of infrastructure considerations?
* Community division: Remaining "us and them" perceptions among different disciplinary communities may hamper collaboration and cohesion within INFCOM and other WMO bodies (e.g., the Commission for Weather, Climate, Hydrological, Marine and Related Environmental Services and Applications (SERCOM), the Research Board (RB).
* Lack of a thematic and ES component balance of SCs that may undermine a willingness for participation, and potentially hinder the achievement of collective goals.
* The reporting and approval chain for documents from a thematic sub-committee (e.g., the Joint Expert Team on Hydrological monitoring (JET-HYDMON) might be considered too long and complex; the fact that such documents are reviewed and cleared by bodies whose membership includes few hydrologists might be perceived negatively (internally and externally).
* Limited visibility and understanding of the representation of sub-disciplinary knowledge (e.g., land/hydrology, cryosphere) across WMO committees and boards. INFCOM is undertaking more work on land/hydrology objectives such as ES-based prediction, providing one example of the need for cross-WMO awareness of the scopes of different WMO units of activity.
* Distinct processes and practices between weather and hydrological data processing, modelling and forecasting (stemming from science versus engineering traditions) are a challenge for rapid consolidation. A recognition of different development pathways is required on all sides to agree on one future.

**Benefits from Hydrology domain expertise to INFCOM**

* Tackling hydrological topics can help with learning broader ES perspectives, and identifying new solutions to problems, and new application areas for existing solution.
* Hydrological expertise contributes to closing the natural cycles (energy, carbon, water) with critical, fit-for-purpose observation and modelling systems.
* Integrating the hydrological community brings key important stakeholders and users to the table, for a more effective use of meteorological and climate data and products. One single WMO community will improve joint delivery.

**Potential benefits from INFCOM to Hydrology**

* Existing tools/systems can be leveraged for the benefit of hydrology, finding ways to modify/apply existing coupled ES monitoring and prediction systems and practices to emphasise land/hydrology domains, concerns and objectives.
* Hydrology can articulate requirements for other Earth System components performance, outputs and information products, and vice-versa, shaping land/hydrology model development practices and priorities.
* Two-way communication between other ES component experts (atmosphere, ocean, cryosphere, other land components) to raise awareness about what is available from key coupled domains (e.g., meltwater into rivers (cryology-hydrology), freshwater flows into coastal areas (ocean-hydrology), soil moisture (biosphere, agriculture link to hydrology)), how and in what quality (including global and regional products), facilitating a faster uptake and leveraging of the latest Earth System advances and interoperability. Communication should demonstrate as well how meteorology and hydrology complement each other, particularly in developing countries.

Based on this analysis, TT-Hydro formulated how the final state of integration should be:

**Definition of final state**

Hydrology and land-related activities in INFCOM are visible from both inside (its requirements and its contribution) and outside (attracting hydrological participation). It is relevant, logically and physically framed within the ES approach, and actionable in delivering results.

In the long term, “no hats are recognized”: instead, there is a shared goal across disciplinary experts of INFCOM, and more broadly WMO, to deliver in observations, modelling and prediction of the Earth System to meet the needs of people.

**Enabling conditions and what to prevent**

* Terms of Reference of any coordinating body must

(a) Prevent additional overloading of key experts by yet another role/task;

(b) Be efficient and limited in size and scope;

(c) Reflect and respect the hydrological structure across other WMO bodies, but possibly benefit from existing coordination mechanisms.

* Complementarity of the Advisory Group on Hydrology (AG-Hydrology) and technical body(ies) with a mandate in hydrology (JET-HYDMON until 2024) to be established by INFCOM-3 must be ensured in order to keep both relevant and to avoid degrading one or the other or overlapping on each other’s role.
* Risk of conflicts of responsibilities between SCs and Advisory Groups in general (who decides?) has to be prevented in the Term of References (ToR).
* The solution should provide a direct link to hydrological expertise/requirements/needs to the management group/president/SC chairs.
* Prioritization of hydrological tasks within INFCOM should be considered to focus human resources on the most important ones in line with the WMO Plan of Action for Hydrology adopted by Cg-Ext(2021) and potentially use one “poster child” activity for promotion.
* Definition of indicators to assess the success of AG-Hydrology.

**What is needed to get to the final state (outcomes)**

* Fast (direct) link for hydro-coordination to Management Group of INFCOM (INFCOM MG) established.
* Co-design of all goals and activities of INFCOM by all communities (always) takes place.
* Enhanced (shared) understanding of the Earth System approach by meteorologists and hydrologists.
* Understanding and promotion of a hydrological presence in INFCOM activities helps attract participation from the community and improves outside visibility of the role of WMO in water-related issues.
* Easy mechanism, to establish and supervise the joint work of INFCOM and SERCOM on common issues (e.g., review of the Guide) in order not to prescribe a unique form of collaboration.
* Increased number of hydrologists involved in the work of INFCOM technical committees. [Balanced representation of ES components (atmosphere, ocean, cryosphere, other land components), as well as in different aspects of ES modelling (paleohydrology, historical, monitoring, prediction, projection].

Those general considerations led to a full list of possible recommendations listed in the information document with a view to being analysed after INFCOM-3. INFCOM is invited to adopt those listed below, being the most important ones.

**Key recommendations from TT-Hydro are summarized below:**

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| **#** | **Recommendation** | **Lead body** |
| 1 | To establish an Advisory Group on Hydrology. | INFCOM |
| 2 | To strengthen the co-design of its goals and activities with all communities, including building on requirements and outputs from the Regional Hydrological Advisers Fora, as requested by [Resolution 4 (Cg-Ext(2021))](https://library.wmo.int/idviewer/57850/36). | INFCOM MG |
| 3 | To prepare a WMO information/induction package on organization, acronyms, mapping of hydrological activities within INFCOM, and consider the communication and presentation of actions and activities with a view to attracting hydrological and other domains’ participation in its activities. | AG-Hydro |
| 4 | To encourage, through the Secretary-General, Permanent Representatives (PRs) in coordination with Hydrological Advisers to nominate more hydrological experts to the Expert Network and to participate in WMO events. | P/INFCOM |
| 5 | To nominate a sufficient number of hydrology experts at the SC level and ensure specific hydrological topics are tackled. Chair and co-chairs of SC to apply a broad interdisciplinary perspective in all aspects of SC work. | P/INFCOM, chair and co-chairs of SCs |
| 6 | To disband JET-HYDMON and to establish new or maintain the existing technical hydrological groups under all SCs. | INFCOM MG |
| 7 | To disband TT-Hydro, noting AG-Hydro will take care of related topics from now on. | INFCOM MG |
| 8 | To develop an approach to monitor and assess the performance and the degree of success of AG-Hydro and report back to INFCOM. | INFCOM MG |

## Annex 2 to Draft Decision 8.5(3)/1 (INFCOM-3)

## Terms of Reference of the Advisory Group on Hydrology

*[This will be adopted as part of the Annex to* [*draft Resolution 6.2/1 (INFCOM-3)*](https://meetings.wmo.int/INFCOM-3/English/Forms/AllItems.aspx?RootFolder=%2FINFCOM%2D3%2FEnglish%2F1%2E%20DRAFTS%20FOR%20DISCUSSION&FolderCTID=0x0120004D58D6EBC5C7054898FF36E91D58C193&View=%7B84F6CC21%2D2DD6%2D403B%2DB16A%2D97A4B833DE2B%7D)*]*

**Purpose**

Under the authority of the management group of the Commission, the Advisory Group on Hydrology (AG-Hydro) will provide oversight, coordination and monitoring of the *WMO Plan of Action for Hydrology*.

Specifically, AG-Hydro will focus on the integration of hydrological monitoring into the WMO Integrated Global Observing System (WIGOS) and the WMO Information System (WIS), and the utilization of hydrological data and products to the WMO Integrated Processing and Prediction System (WIPPS) towards a fully coupled hydrology in Earth System models.

AG-Hydro will function under the general terms of reference of advisory groups and:

(a) Act as the entry point for hydrological observing infrastructure, data and information systems and predictions, including advocacy for Earth System approach benefits and increased expert participation;

(b) Advise the management group on hydrological monitoring related matters by translating the needs from and for the hydrological community, gathered through the Hydrological Coordination Panel (HCP), into suggested activities of INFCOM bodies;

(c) Oversee, coordinate and monitor the implementation of the infrastructure aspect of the *Plan of Action*, in coordination with HCP;

(d) Advise the management group and standing committees on the optimal working structure and engagement of domain experts to address specific deliverables required by the *Plan of Action*, promoting the integration of observing systems, data exchange and management and prediction functions into WIGOS, WIS and WIPPS, while ensuring the necessary coordination within domain experts;

(e) Advise the management group and assist the vice-president representing the domain on engagement, through HCP, with the regional associations, the Services Commission, and relevant external partners to share information on requirements, workplans, and deliveries to preserve the value cycle in specific infrastructure components of the hydrological domain;

(f) Work with the Panel on Capacity Development of the Executive Council, through the Coordinator on Capacity Development, on capacity development including training.

**Composition**

AG-Hydro will comprise some 15 experts representing the relevant Expert Teams of all Standing Committees of the Commission.

AG-Hydro will be led by a Chair and a Vice-chair, who will be members of the management group of the Commission.

**Modalities of work**

Most of the work will be conducted by electronic correspondence and tele/video conference, with the possibility of holding face-to-face meetings when deemed appropriate by the Chairs and if resources are available.

**Deliverables**

Deliverables are aligned with the work programme of the Commission.

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