South-Caucasus EW4All Event

WMO activities to support flood forecasting

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World Meteorological Organization
Organisation météorologique mondiale

WEATHER CLIMATE WATER
TEMPS CLIMAT EAU

Disasters in Numbers
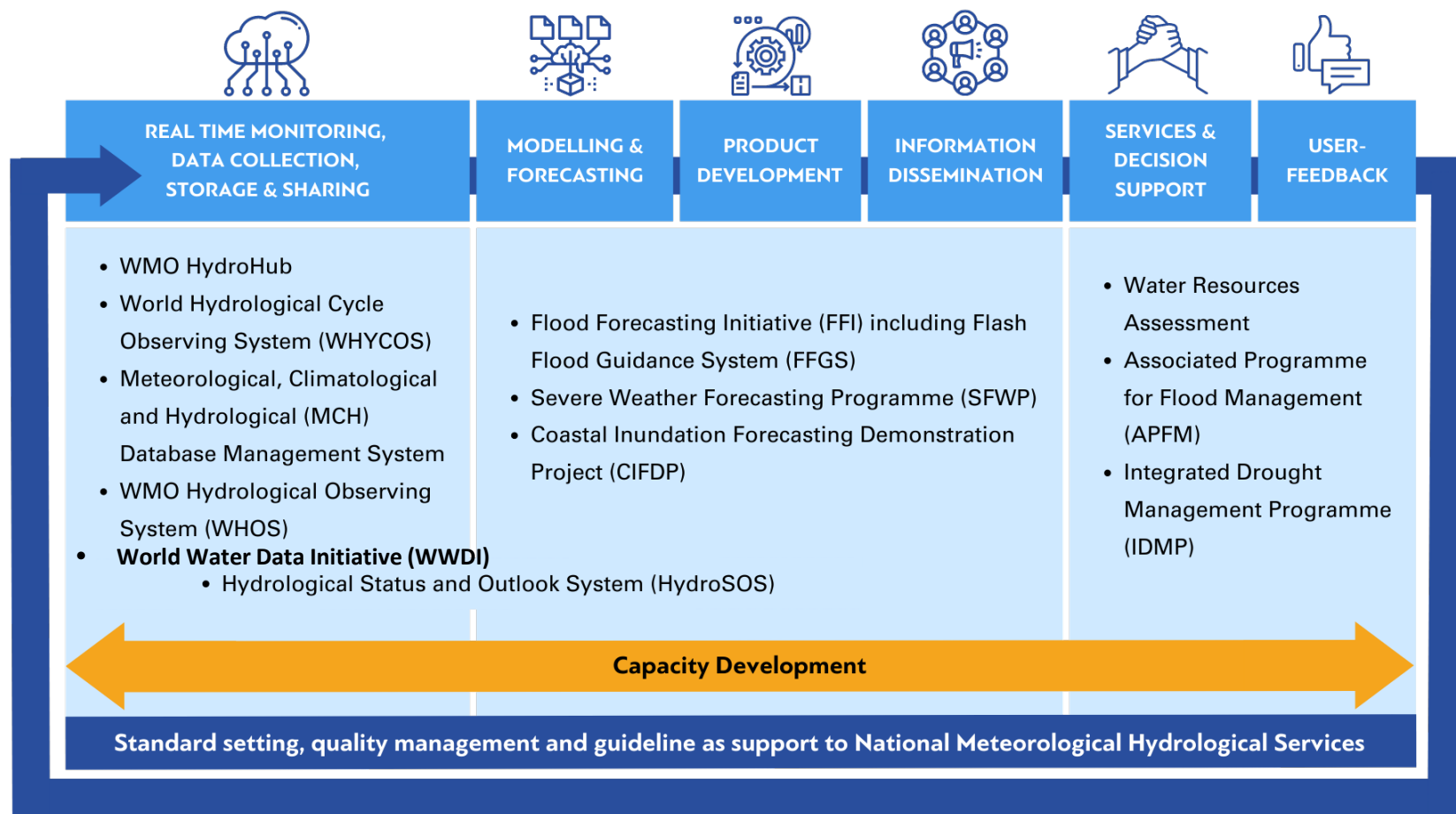

Source: UNDRR — UN Office for Disaster Risk Reduction
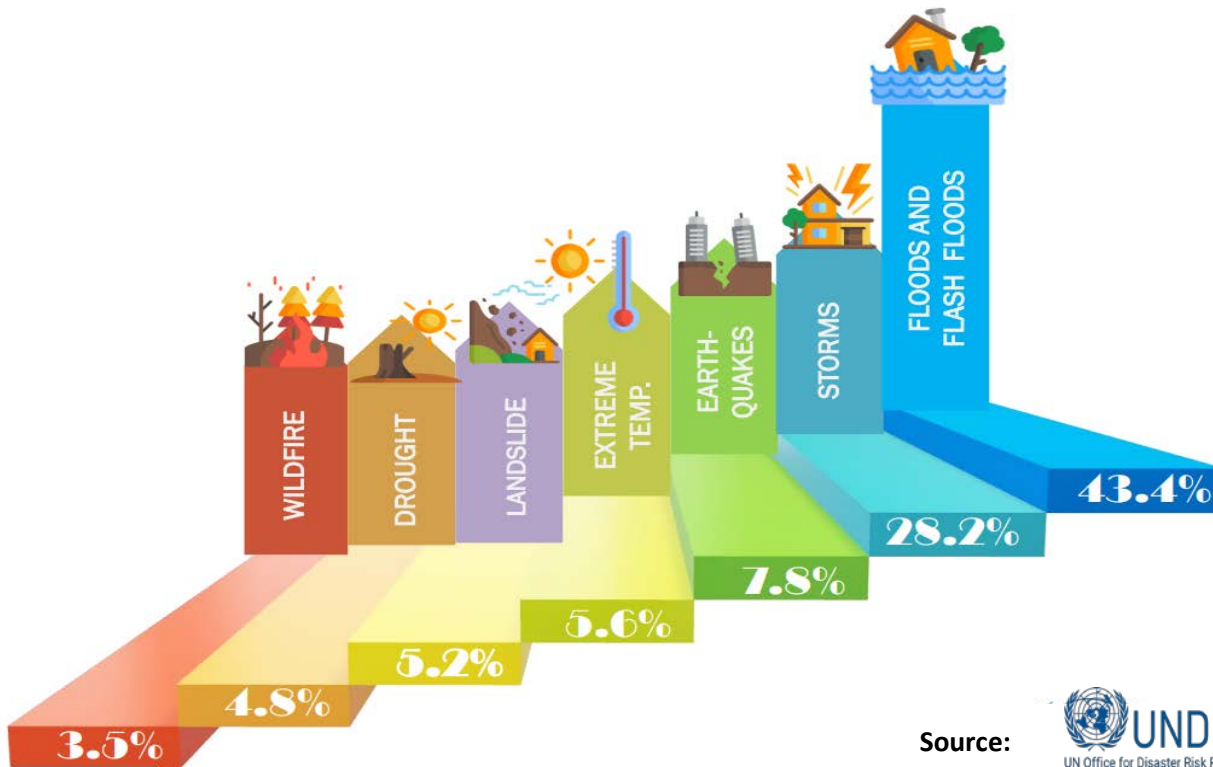
- Between 2000 to 2019 – Over 7000 major recorded disasters

- Millions of lives lost, and billions affected

- US$ 2.97 trillion in global economic losses

- Floods and droughts together account for nearly half of all the disasters worldwide

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Value Chain from Data to Decision-Making WMO Hydro related Initiatives

REAL TIME MONITORING, DATA COLLECTION, STORAGE & SHARING	MODELLING & FORECASTING	PRODUCT DEVELOPMENT	INFORMATION DISSEMINATION	SERVICES & DECISION SUPPORT	USER-FEEDBACK

- WMO HydroHub
- World Hydrological Cycle Observing System (WHYCOS)
- Meteorological, Climatological and Hydrological (MCH) Database Management System
- WMO Hydrological Observing System (WHOS)
- **World Water Data Initiative (WWDI)**
  - Hydrological Status and Outlook System (HydroSOS)

- Flood Forecasting Initiative (FFI) including Flash Flood Guidance System (FFGS)
- Severe Weather Forecasting Programme (SFWP)
- Coastal Inundation Forecasting Demonstration Project (CIFDP)

- Water Resources Assessment
- Associated Programme for Flood Management (APFM)
- Integrated Drought Management Programme (IDMP)

Capacity Development

Standard setting, quality management and guideline as support to National Meteorological Hydrological Services

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WMO – Long Term Ambitions in Hydrology

1. No one is surprised by a flood;

2. Everyone is prepared for drought;

3. Hydro-climate and meteorological data support the food security agenda;

4. High-quality data supports science;

5. Science provides a sound basis for operational hydrology;

6. We have a thorough knowledge of the water resources of our world;

7. Sustainable development is supported by information covering the full hydrological cycle;

8. Water quality is known

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Snapshot of Hydrology Initiatives

- **[Quality Management Framework](#)**

- **Assessment of the performance of flow measurement instruments and techniques**

- **[The Global Hydrometry Support Facility (HydroHub)](#)**

- **Hydrological data operations and management**: [WMO Hydrological Observing System (WHOS)](#)

WMO HydroHub

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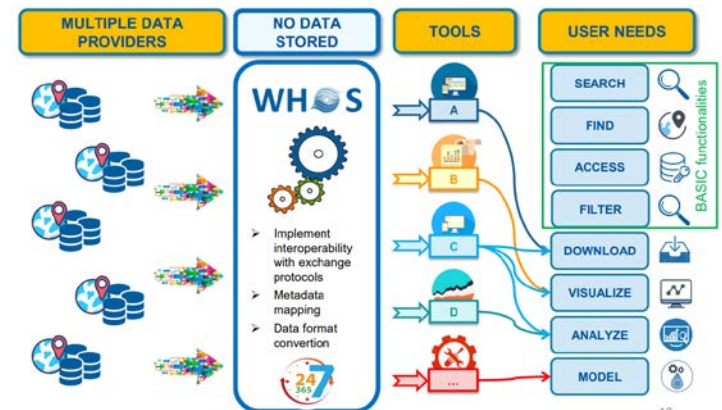
Snapshot of Hydrology Initiatives

WMO Flood Forecasting Initiative – APFM, FFGS and drought: IDMP

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Snapshot of Hydrology Initiatives

- **WMO Global Hydrological Status and Outlook System (HydroSOS)**

Snapshot of Hydrology Initiatives

Capacity building in hydrology and water resources management

The World Water Data Initiative (WWDI)

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WMO and Emerging Technologies

- Through Public Private Engagement (PPE) – piloting AI based flood forecasting

- Hydrohub Innovation Call

- Research call for proposals – Use of drones for hydrometry or rating curves/riverbed profiling

- Integrated urban services and use of IoT sensors

Source: NIWA

OPEN-PROFILE
A turnkey low-cost solution to improved operational hydrology

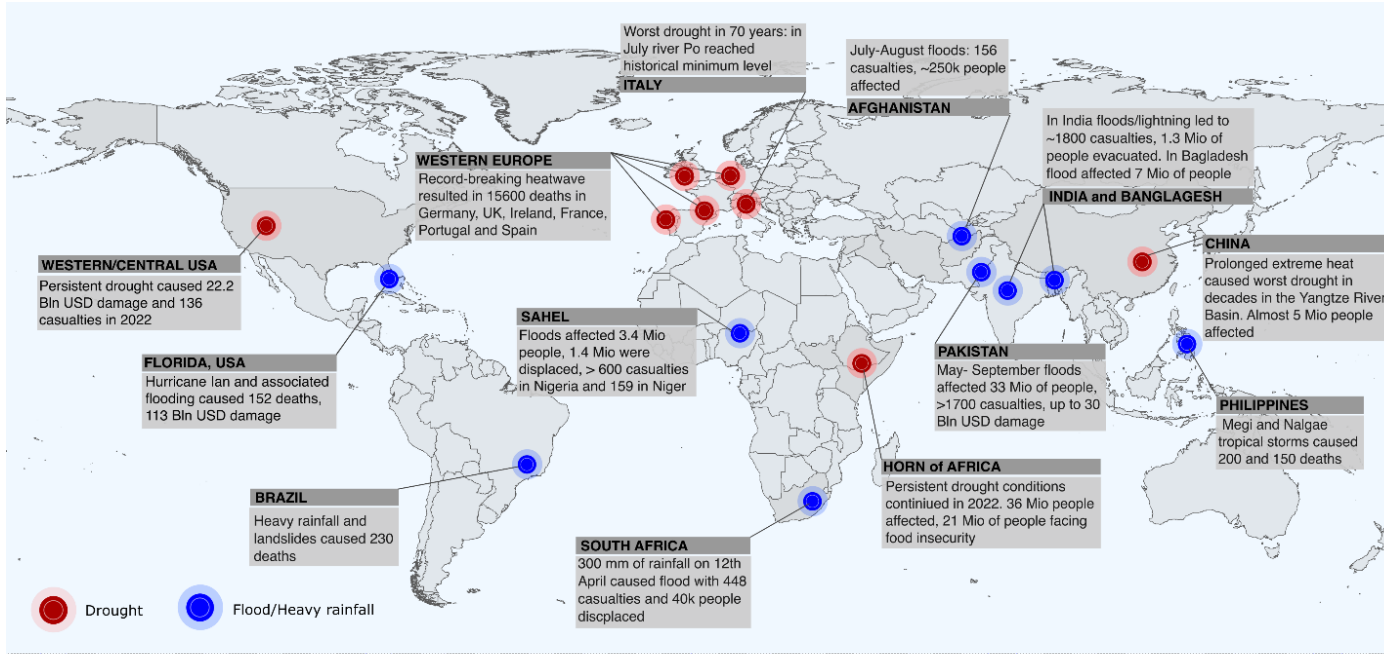WMO OMM

EARLY WARNINGS FOR ALL (EW4All)

- 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.

Pillar Leads:

Pillar 1: UNDRR
Pillar 2: WMO
Pillar 3: ITU
Pillar 4: IFRC

New investment required to advance towards early warnings for all within five years: **USD 3.1 BILLION** *Estimate based on consultations with pillar lead partners

USD 374 MILLION*

USD 1.18 BILLION*

Pillar 1: DISASTER RISK KNOWLEDGE

Pillar 2: OBSERVATIONS & FORECASTING

MONITORING & EVALUATION

Pillar 4: PREPAREDNESS & RESPONSE

Pillar 3: DISSEMINATION & COMMUNICATION

USD 1 BILLION*

USD 550 MILLION

PARTNERSHIPS

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State of Global Water Resources 2022

Worst drought in 70 years: in July river Po reached historical minimum level
ITALY

July-August floods: 156 casualties, ~250k people affected
AFGHANISTAN

In India floods/lightning led to ~1800 casualties, 1.3 Mio of people evacuated. In Bagladesh flood affected 7 Mio of people
INDIA and BANGLAGESH

WESTERN EUROPE
Record-breaking heatwave resulted in 15600 deaths in Germany, UK, Ireland, France, Portugal and Spain

CHINA
Prolonged extreme heat caused worst drought in decades in the Yangtze River Basin. Almost 5 Mio people affected

WESTERN/CENTRAL USA
Persistent drought caused 22.2 Bln USD damage and 136 casualties in 2022

SAHEL
Floods affected 3.4 Mio people, 1.4 Mio were displaced, > 600 casualties in Nigeria and 159 in Niger

PAKISTAN
May- September floods affected 33 Mio of people, >1700 casualties, up to 30 Bln USD damage

FLORIDA, USA
Hurricane Ian and associated flooding caused 152 deaths, 113 Bln USD damage

PHILIPPINES
Megi and Nalgae tropical storms caused 200 and 150 deaths

BRAZIL
Heavy rainfall and landslides caused 230 deaths

HORN of AFRICA
Persistent drought conditions continiued in 2022. 36 Mio people affected, 21 Mio of people facing food insecurity

SOUTH AFRICA
300 mm of rainfall on 12th April caused flood with 448 casualties and 40k people discplaced

● Drought   ● Flood/Heavy rainfall
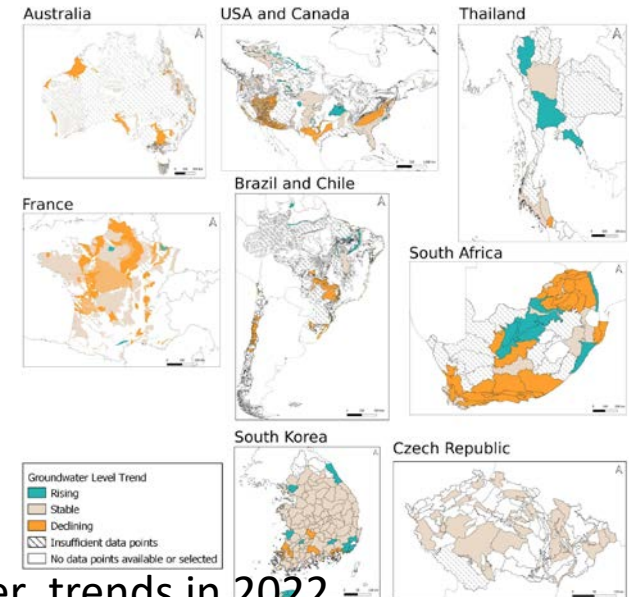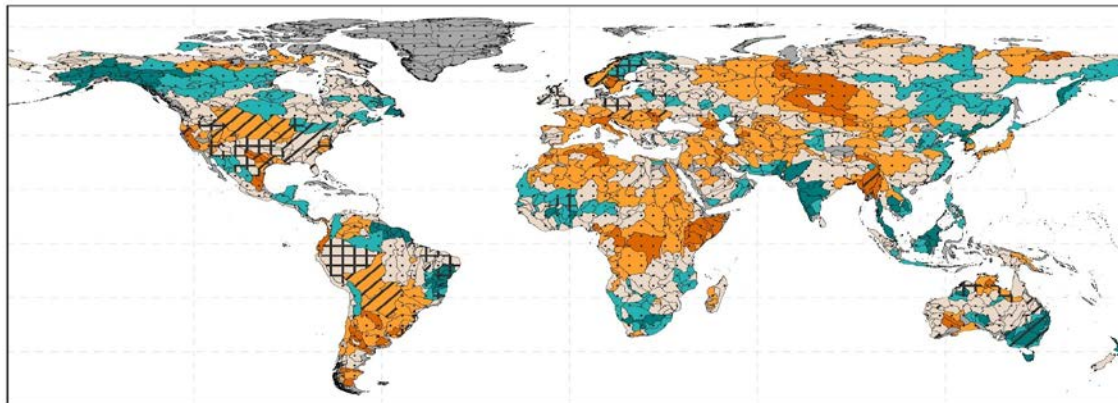
Sources: WMO Global State of the Climate Report 2022, EM-DAT, 2023; World Bank; ReliefWeb and others

Selected High Impact Hydrological Events 2022

much below   below   normal   above   much above

no data   agree   disagree

Validation of River Discharge patterns

Australia   USA and Canada   Thailand

France   Brazil and Chile   South Africa

South Korea   Czech Republic

Groundwater Level Trend
- Rising
- Stable
- Declining
- Insufficient data points
- No data points available or selected

Groundwater trends in 2022

Ongoing Regular Activities

Ongoing Activities for Guidance Materials:

Guide to Hydrological Practices (WMO-No. 168) Volume 2: Management of Water Resources and Application of Hydrological Practices
- in coordination with HCP, INFCOM and SC-HYD - ongoing

Seasonal Hydrological Prediction - completed

Assessment guidelines of E2E EWS for Floods – completed

Guidelines for Verification of hydrological forecasting- under development

Inventory of interoperable platforms and models – completed

Updating Manual (Guide) on Flood Risk Mapping – undergoing peer review

Coastal Inundation Forecasting Initiative Guideline – completed

Other Materials:

Manual on Low Flow Estimation and Prediction - 2008

Manual for the Estimation of Probable Max. Precipitation - 2009

Guidelines for the Assessment of Uncertainty for Hydrometric Measurement" 2017 (WMO-No. 1097)

Guidance on Environmental Flows, Integrating E-flow Science with Fluvial Geomorphology to Maintain Ecosystem Services - WMO, 2019 (WMO, No. 1235)Manual on Flood Forecasting and Warning - 2011

Guidelines on the role, operation and management of National Hydrological Services - WMO, 2006 (WMO, No. 1003)
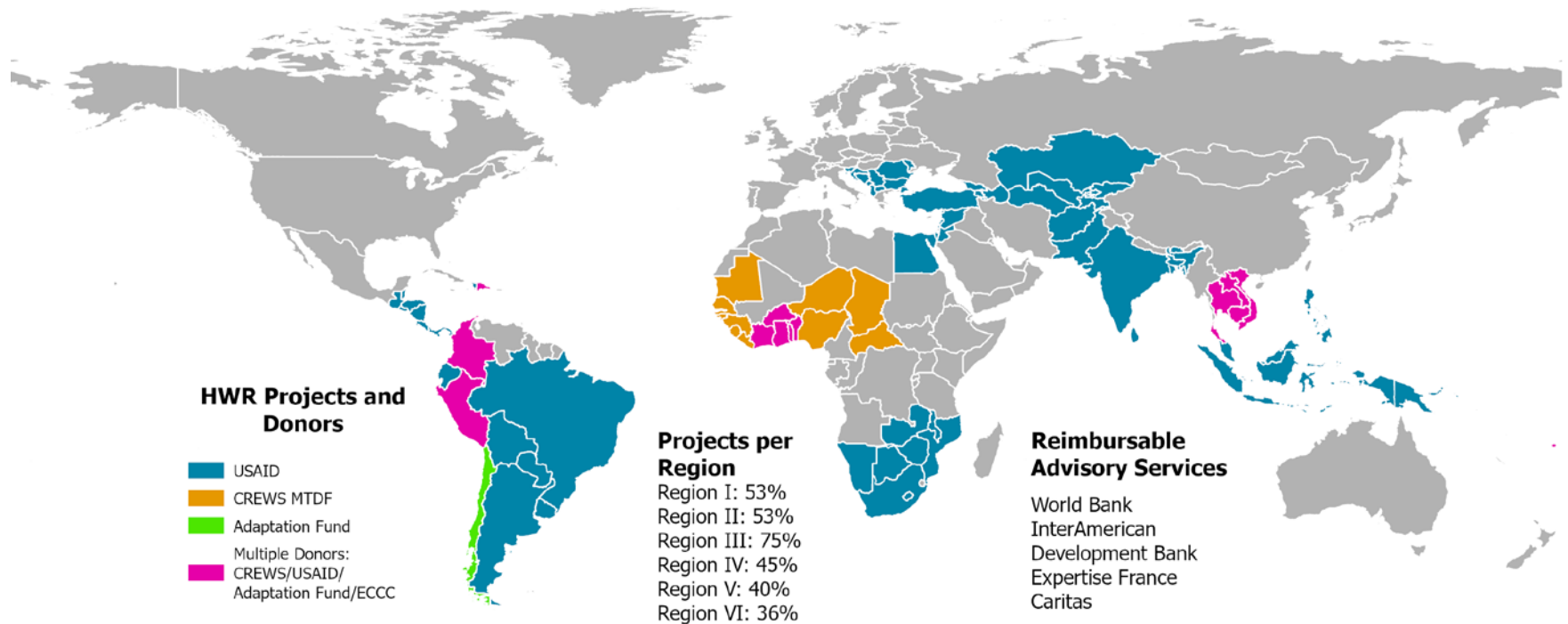
IFM:
- Measures and Strategies for IFM
- Concept Paper
- 4 IFM Policy papers with 3 Case Study
- 30 IFM Tools and 3 IFM Training Manuals (Training Manual for Mainstreaming Gender under pilot testing)

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Groundwater trends in 2022

RAVI activities in Hydrology

Activity Brief:
Extrabudgetary Project **(95 Countries)**

HWR Projects and Donors
- USAID
- CREWS MTDF
- Adaptation Fund
- Multiple Donors: CREWS/USAID/ Adaptation Fund/ECCC

Projects per Region
Region I: 53%
Region II: 53%
Region III: 75%
Region IV: 45%
Region V: 40%
Region VI: 36%

Reimbursable Advisory Services
World Bank
InterAmerican Development Bank
Expertise France
Caritas

WMO's Strategic Objectives 1.3
Further develop services in support of sustainable water management

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RAVI activities in Hydrology

Flash Flood Guidance System with Global Coverage

Black Sea and Middle East FFGS: Armenia, Azerbaijan, Bulgaria, Georgia, Jordan, Lebanon, Israel and Türkiye (RC);

South East Europe FFGS: Albania, Bosnia and Herzegovina, Croatia, Moldova, Montenegro, Romania, Serbia, Slovenia, North Macedonia, and Türkiye (RC);

FFGS serves more than

3 billion people around the world saving lives and decreasing economic losses.

Flash floods occurs quickly, within 6 hours of the rain event.

15 FFGS Projects

More than **500** Trained forecasters

More than **30** Hands-on FFGS trainings

67 Countries covered
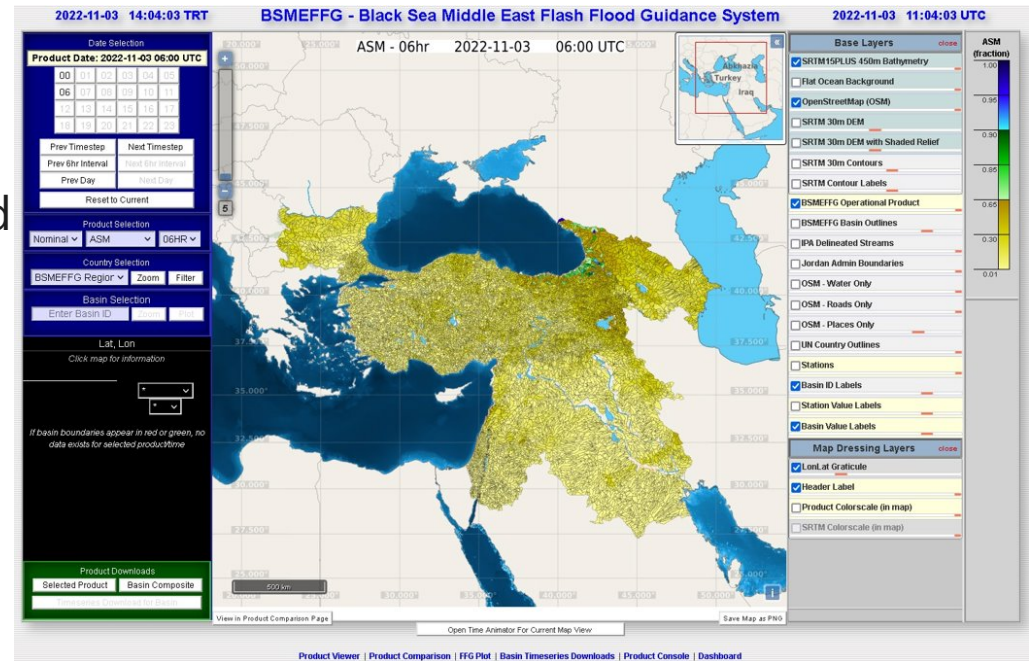
60 WMO Certified FFGS Programme Trainers

Second FFGS Global Workshop

RAVI activities in Hydrology

Steering Committee Meeting of
The Black Sea Middle East Flash Flood
Guidance (BSMEFFGS) Project
Antalya, Türkiye, 8 -9 November 202

**FFGS User Training Workshop &
Discussion for Future Plans
in Mar, 2024**

RAVI activities in Hydrology

Countries suggestions

Azerbaijan

• Request to have Moodle platform in other UN languages (request for also Turkish).

• Following the presentation of the Global FFGS status map, the country suggested to have it available in other WMO languages.

• The country also requested radar training, as they now have radars.

• Having refresher trainings for the FFGS users in person.

• Inclusion of DRMA experts in future FFGS trainings.

Georgia

•Improvement of the re-delineation currently on-going with HRC

•Training on radars in FFGS, their connection with the products and improvement they

•Request for the warning message app from TSMS

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Thank you

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