SAHF – Operational Hydrology

Related document(s): 1) ToR for the SAHF Hydrology Working Group

1 Introduction

1.1 The South Asia region is one of the world's fastest developing regions, characterized by a relatively young and growing population. However, it is also a region that remains vulnerable to natural hazards and climate change impacts which threaten lives, livelihoods, and critical infrastructure. These challenges put increasing pressure on the region's water resources in terms of the availability of water as well as the potential for severe hydrological hazards such as floods and droughts that are often transboundary in nature. Recent flood events such as the flash floods in Nepal (September 2024), the landslides in India (July 2024), and major floods in Bangladesh (August 2024), outline the need for coordinated action.

1.2 Several key initiatives such as the World Meteorological Organization (WMO) Flood Forecasting Initiative (FFI) including Flash Flood Guidance System (FFGS), WMO Global Hydrological Status and Outlook Systems (HydroSOS), World Hydrological Cycle Observing System (WHYCOS), WMO HydroHub, and WMO Hydrological Observing System (WHOS) as well as the WMO Regional Association II (Asia) and its working bodies enable the Members in the region to enhance their capacity in real-time monitoring, forecasting, and early warning of hydrological hazards and improved management of their water resources through informed decision making and enhanced risk management. Most recently, three SAHF countries (Bangladesh, Maldives, and Nepal) were identified to receive targeted support under the United Nations Early Warnings for All (EW4All) initiative. In their national EW4All Roadmaps, different types of floods as well as droughts are always among the top five hazards for which scaled up and sustained support is needed.

1.3 The SAHF Executive Council (EC) during its meeting in November 2023, endorsed the creation of a Working Group (WG) on Hydrology that would focus its effort on hydrological processes essential for addressing water-related challenges effectively. With the shared membership in SAHF and WMO, countries in South Asia should build on and leverage in particular the above-mentioned mechanisms and initiatives of WMO.

2 Discussion

2.1 Given the manifold challenges in South Asia, and not least with the recent geopolitical developments and the subsequent changes brought on within the climate and disaster risk reduction landscape, sub-regional mechanisms such as SAHF are essential to address challenges like floods, droughts and broader water resources management, complementing efforts of national and international partners.

2.2 The WMO FFI is a key activity established by WMO in 2003 to enhance flood forecasting and early warning capabilities. Its primary objective is to improve the capacity of meteorological and hydrological services to deliver accurate and timely flood forecasting products and warnings, while fostering collaboration with disaster management authorities involved in flood emergency preparedness and response. The initiative supports the implementation of end-to-end early warning systems by improving hydrological monitoring, modelling, and forecasting capabilities, particularly in countries and regions that are vulnerable to flood hazards.

2.3 The FFGS with Global Coverage is one of the FFI tools, jointly developed by WMO in collaboration with the U.S. Agency for International Development/Office of U.S. Bureau for Humanitarian Assistance (USAID/BHA), the U.S. National Oceanic and Atmospheric Administration/National Weather Service (NOAA) and the Hydrologic Research Center (HRC). FFGS, which is operationally used in over 72 Member countries globally, provides operational forecasters and disaster management agencies with real-time informational guidance products pertaining to the threat of small-scale flash flooding. The South Asia region has three FFGSs running, namely: (i) the South Asia Flash Flood Guidance System (SAsiaFFGS) with India as the Regional Centre and covering Bangladesh, Bhutan, Nepal and Sri Lanka; (ii) the Pakistan and Afghanistan Regional Flash Flood Guidance System (PARFFGS) with Pakistan as the Regional Centre and covering Afghanistan; and (iii) Myanmar FFGS which is a standalone system covering Myanmar. Given recent developments and discussions on the future of USAID, there is uncertainty surrounding the continuity of technical support for the FFGS provided to Member countries. While the three systems are expected to remain operational, there is a risk that technical issues may not be adequately addressed due to limited financial support for the technical development partner that is responsible for the ongoing maintenance and updates of the FFGS software. This poses a potential challenge for the region, which is highly susceptible to flash floods and landslides, particularly during the monsoon season, should the system become unavailable at a critical time. Considering this, WMO has been working on the development of

Flood Forecasting Framework (FFF) to explore other possible freely available and open source systems to address this gap. However, this calls for a collaborative effort, supported by WMO and the SAHF Secretariat, to explore and develop a complementary technical solution. Such a solution should aim to enhance the sustainability of the existing FFGS framework while offering Regional Centres and Member States the flexibility to implement updates and improvements as needed. The needed effort as above be considered as additional activity to be supported beyond the activities identified under CREWS SA.

2.4 HydroSOS, an initiative envisioned by the former WMO Commission for Hydrology (CHy) and approved by the 18th session of the World Meteorological Congress (Cg-18), provides an operational framework for WMO Members to assess the current status of their water resources and its likely near-future outlook (from sub-seasonal to seasonal timescales). As part of the implementation of HydroSOS, the WMO Regional Associations were tasked with developing regional HydroSOS implementation plans, which were endorsed during the 19th session of the World Meteorological Congress (Cg-19). For WMO RA II, the HydroSOS implementation was divided into four broad regions based on similar hydrogeological and climatological conditions, namely: (i) Central and West Asia region, (ii) South Asia region, (iii) Southeast Asia region and (iv) East Asia region. As part of the process, SAHF Member States were requested to nominate national HydroSOS focal points to lead the development of their respective national-level implementation plans. All Members, except for Afghanistan and Pakistan, nominated focal points who contributed to their respective national plans and the broader Regional HydroSOS Implementation Plan for WMO RA II. The RA II HydroSOS Implementation Plan, which encompasses the SAHF countries, highlights the critical need for enhanced collaboration among Members and relevant stakeholders. Key priorities include the systematic exchange of hydrological information and the establishment of a Regional Hydrological Outlook Forum. This forum would serve as a platform to convene hydrological experts from across the region, fostering dialogue on regional and transboundary hydrological outlooks while supporting capacity-development initiatives and promoting knowledge sharing within South Asia. The SAHF, through its WG on Hydrology, can further guide the development and implementation of HydroSOS at the sub-regional level and strengthen coordination among Members by promoting harmonized methodologies for hydrological status and outlooks, facilitating data exchange protocols, and supporting joint initiatives that enhance the region's capacity to monitor, assess, and respond to hydrological variability and change. SAHF will act as an interface between NMHSs and users of hydrological information to understand better what variables and indices are useful to report on for the different sectors. SAHF proposes to co-opt designated national focal points of HydroSOS to be made part of Hydrology WG.

2.5 WHYCOS is a flagship initiative of WMO supporting its Members in establishing a sustainable and effective hydrological monitoring system based on latest developments in terms of user requirement, network design and operation and maintenance plan. It is incorporating modern solutions through the WMO HydroHub, upscaling and standardizing innovative approaches in hydrological monitoring. WHYCOS is part of WMO's Earth System Approach and the WMO integrated Global Observing System.

2.6 WHOS is the data sharing and discovery system, a hydrological component of the new generation of the WMO Information System (WIS 2.0). It provides tools for the interoperable, multi-scale framework for sharing real-time and historical hydrological data, interconnecting heterogeneous data sources and downstream applications. Built on open standards together with the Open Geospatial Consortium (OGC) , WHOS enables seamless data registration, discovery, and access through a services-oriented architecture. WHOS is implemented at global, regional and national scales.

2.7 To increase effectiveness and ensure coherence with global and regional priorities, it is essential for SAHF to align its activities with the WMO Plan of Action for Hydrology and closely coordinate with WMO RA II, thereby strengthening the South Asia region's contribution to, and benefit from, the broader WMO hydrological agenda for the benefit of Members. Further, to enhance integration between the hydrological and meteorological communities, it is recommended that a dedicated hydrological representative be nominated at the regional (i.e. South Asia/SAHF) level. This representative would serve as a liaison, reporting to the SAHF EC on matters related to hydrology and water resources, and ensuring that hydrological priorities are effectively reflected in regional discussions and decision-making processes.

3 Actions required by The SAHF Executive Council

3.1 The SAHF EC is invited to:

a) Consider sustaining the capacities of SAHF Member Countries on flood forecasting and warning services.
b) Recognize the importance of strengthening the hydrological value chain and empower the SAHF WG on Hydrology to support this process.
c) Request Members to designate additional technical focal point(s) within the SAHF WG on Hydrology
d) Review and update the Terms of Reference (ToR) for the SAHF WG on Hydrology to ensure alignment with key regional and global initiatives
e) Consider appointing a dedicated hydrology representative to the SAHF EC who will advise the EC on regional matters pertaining to hydrology and water resources

f) Mobilize through the SAHF Secretariat and Member Countries, adequate technical, financial, and human resources to support the realization of hydrological activities detailed in sections 2.2 to 2.5, over and above needed support extended from WMO, WBG and FCDO for regional activities.

3.2 The SAHF EC is invited to consider, and adopt the following resolutions:

a) Endorses the adoption of appropriate actions to ensure the sustainability of flood forecasting and warning services in the region, including the exploration of technical and financial mechanisms to support continued maintenance, development, and capacity development.
b) Mandate the SAHF WG on Hydrology, the co-responsibility – together with WMO RA II – for guiding and supporting the implementation of initiatives such as HydroSOS, WHOS and others in the SAHF Members
c) Entrust the SAHF WG on Hydrology to ensure adequate representation of technical focal point(s) to liaise with relevant WMO technical bodies at global and regional levels, and to report back to the SAHF Executive Council on the progress of implementation.
d) Requests the revision of the ToR of the SAHF WG on Hydrology to ensure alignment with the WMO Plan of Action for Hydrology and the hydrological components of the WMO RA II Operating Plan.
e) Endorses the representation of a hydrological expert to the SAHF Executive Council as outlined in Annex –1 (Terms of Reference of Hydrological Representative to SAHF EC).
f) Mobilize the necessary technical, financial, and human resources—through the SAHF Secretariat, with support from the World Bank, WMO, and SAHF Members—to support the implementation of hydrological initiatives across SAHF Member countries.
g) Requests the SAHF to: a) review current and future ocean-atmospheric conditions and their repercussions on rainfall patterns in South Asia in order to generate a South Asian Climate Outlook (climatologists in coordination with RCC-Pune); b) participate in discussions on climate forcings in the region and discuss the results of climate forecast models to be used as input for a hydrological outlook (climatologists and hydrologists); and c) generate hydrological outlooks for basins selected by participating countries (hydrologists).
h) Establishment of a Regional Hydrological Outlook Forum with the guidance of WMO and other regional agencies.

Annex-1

Terms of Reference for Hydrological Representative to SAHF EC

The Chair and Vice-Chair of the SAHF Executive Council (EC) will be assisted by a Hydrological representative designated at the EC session, who should be a representative of a National Hydrological Service responsible for operational hydrology. The Hydrological representative for SAHF EC will have the following duties:

(i) Collaborate with the WMO Hydrological Advisers of SAHF Member countries, WMO Regional Hydrological Adviser for Regional Association II (Asia) (RA II), SAHF Working Group on Hydrology (HY WG) experts and others as needed,
(ii) Facilitate adequate representation of hydrological experts in the SAHF HY WG and other relevant WGs, as needed,
(iii) Advise the SAHF EC on matters of hydrology and water resources for the region,
(iv) Perform any other duties as entrusted by the SAHF EC.