Data for Water-Related Disaster Risk Reduction

An AGUASAN Learning Journey e-workshop

Thursday 13th July 2023 3pm CET

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Date: June 29th, 2023
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today

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If you want to speak or have a questions, click on the button at the bottom of the screen to open the mic

This event is being recorded. Plenary sessions may be shared online.

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If you have comments or questions during presentations, please post them in the chat, or wait for the Q&A moment

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INTRODUCTION

Amanda Loeffen - Human Right 2 Water

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Early Warning 4 ALL - Task Team on Implementation of Products from Non-traditional Sources in the GDPFS/WIPPS

Angelica Gutierrez, Lead Scientist - NOAA

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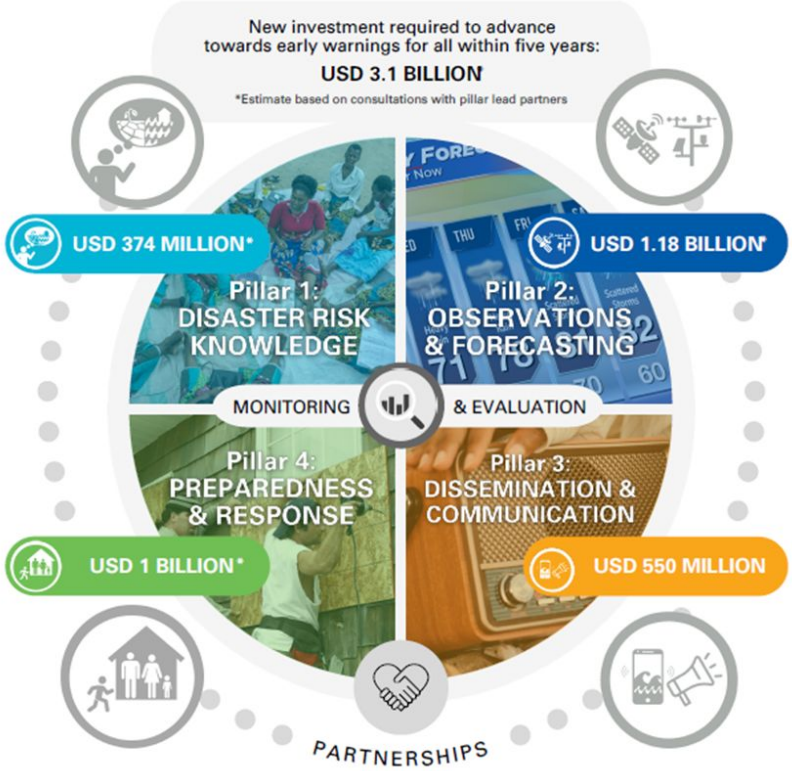
Early Warnings for All

The UN Global Early Warning Initiative for the Implementation of Climate Adaptation

> Today I announce the United Nations will spearhead new action to ensure every person on Earth is protected by early warning systems within five years. I have asked the World Meteorological Organization to lead this effort and to present an action plan at the next UN climate conference, later this year in Egypt.
>
> UN Secretary-General Antonio Guterres on World Meteorological Day 23 March 2022

EARLY WARNINGS FOR ALL (EW4A):

The UN Global Early Warning Initiative for the Implementation of Climate Adaptation



In March 2022, United Nations Secretary-General, António Guterres, announced the United Nations would spearhead new action to ensure every person on Earth is protected by early warning systems within five years. He tasked the World Meteorological Organization to lead this effort.

<u>Pillar Leads:</u>

Pillar 1: UNDRR

Pillar 2: WMO

Pillar 3: ITU

Pillar 4: IFRC

Key Action Areas for Pillar 2

1. Enhancing capacity to detect hazards

2. Close the observing gaps to meet the data needs for monitoring hazards (Estimated for 70 priority countries)

3. Enhance the existing framework and the capabilities of global data processing, forecasting, and analysis systems:

a. Expand the network of Regional Specialized Hydro-Meteorological Centres and the associated National Hydro-Meteorological Centres with at least 13 new centres (e.g Northern Africa, South America, Middle East, Caucasus, Eastern Europe, Oceania, Central Asia) to meet region specific needs, e.g. Severe Weather Forecasting, flood and flashflood forecasting, high resolution weather prediction, nowcasting, tropical cyclones, impact-based forecasting, tsunami, etc. Estimated funding requirement

4. Sustainable data and Information exchange infrastructure to support EWS

5. Optimize international efforts on observation, monitoring, and forecasting in support of EWS, as fostered by, for example, UNDP, UNEP, UNESCO. and upscale successful regional initiatives on sharing data and forecasting products

Main link to WIPPS

The WMO Integrated Processing and Prediction System (WIPPS) is a worldwide network of operational centres operated by WMO Members.

Task Team on Implementation of Products from Non-traditional Sources in the GDPFS/WIPPS (TT-NTS)

With a thematic focus on global riverine flood products:

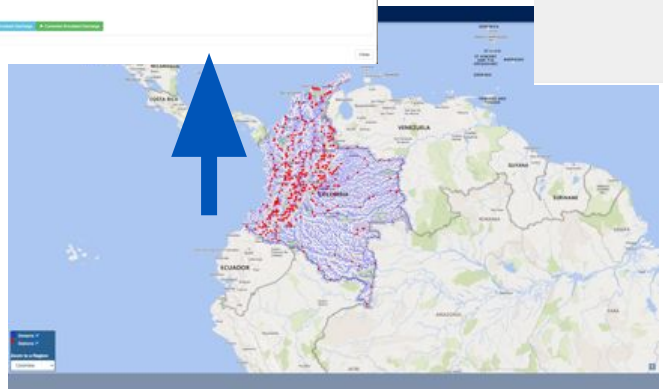
- Review, catalogue and assess the most relevant producers and products for global riverine flood forecasting
- Identify pathways for delivering global riverine flood pilot products in the context of EW4ALL
- Assess the WIPPS centre designation process regarding non-traditional (and hydrological) sources of riverine flood WIPPS products

Some of current publicly available operational global riverine flood forecasting systems.

Name (Acronym)	Host
CEMS Global Flood Awareness System (GloFAS)	JRC/ECMWF
Worldwide HYPE (WWHype)	SMHI (SWE)
GEOGloWS-ECMWF	GEO (USA-EU)
Google Flood Hub	Google (USA)
DHI Global hydrological model (DHI-GHM)	DHI, Denmark
ECMWF Land Surface Modelling System (ECLand)	ECMWF (Interational)

GEOGLOWS

GLOBAL WATER SUSTAINABILITY



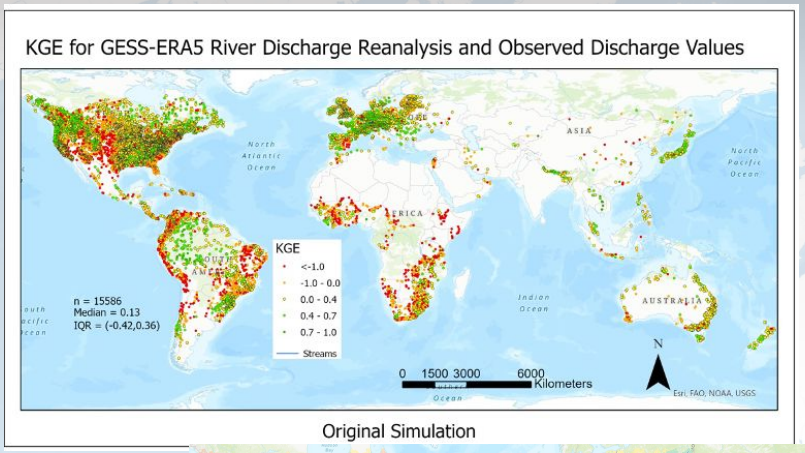
- Currently **used** in every region that is covered by the GEOGloWS river network, with over **16,500 hits/per day**, with 6 million average annual requests for streamflow forecast, **accessed through** the GEOGloWS ECMWF Streamflow Service **REST API.**

Temporal resolution of the streamflow forecast

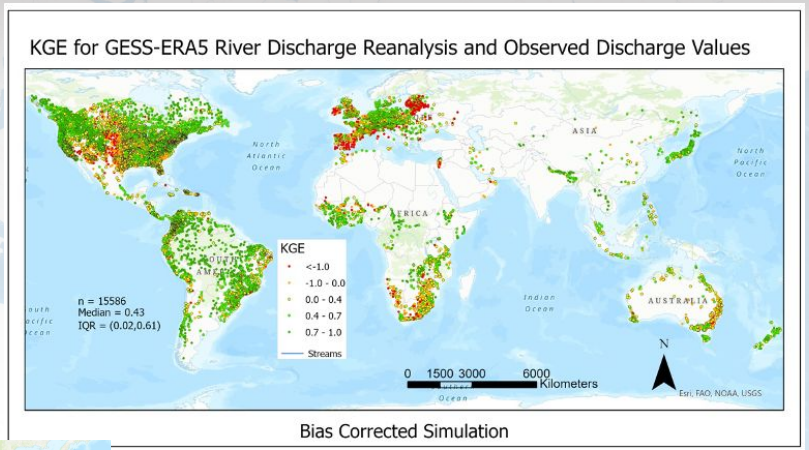
- The 51-member ensemble is 3 hours for the first six days and 6 hours through the end of the fifteen-day simulation. The high-resolution member is 1 hour for the first 90 hours and then follows the ensemble members for the remaining time steps out to ten days.

Validation and Local Adaptation - Bias Correction using local data

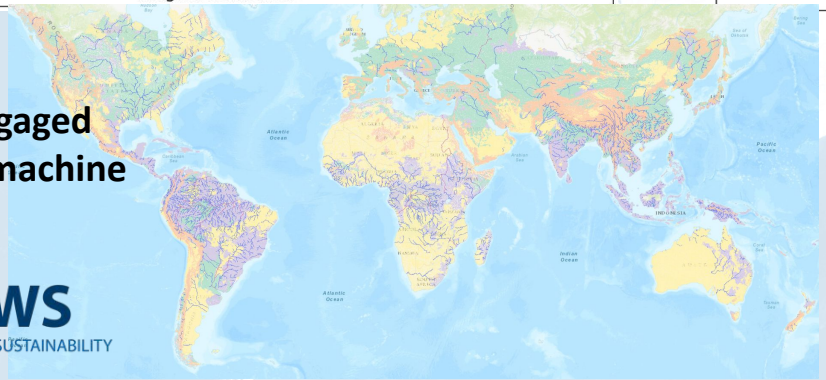
More than 12,000 in-situ stations used to bias correct



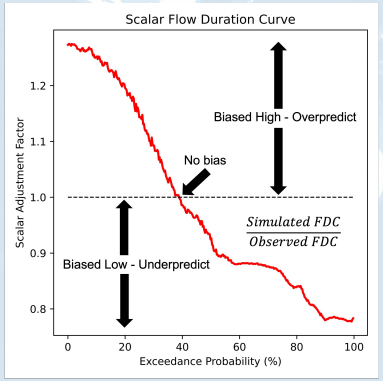
Original Simulation



Bias Corrected Simulation



Extended to ungaged rivers through machine learning



GEOGLOWS
GLOBAL WATER SUSTAINABILITY

Summary

- **Key Goal :** To contribute to the WMO EW4ALL effort and advance the implementation of the GEOGloWS Service to benefit underserved communities.
- **Implementations:** The Service is formally implemented through partner organizations such as SERVIR, World Bank projects, and private efforts from commercial entities and academic organizations.
- **Implementations: https://stories.geoglows.org/**
- **Impact:**
  a. Adopted as authoritative data by hydromet services in **Colombia, Ecuador, Peru, and the Dominican Republic.**
  b. Adopted as authoritative data by disaster organizations **in Malawi (DoDMA) and Brazil (CEMADEN), and Central America (CEPREDENAC).**
  c. Preparation for additional implementations in Africa (**Malawi, Tanzania, Kenya, Zimbawe, Zambia, Uganda, Lesotho, and Mozambique**)
  d. Over the next five years, the United States, including NOAA and the National Aeronautics and Space Administration (NASA), together with other partners will commit $2.0 million to enhance GEOGloWS service implementation in Africa.

GEO GROUP ON EARTH OBSERVATIONS

The GEOGloWS-ECMWF Streamflow Forecasting Service Partnership

Providing a service to deliver global water information for local decision-making

GEOGLOWS

GLOBAL WATER SUSTAINABILITY

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Hydrometeorological data to support in water-related decision-making

Igor Chernov, WMO HydroHub Project Officer

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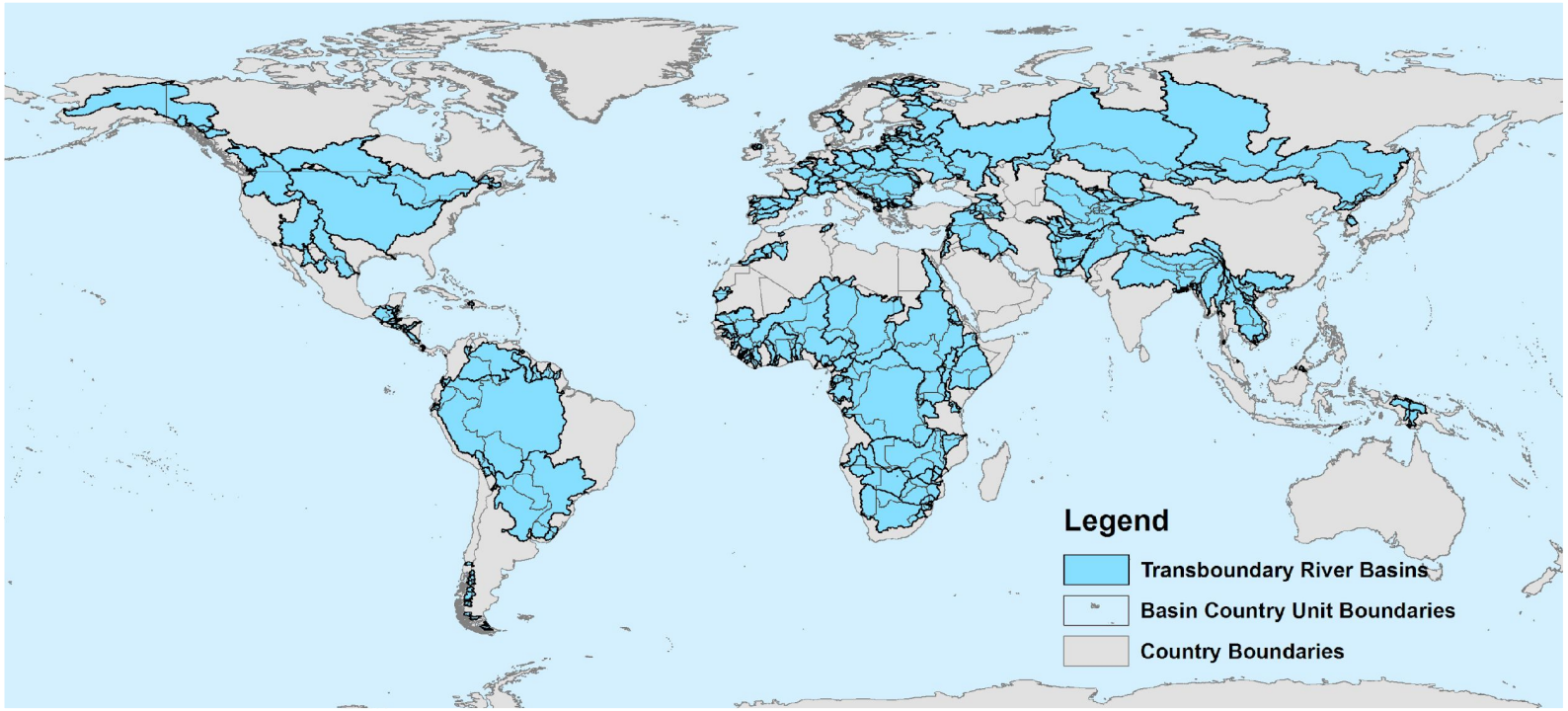
Interconnected nature of freshwater systems



286 transboundary basins

151 countries

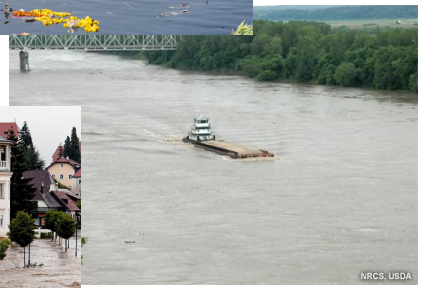
2.8 billion people

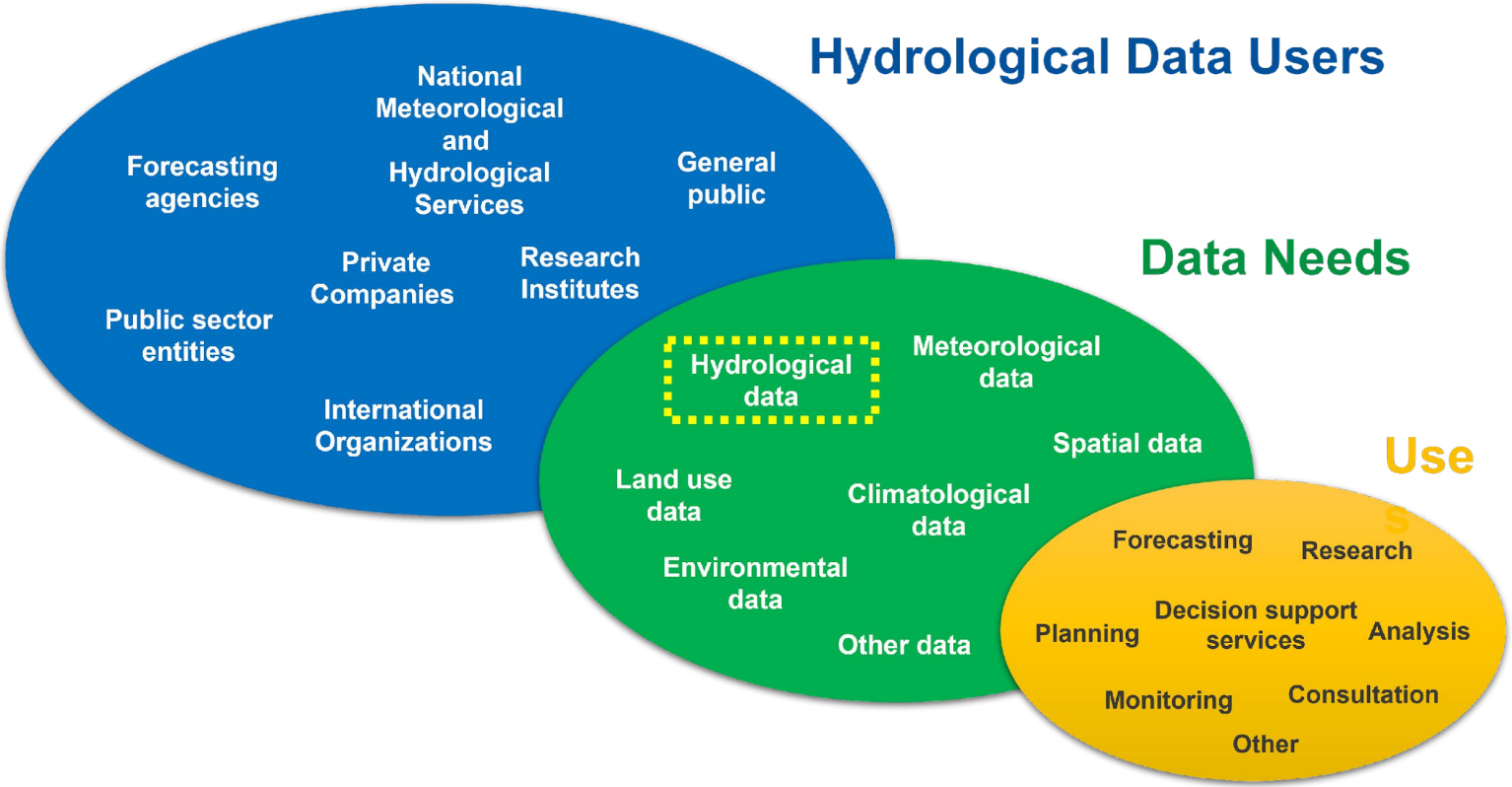
42% of the total Earth's land area

54% of global river discharge

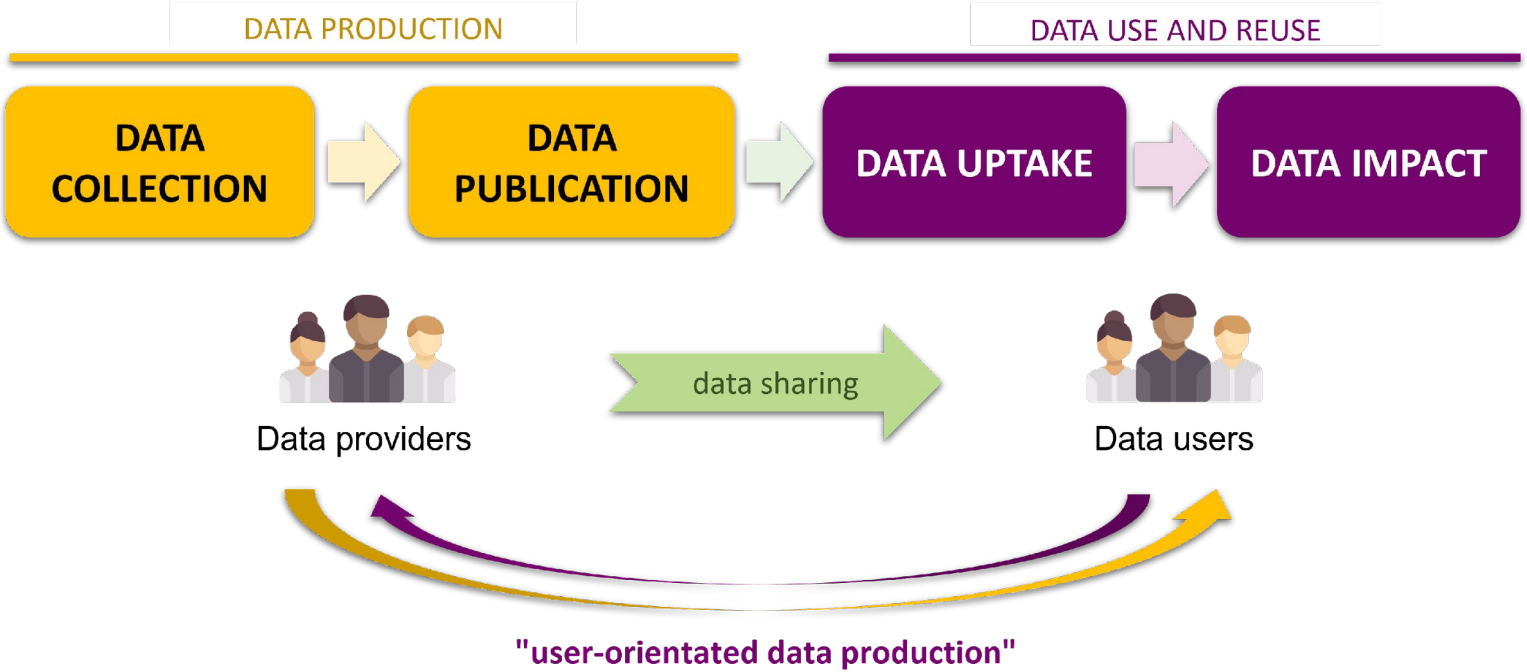
Critical water-related activities rely on hydrological data

- planning, designing, operating, and maintaining water management systems;
- protecting water quality and regulating pollutant discharges;
- managing water rights and transboundary water issues;
- preparing and distributing flood forecasts and warnings;
- monitoring and maintaining environmental flows;
- designing infrastructure;
- supporting navigation and commerce;
- education and research.




Hydrological Data Users
National Meteorological and Hydrological Services
Forecasting agencies
General public
Private Companies
Research Institutes
Public sector entities
International Organizations
Data Needs
Hydrological data
Meteorological data
Spatial data
Land use data
Climatological data
Environmental data
Other data
Use
s
Forecasting
Research
Decision support services
Planning
Analysis
Monitoring
Consultation
Other

Data value chain



Hydrological data: most wanted but often not available

WMO Global Hydrology Survey, 2020

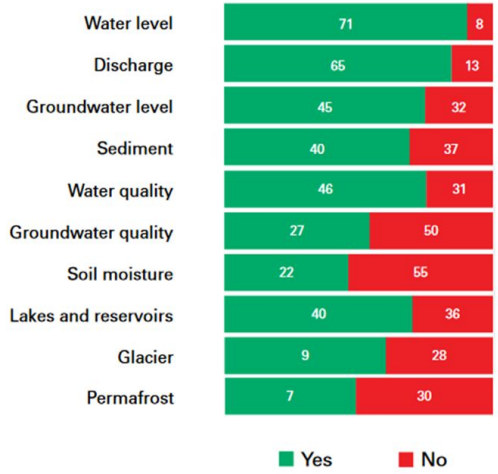
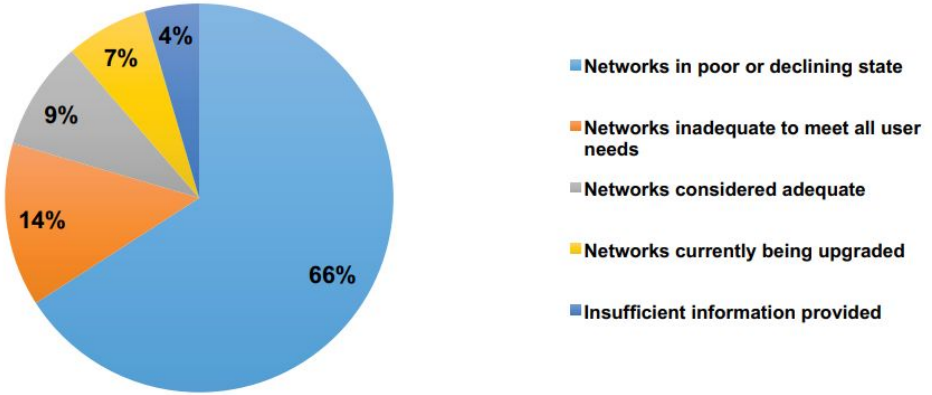


FIGURE 3 · **Status of Hydrometeorological Observation Networks in Developing Countries**



"Assessment of the State of Hydrological Services in Developing Countries" (The World Bank Group, 2018)

Available data often remain disperse and difficult to discover, access and reuse

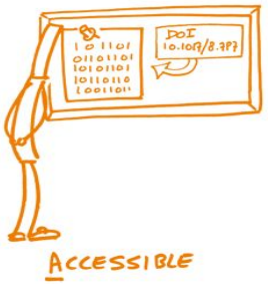
FORCE11
The Future of Research Communications and e-Scholarship

"FAIR" data principles

FAIR (Findable, Accessible, Interoperable and Reusable) Data

The data and the metadata should be easy to find online by both people and computers

The data should be easily combined and used with other data or tools



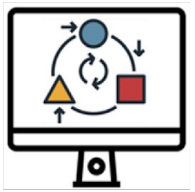
The data and associated metadata should be retrievable online using standardized communications protocols

The data should be well-described so that they can be replicated and used in different settings

WMO Hydrological Observing System (WHOS)

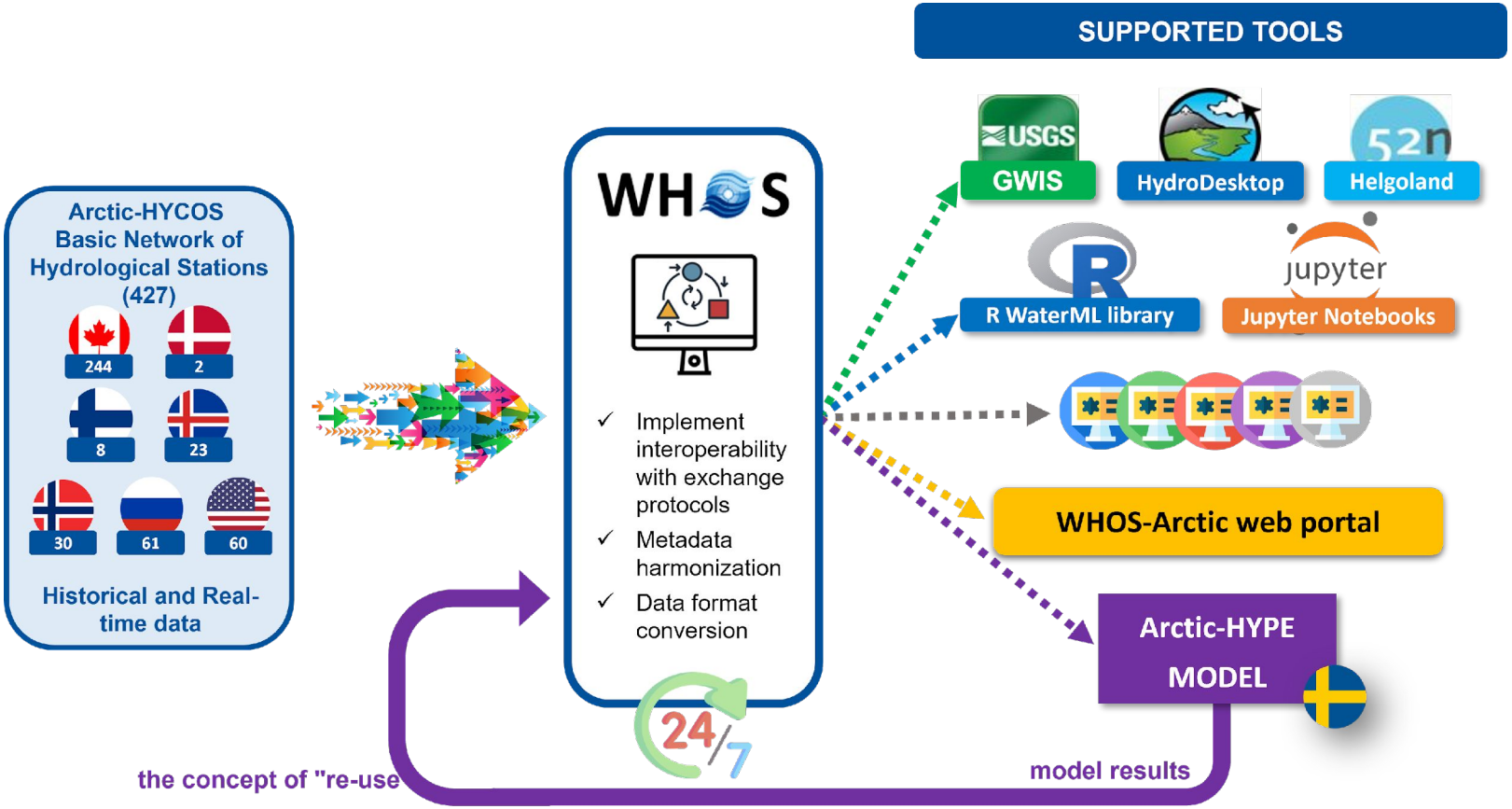
Standardization approach
is key in making data more findable, accessible, interoperable and reusable

compatible
and
complementary

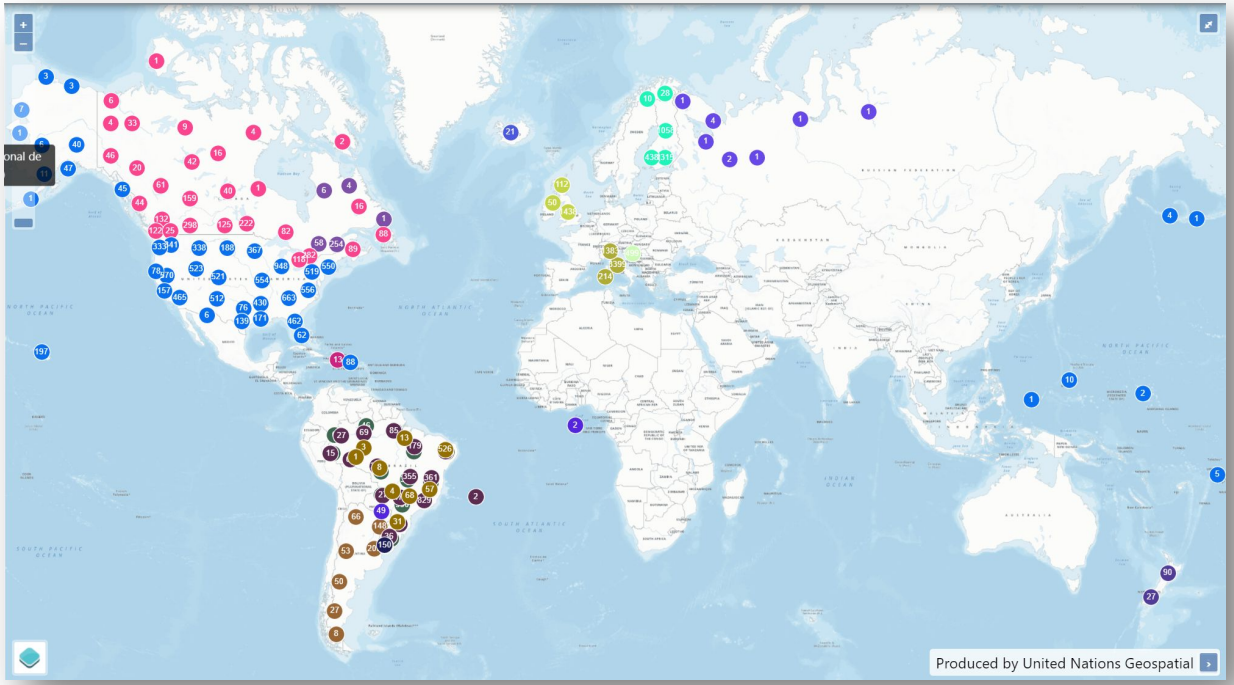


Brokering approach
addresses technological, data and format layers of interoperability

WHOS-Arctic implementation



WHOS Global Portal and web services



https://community.wmo.int/en/activity-areas/wmo-hydrological-observing-system-whos

Earth Systems Data Exchange

WHOS (Hydrology)

Climate

Cryosphere

Ocean

Weather

WHOS as Hydrology Component of WIS 2.0

WIS 2.0

Framework enabling interoperability and unified data sharing

Data for Water-Related Disaster Risk Reduction

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DATA for better decision-making to increase Resilience in Water Management PPP project implementation

David Baxter & David Dodd - ISRC

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Too Much, and Not Enough

- Flooding and drought now occurring simultaneously
  - U.S. Examples—California and Louisiana
  - Worldwide
  - 10 Across Initiative--Florida to California--Innovations in Water Management (https://10across.com/)
- Challenge: Using Data to Produce Scientifically-Based Measurement of Impacts, then comparing impacts without, then with, resilience investment
  - Agent-based modeling allows an infinite # of scenarios
  - Comparing impacts can lead to better water management decisions that reduce disaster risk

How Agent-Based Modeling Works

- The Agent-Based modeling structure allows for multiple factors, termed agents, to be entered thus creating the opportunity for an infinite number of "what if" scenarios for better decisions in reducing disaster risk
- The model uses both historical data and projections for future risk, based on credible sources such as the UN Conference of the Parties, or COP, and the UN Disaster Risk Reduction Unit.
- It also incorporates socioeconomic and GIS-based special data, providing a 360-degree view of risk from multiple types of disaster in multiple sizes and intensities.

Example: Modelling Floods

2013Calgary, Canada

Modeling the impacts of floods requires a combination of hydrology—the movement, distribution, and management of water; such as the impacts of rivers not being maintained thereby decreasing its capacity to move water; and hydraulics--the study of what conveyance of water through pipes or channels (such as a river or canal) affects it—such as the impacts of a large amount of water going through a pipe culvert not designed to handle that much flow, such as overflow and increasing pressure as the water comes out. Both of these must be considered to accurately model flood impacts.

Financial and Social Impact Analysis

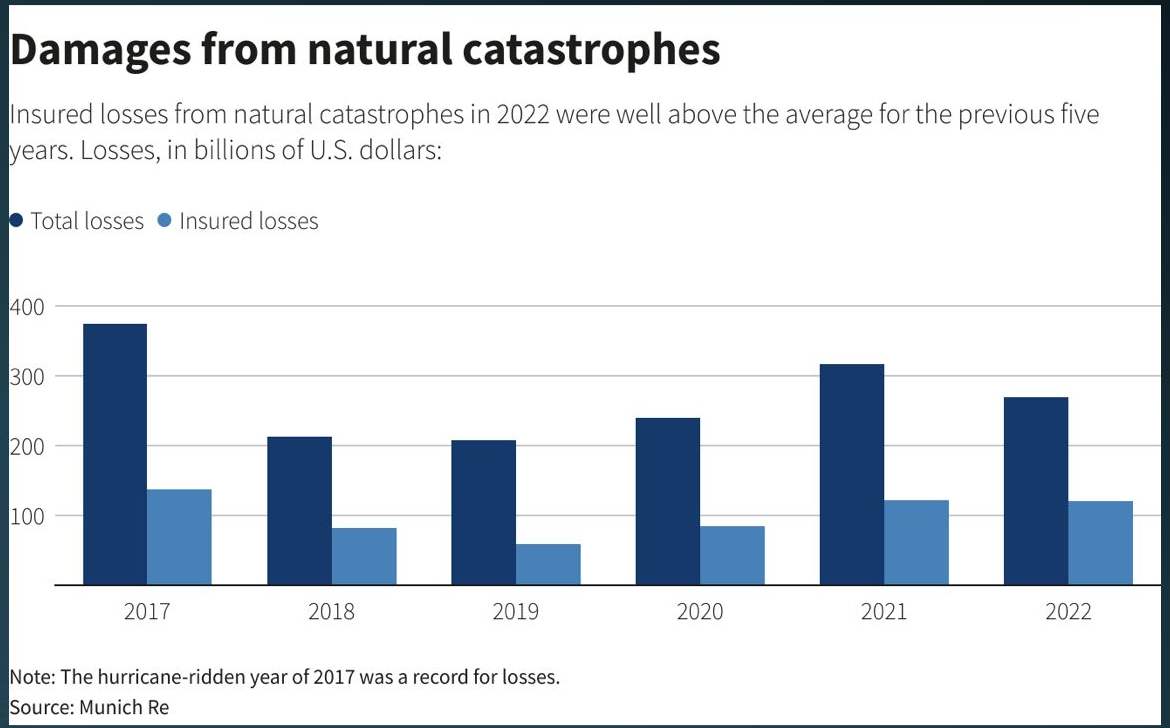
Resilience

- Compare scenario results with and without resilience investments
- Calculate a return on investment based on reduction in damages
- Utilize ISRC's economic impact model for both scenarios for a total
- Using ISRC's Environmental, Social, and Societal impact tool, calculate reduction in environmental, social/, and societal impacts
- Estimate cost of the resilience enhancement used in the model
- Present the results to public and private project sponsors to justify additional investment in resilience

Insurance: Of Critical Importance

--Insurance losses continue to mount, and many insurers are moving out of vulnerable areas—which are growing exponentially—insured losses were $120 Billion in 2022

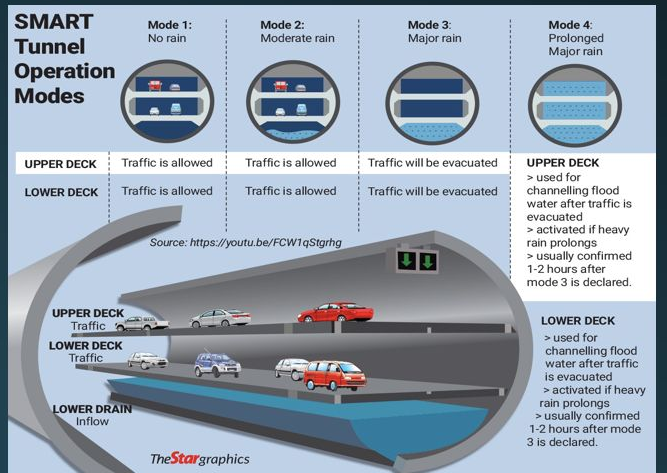
--The cost of reinsurance, to cover insurance payouts, has risen 41% over the past two years-passed to policy holders, negating many otherwise viable PPPs



Successful Examples of Public Private Partnerships for Water Management

- **UK--Broadland Flood Alleviation**
- $225 million, 20-year contract to rebuild and maintain flood defenses
- Roles of private partner include maintenance, emergency response, design and monitoring
- http://www.halcrow.com/Our-projects/Project-details/Broadland-Flood-Alleviation-Scheme-England/

- **Malaysia SMART (Stormwater Management and Road Tunnel)**
- 6-mile storm drainage and road structure in Kuala Lumpur; mitigates flash flood problem while reducing traffic congestion
- https://en.wikipedia.org/wiki/SMART_Tunnel



Thank You!
For More Information:

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David Baxter, Senior PPP Advisor

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AGUASAN learning journey next steps

Samira Keller, Skat Consulting

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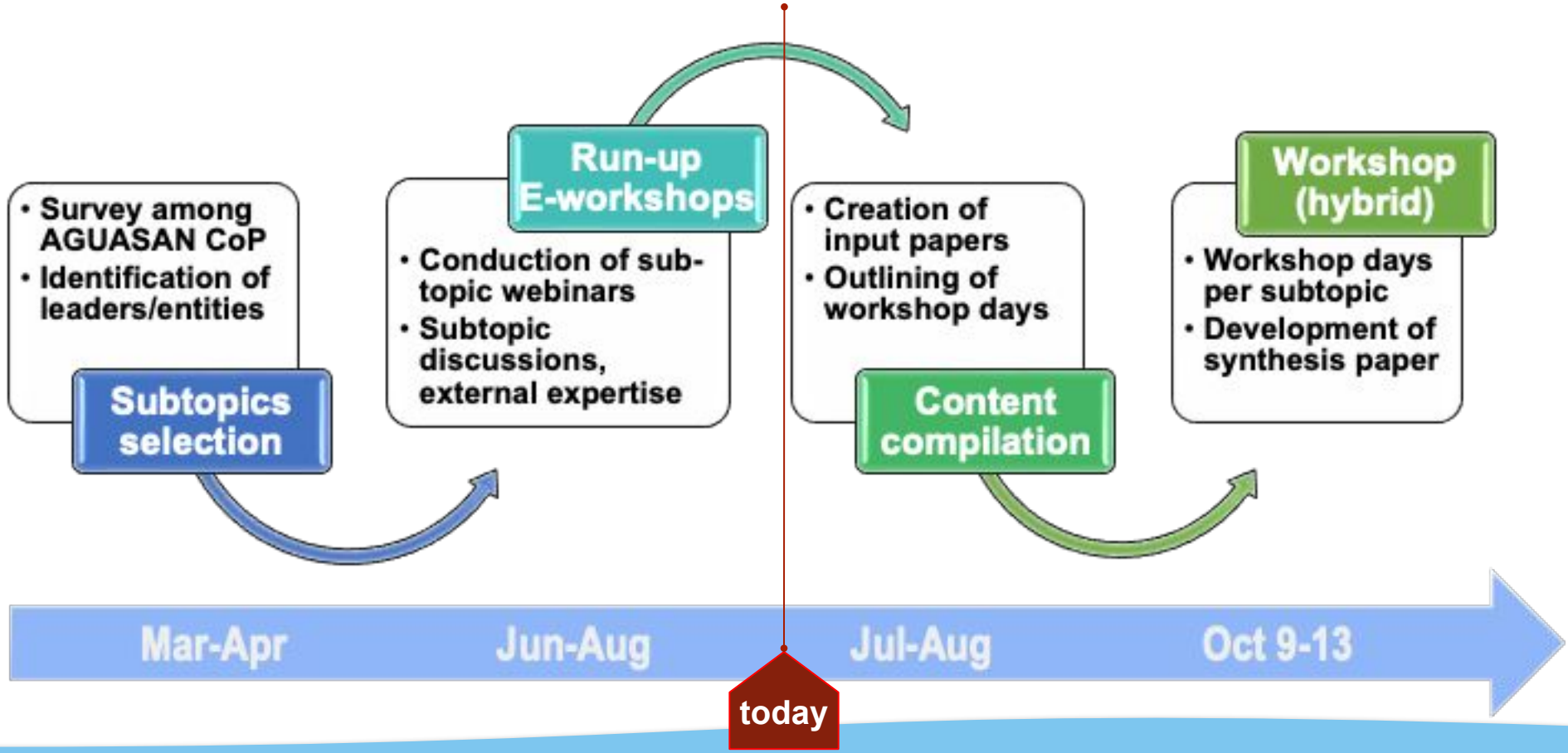
• Survey among AGUASAN CoP
• Identification of leaders/entities
Subtopics selection
Run-up E-workshops
• Conduction of sub-topic webinars
• Subtopic discussions, external expertise
• Creation of input papers
• Outlining of workshop days
Content compilation
Workshop (hybrid)
• Workshop days per subtopic
• Development of synthesis paper
Mar-Apr
Jun-Aug
Jul-Aug
Oct 9-13
today

ANNOUNCEMENT - 37TH AGUASAN WORKSHOP (2023)

Digitalisation and Data Management in the Water Sector

Using data for action and for impact

MARTIGNY, SWITZERLAND, 9 – 13 October 2023

All information to be found on aguasan.ch: https://aguasan.ch/JpiDknm6KuHnJMg4KJ8W

AGUASAN Workshop, 9-13 October 2023

Face-to-face in Martigny, Switzerland. With selected hybrid sessions

1) Citizen Science & Digitalisation for Water Quality
2) Digitalisation in Rural & Small Town Water Services
3) Data for Water Disaster Risk Reduction

And…

- Artificial Intelligence in Water Resource Mgmt/Services
- Data Mgmt/Security/Misuse
- Digitalised Responses to Disasters/Extreme Events

Applications are open until 30 July

- **Apply** to participate at the AGUASAN Workshop 2023 online
- **Selection** by Steering Committee
- **Why?** 40 participants, face2face exchange, in-depth learning, synthesis for daily work in various organisations
- https://www.surveymonkey.com/r/aguasan-workshop-2023

Group Picture
Breakout Groups

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