



World Meteorological Organization
Working together in weather, climate and water

Introduction to the WMO Flood Forecasting Initiative

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The expected outputs from the meeting during its first constituent session are:

- 1. Agreement on the scope of work and approach to be taken by the FFI-AG, within its ToR;**
 - 2. Improve understanding of the current initiatives and activities undertaken in the framework of the WMO Flood Forecasting Initiative;**
 - 3. Agreement on specific actions to be undertaken and a Work Plan associated with these actions;**
 - 4. Agreement on how the work of the FFI-AG should be undertaken including its outreach to Members, relevant Commissions, Technical Support Partners, and Development Partners (donors);**
 - 5. Conclusions and recommendations (including target audience), based on the presentations and discussions.**
-



History of the WMO-FFI

- **Started from an Expert Meeting in 2003**
 - **Technical Conference on Improved Meteorological and Hydrological Forecasting, Geneva, November 2006**
 - **On request of CHy, development of an Activity Plan in support of the FFI-Strategy and Action Plan, Geneva, November 2009**
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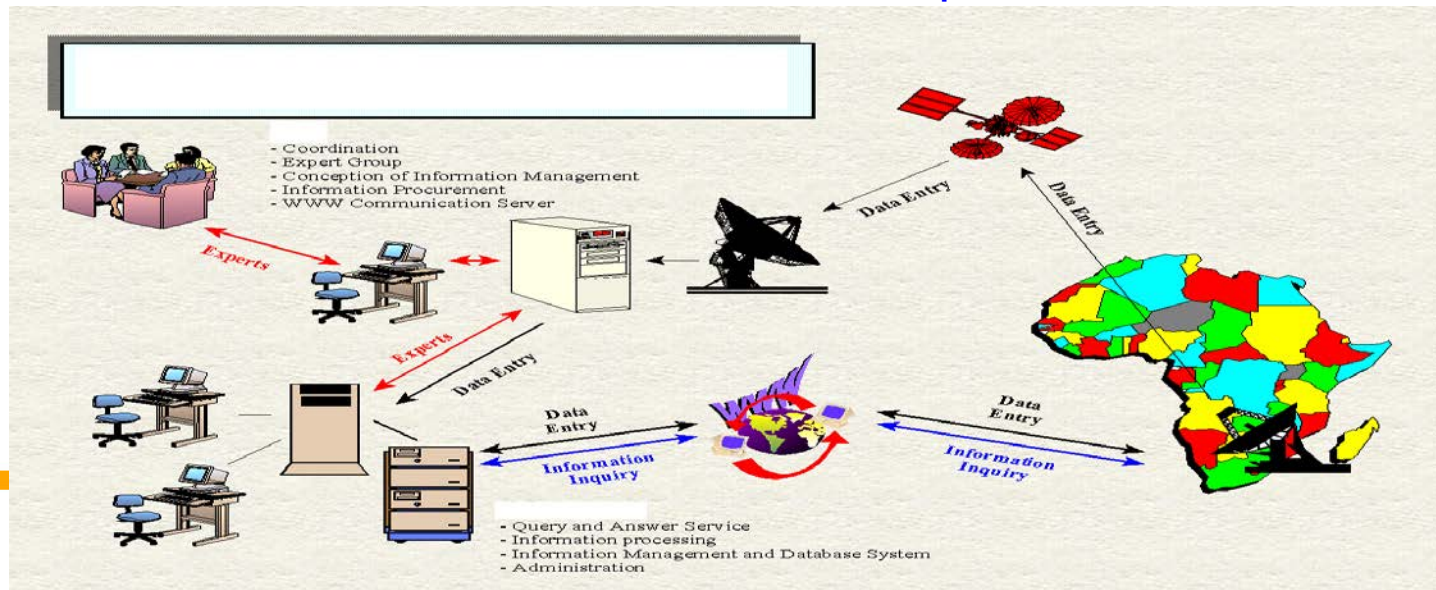
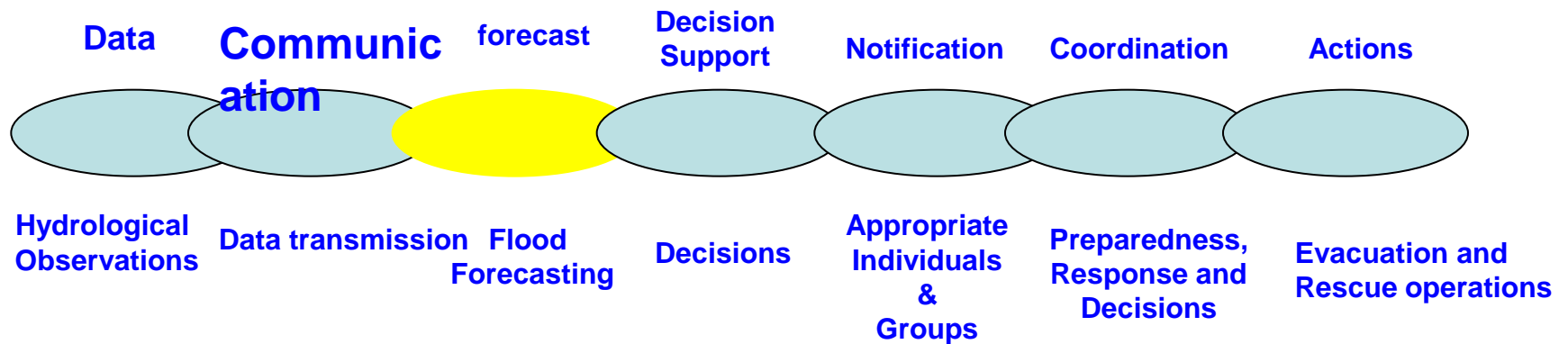
History of the WMO - FFI

- **In 2011, the World Meteorological Congress (Cg) passed Resolution 15 (Cg-16) establishing the WMO Flood Forecasting Initiative - Advisory Group (FFI-AG) with the objective to provide guidance and advice on the hydrological forecasting elements of a number of flood-related initiatives and programmes in progress under WMO programmes, and to provide broad-based support to improve collaboration between the meteorological and hydrological communities for improved flood forecasting related practices.**
-



Flood forecasting, warning and response system

a Critical Chain of Events and Actions





COMPONENTS OF THE WMO – FFI OVERVIEW

**FLASH FLOOD
GUIDANCE
SYSTEM**

**ASSOCIATED
PROGRAM ON
FLOOD
MANAGEMENT**

PUBLICATIONS

**STRATEGY
AND
ACTION
PLAN**

**ACTIVITY
PLAN IN
SUPPORT
OF THE SAP**

PROJECTS

**DEMONSTRATION
PROJECTS**

**INTERNATIONAL
FLOOD INITIATIVE**



Improved Meteorological and Hydrological Cooperation For Improved Flood Forecasting

Overall Objective of global/regional activities

Improve the capacity of meteorological and hydrological services to jointly deliver timely and more accurate products and services required in flood forecasting and warning and in collaborating with disaster managers, active in flood emergency preparedness and response.



Problem Statement

Many meteorological and hydrological services do presently not have adequate means or the knowledge to provide extended forecasting services in flood critical situations and to communicate effectively with disaster management authorities



Current Weaknesses of

Forecasting Systems (1)

Meteorological information and forecasting are often not provided in a form usable for hydrological pre-warnings and forecasting,

Meteorological forecasts are often qualitative and not quantitative,

Extreme meteorological and hydrological events are not risk qualified. What does i.e. severe rainfall mean for the input to hydrological forecasting or the general public?

Advanced methods and techniques including the use of NWP products and ensemble forecasting techniques are not widely used in the meteorological and hydrological communities,



Current Weaknesses of Forecasting Systems (2)

Fragmented data holdings, non-standardized data archiving, data formats and transmission protocols severely limit timely access to data and information,

There is a pronounced “communication gap” between meteorological and hydrological services with regard to forecasting concepts, methods, products and services, outreach to end-users and even the technical language used,

Forecasting is often not objective-driven; different users of forecasting information require specific forecasting products,

Warnings directed to disaster management agencies and the general public use technical vocabulary not easily understood by those who should benefit from the warnings.



Expected Outcomes

Improved quantitative and qualitative weather forecasting products are available in such a way that these can be directly used for flood forecasting,

Medium-range weather forecasting and climate prediction tools can be applied to extend warning times and produce pre-warning information,

NHMSs have improved their capacity to cooperate to jointly deliver timely and accurate flood forecasting information,

Integrated weather, climate and hydrological forecasting information is available in a relevant format for use by civil organizations responsible for disaster preparedness and mitigation.



SCOPE OF THE SAP (1)

The SAP promotes the preparation of national implementation plans. These have to be adapted in accordance with current national/regional flood forecasting capabilities, specific requirements and priorities.

The SAP suggests the implementation of demonstration projects at various levels (country-specific, sub-regional and regional projects) to showcase the value of increased cooperation between NMSs and NHSs in flood forecasting (Doc 9).



SCOPE OF THE SAP (2)

At the regional level, the SAP advocates the establishment of a framework under which partnerships and development assistance could be provided and coordinated amongst services while taking advantage of existing regional and international arrangements.

The SAP also addresses requirements of well-established flood forecasting and warning systems for their further improvement through the development and use of new technologies.



SAP ACTION DOMAINS (1)

- I. Strengthening of Observing and Information Systems**
 - II. Improvement of Meteorological Forecasting Practices and Products**
 - III. Improvement of Hydrological Forecasting Practices and Products**
 - IV. Strengthening of Institutional Coordination, Cooperation and Integration between NMSs and NHSs**
 - V. Strengthening of Cooperation and Coordination between Countries on issues related to Flood Forecasting**
-



SAP ACTION DOMAINS (2)

VI. Formulation of Technical Documentation and Guidelines related to Flood Forecasting

VII. Supporting Disaster Management

VIII. Addressing Climate Variability and Change in the Light of Extreme Events

IX. Demonstrating the Value of Meteorological and Hydrological Data, Information and Products



Outreach process (1)....

- Activity Plan developed on the basis of the SAP that can be adapted and used under a wide range of capabilities and conditions for flood forecasting,
 - Facilitated national consultations to sensitize National Meteorological and Hydrological Services for an improved cooperation. WMO is seen as the lead agency to facilitate these consultations,
 - Development of a Certification procedure for NHSs as a tool to improve efficiency of flood forecasting services.
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Outreach Process (2)...

- Pilot projects with a high visibility to demonstrate the value of the cooperation between meteorological and hydrological services and the use of advanced meteorological forecasting and prediction outputs,
 - Fostering twinning agreements between NMHSs with the objective of sharing know-how and technology in improved cooperation and the development and use of advanced forecasting products and their dissemination,
-



Development of Integrated Products

Deliverable: Outline of basic requirements for integrated products and pathways to enable the development of these products

- Improved flood forecasting services through the use of integrated forecasting information
- Availability and use of meteorological forecasting tools
- Suitability of currently used hydrological forecasting models to include meteorological observations;
- Access to meteorological data and information for flood forecasting purposes;
- Information required/available for flood probability estimates based on climate information
- Recommendations: Pathways for the development of integrated products



Demonstration Projects as proposed in the SAP

1. Standardized communications and operation terminology for meteorologists and hydrologists in flood forecasting;
2. Processing of hydrological relevant NWP information for flood forecasting;
3. Common regional Internet websites for meteorology/hydrology information sharing for improvement of flood forecasting;
4. Intercomparison of coupled forecasting models currently in use in the various WMO Regions, to identify most suitable models to serve requirements.
5. Joint research activities on flood forecasting systems and models in countries with similar regional characteristics.
6. Storm surge forecasting and warning services.
7. Improved precipitation forecasting that is critical for effective flood forecasting.
8. Utilization of meteorological products from Regional Centres in flood forecasting.



Activity Plan on the basis of the SAP

As outlined in the SAP itself, the activity plan recognizes three levels of different development status of NHSs and proposes activities related to the level of the development of NHSs (Category I : fully developed, Category II. medium development status, Category III: low development status)

Overall, activities are proposed in the following topic areas.....



Topics covered in the actions (1)

Observational networks including space-based systems, data exchange/transmission and data analysis including data quality;

State-of-the-art of meteorological models used including now-casting,

State-of-the-art possibilities of NWP precipitation forecasts,

State-of-the-art of hydrological modeling and forecasting and including applications in now-casting of flash-floods;



Topics covered in the actions

(2)

Development and application of climate predictions in the preparation of seasonal river-flow outlooks

Means of coordination between meteorological and hydrological services,

Operational aspects of integrated flood forecasting/warning systems,

Issues related to uncertainties and verification of forecasts

Warning procedures and the development of information and its dissemination down to community level.



Topics covered in the actions

(3)

Assimilation of the outputs of NWP, including ensemble forecasts, using radar and satellite information in hydrological models and operational flood forecasting/warning,

Critical aspects with respect to predictability, thresholds, interpretation and use of these forecasts related to precipitation and other relevant parameters



IMPLEMENTATION STATUS OF THE STRATEGY AND ACTION PLAN (SAP)

Progress achieved until 2013



Achievements until 2013 (1)

- **Eight regional meetings held**
- **About 58 countries have participated in workshops with over 300 participants from National Meteorological and Hydrological Services;**
- **Since 2005, a network of meteorologists and hydrologists has been formed and is active covering regions WMO Regions III and IV (South and Central America),**
- **86 countries have participated in a survey to identify main flood forecasting capabilities and shortfalls;**
- **Global conferences have been organized in November 2006 and December 2009 to formulate the Strategy and Action Plan for Flood Forecasting and its Activity Plan.**



Achievements until 2013 (2)

- **A project “Flash Flood Guidance System with Global Coverage (FFGS)” has been developed in 2008 together with NOAA, HRC and USAID that is implemented in different regions since 2009; ongoing project, covering close to 1 Billion people**
- **Manual on Flood Forecasting and Warning published in September 2011**
- **Workshops held on Intercomparison of Flood Forecasting Models - Decision-making for their selection and application in Koblenz, Germany, September 2011, and June 2013, draft guidance material available**
- **Expert Meeting held on the Efficiency of Flood Forecasting Services in Geneva, October 2011 and scheduled for November 2013, first draft guidance material available**

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Achievements until 2013 (3)

- Regional Workshop on Flood Forecasting and Warning, Nanjing, October 2011**
 - Seminar organized: Integrated Urban Flood Management: Challenges and Approaches in the Developing World, Stockholm Water Week, August 2011**
 - APFM, HelpDesk established, numerous trainings and national/regional workshops conducted, large number of IFM-tools developed, pilot projects conducted...**
 - Establishment of the Zambezi Flood Forecasting System in progress**
 - Cooperation in the joint UNESCO/WMO Flood Initiative**
-



WORKSHOP ON INTERCOMPARISON OF FLOOD FORECASTING MODELS

**Development and Finalization of a Decision-
Aiding Tool for the Selection of
Flood Forecasting Models**

**A contribution to the WMO Flood Forecasting
Initiative**

8 – 10 July 2013

Federal Institute of Hydrology, Germany

(First workshop on the subject held in 2011)



Efficiency of Flood Forecasting Services

EXPERT MEETING: IMPROVING THE EFFICIENCY OF FLOOD FORECASTING SERVICES

**Development of a Framework for the Assessment of
Service Delivery Capabilities of Hydrological Services**

A contribution to the WMO Flood Forecasting Initiative

12 to 14 October 2011

WMO Headquarter, Geneva

(Final Expert Meeting scheduled for November 2013)



Regional Activity

Regional Workshop and Training on Flood Forecasting and Warning

- A contribution to the WMO Flood
Forecasting Initiative –
24 to 28 October 2011
Nanjing, P. R.CHINA**
-



Output of the Workshop and training

Participants can share the knowledge and experience gained in providing significant inputs to improving flood forecasting services in their respective institutions and related flood forecasting programs and projects.



Elements of the FFI implemented in selected HYCOS- projects



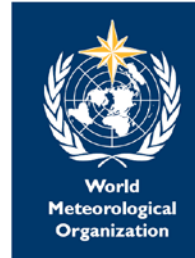


Establishment of Regional Flood Information Systems

Mekong – HYCOS project (4 countries participating, implemented, largely improved Flood Forecasting accuracy and timeliness

Hindu-Kush Himalaya (HKH)-HYCOS (4 countries participating, under implementation.

Motto: Make Information Travel Faster than Floods



USAID
FROM THE AMERICAN PEOPLE

Development and Implementation of Regional Flash Flood Guidance and Early Warning Systems

Purpose and Technical Approach

Dr. Wolfgang E. Grabs
Chief, Hydrological Forecasting and Water
Management Division
World Meteorological Organization (WMO)
wgrabs@wmo.int



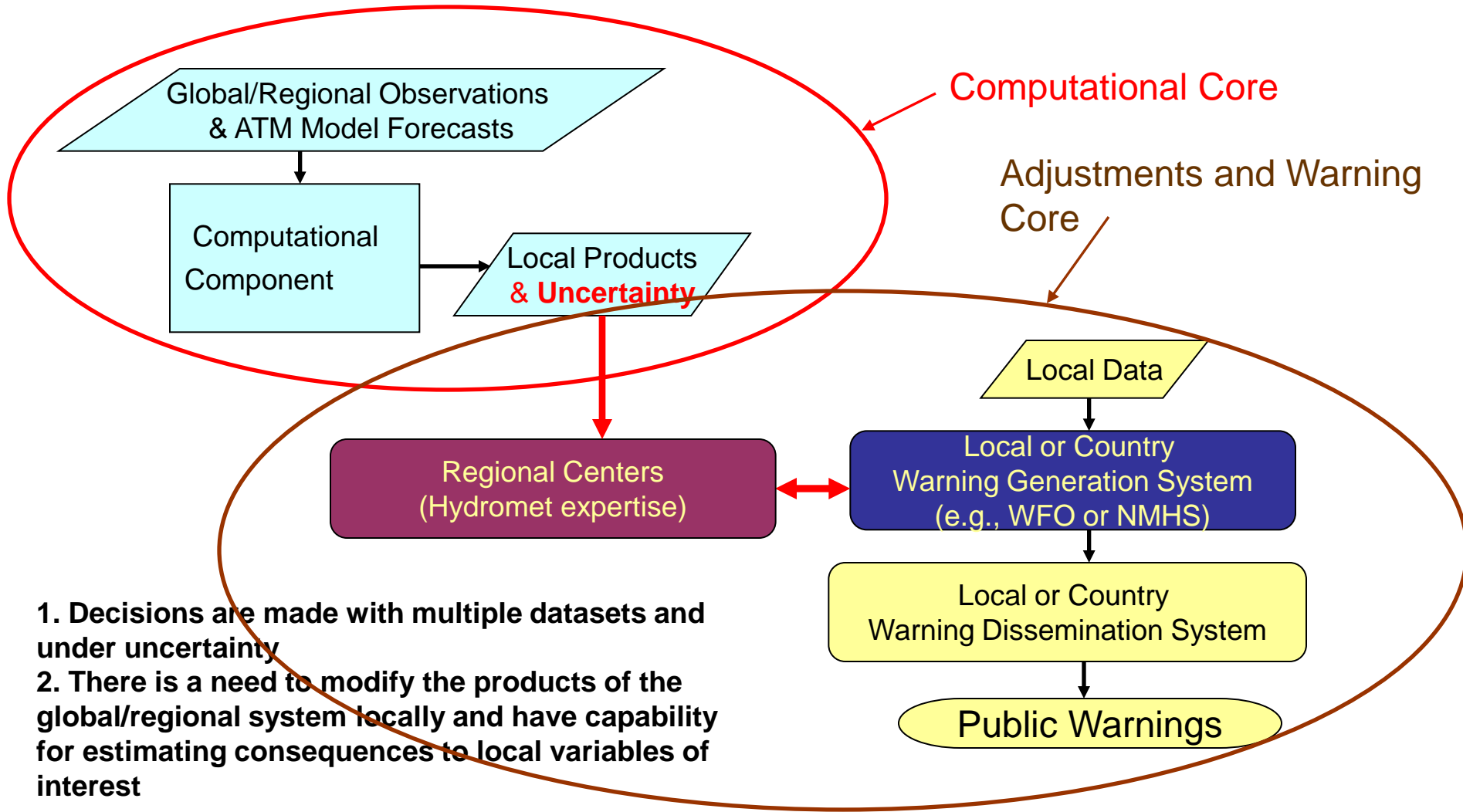
Main objective of the project

To contribute towards reducing the vulnerability of regions around the world to hydrometeorological disasters,

specifically flash floods,

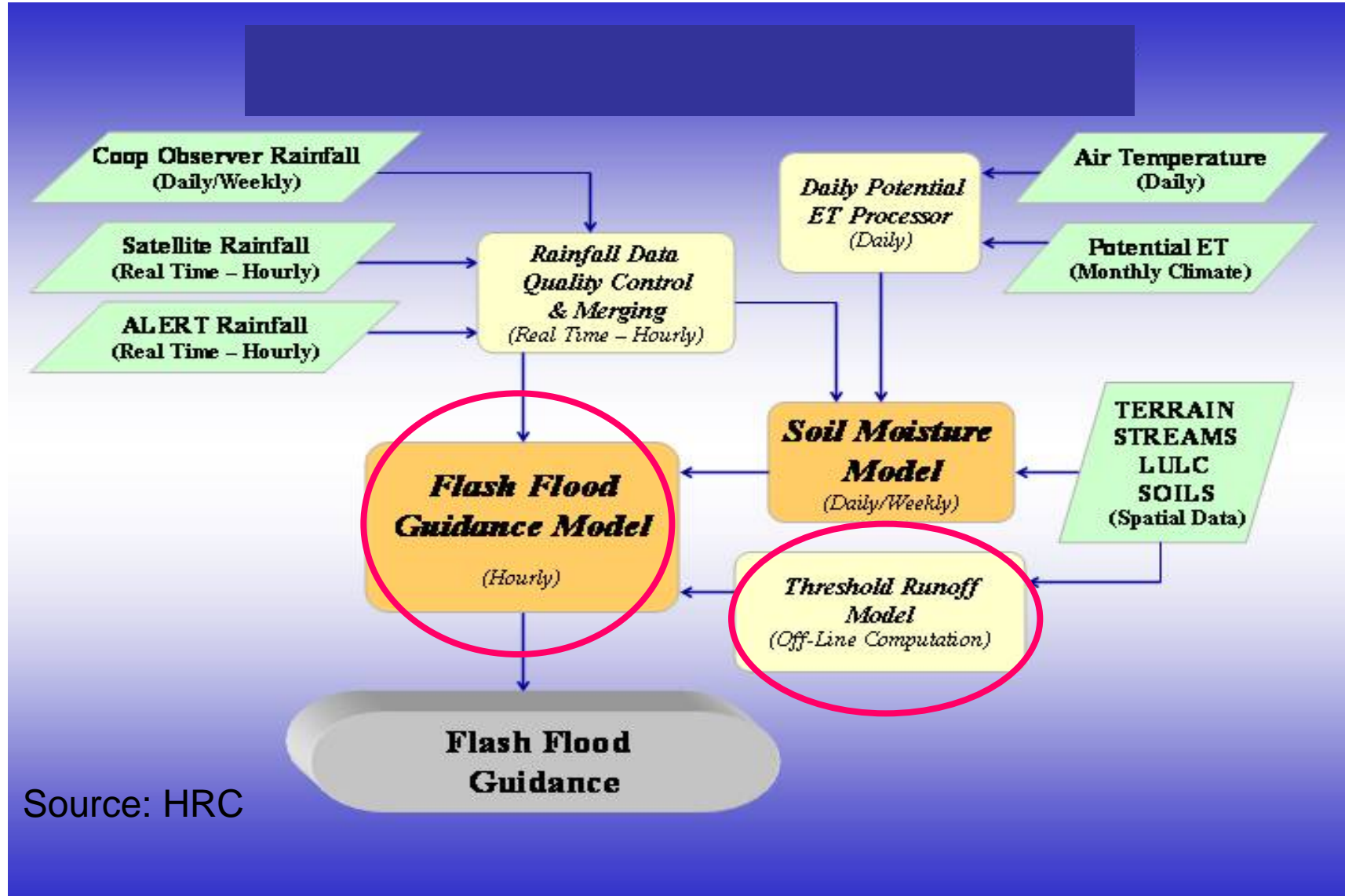
by developing and implementing flash flood guidance systems to strengthen regional capacity to develop timely and accurate flash flood warnings

From Global to Regional to Local



1. Decisions are made with multiple datasets and under uncertainty
2. There is a need to modify the products of the global/regional system locally and have capability for estimating consequences to local variables of interest

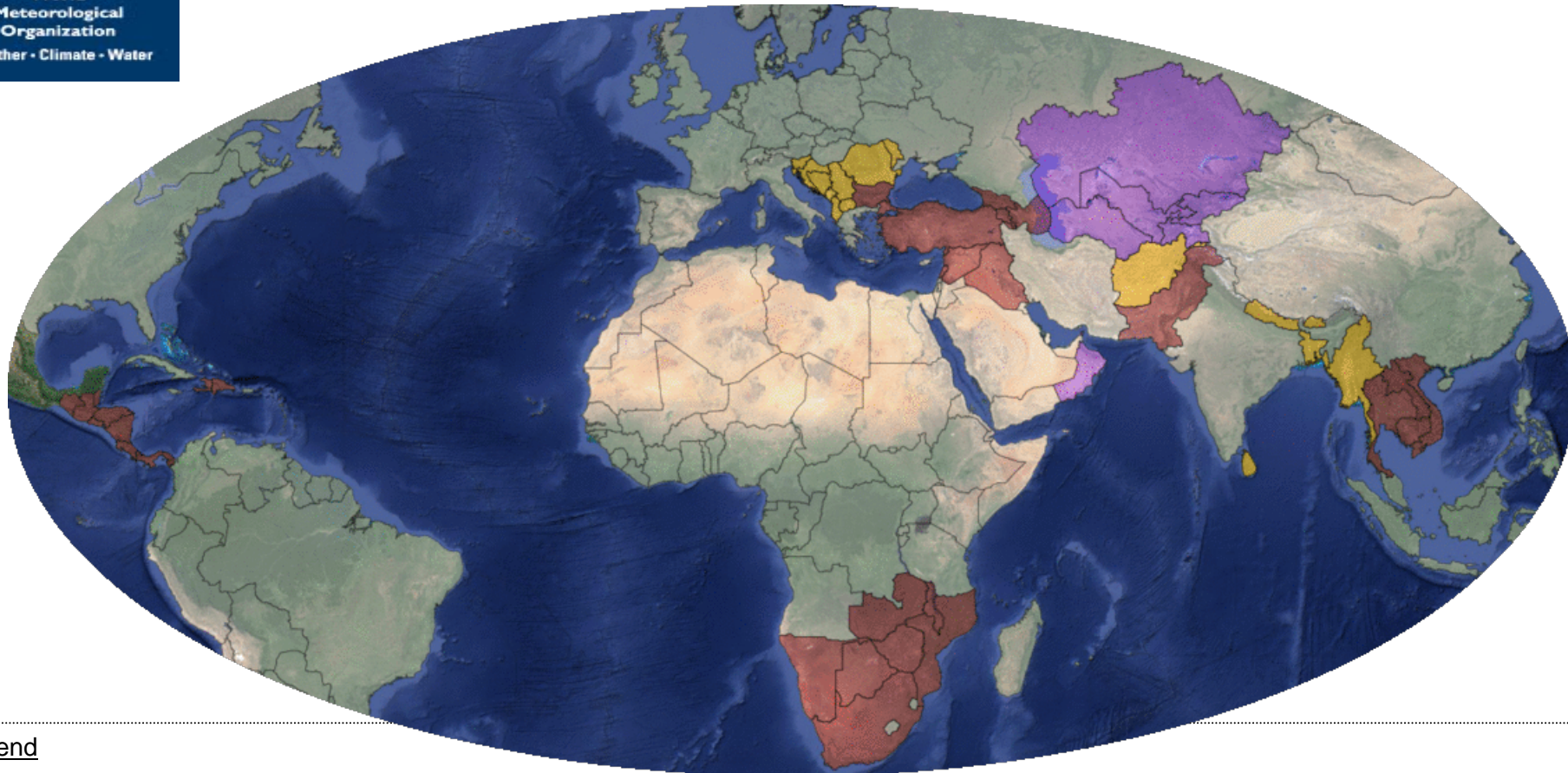
Flash Flood Guidance System Flow Chart





World
Meteorological
Organization
Weather · Climate · Water

The Global Distribution of Flash Flood Guidance Systems



Legend

FFG Implementation Status

	 Completed	 In Progress	 Under Planning	Total
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Total # Countries	30	15	6	51
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Total Population Reached	645,698,967	184,846,165	65,542,913	896,088,045
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WMO in cooperation with USAID

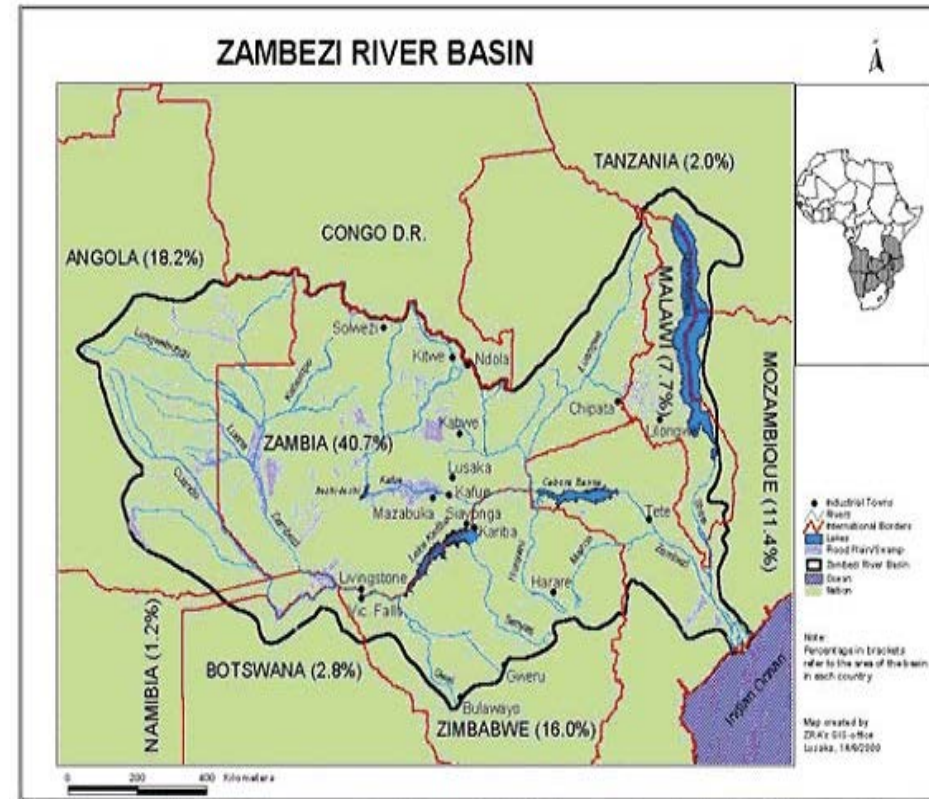
Strategy for Flood Forecasting and Early Warning

■ Main activity areas:

- National stakeholder workshops
- Regional consultation meeting
- Strengthening flood early warning
- Development of the flood early warning strategy

■ Complementary projects:

- Regional Flash Flood Guidance System (SARFFG)
- Severe Weather Forecast Demonstration Project (SWFDP)
- SADC-HYCOS: Enhancing hydro-meteorological monitoring



The basin is shared by 8 countries



Associated Program on Flood Management (APFM)

A photograph of blue water with ripples and a small boat in the distance. The water is a deep blue color, and the ripples are visible on the surface. The boat is small and dark, and is located in the upper right portion of the image.

Overview IFM HelpDesk, Activities and Partners



Associated Programme on Flood Management

“ to support countries in the integrated management of floods within the overall framework of Integrated Water Resources Management.”



Help Yourself

Flood Management Tools

Questions and Answers Bank

Reference Centre Databases

Virtual Discussion Group

Get Help

Assistance for Flood Management Policy, Law and Strategy

Capacity Building for Integrated Flood Management

Rapid Guidance on Technical Tools and Advisory Material

Support Base Partners

Find us on Facebook

Recommend

Engage in state-of-the-art Flood Management Strategy Formulation, Policy Making and Legal Reform with full process coaching through the HelpDesk.

Utilize the HelpDesk in organizing advocacy workshops, awareness building campaigns and training at various levels to further integrated flood management.

Be guided to the right combination of information from various sources available under the HelpDesk.

Get Help

Assistance for Flood Management Policy, Law and Strategy

Capacity Building for Integrated Flood Management

Rapid Guidance on Technical Tools and Advisory Material

Flood Management Tools

Questions and Answers Bank

Reference Centre Databases

Virtual Discussion Group

Help Yourself

Explore Flood Management Tools with substantive guidance on specific methodologies, technologies and concepts for implementing Integrated Flood Management.

Browse through the Questions and Answers Bank to find answers on frequently asked questions related to IFM and the HelpDesk.

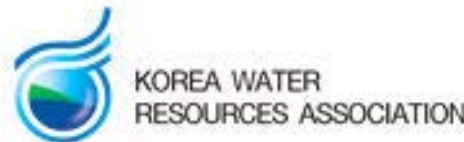
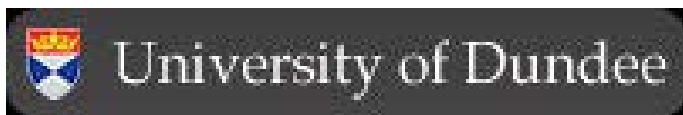
Use the Reference Centre to know more about the setup in different countries in terms of flood management policy, legislative documents and literature on issues related to floods.

Engage in one of our Virtual Discussion Groups to learn through debate, and share experiences, knowledge and good practices.

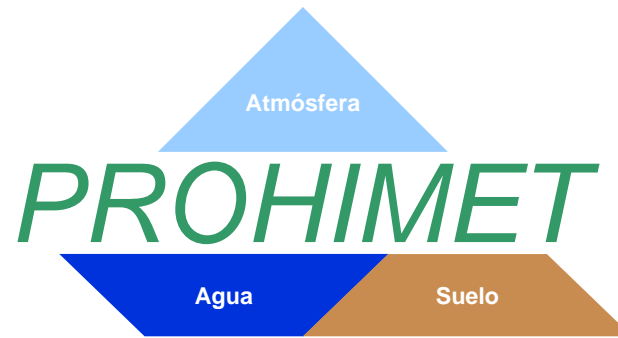


Support Base Partners

Specialized institutes in various disciplines relevant for IFM



<http://www.floodmanagement.info>



***Ibero-American Network on
monitoring and forecasting of
hydrometeorological phenomena***

<http://www.prohimet.org>

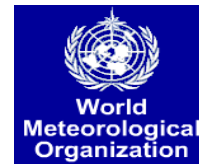
Angel Luis Aldana Valverde

Program manager at the Hydrographic Studies Center of CEDEX (Spain)

Coordinator of PROHIMET

International Flood Initiative

Addressing hydrological extremes:
knowledge base and capacity for prediction,
adaptation and mitigation



United Nations University

"advancing knowledge for human security and development"



Secretariat:

IIASA



ICHARM - International Centre for Water Hazard and Risk Management under the auspices of UNESCO (Tsukuba, Japan)



UNESCO – WMO INTERNATIONAL FLOOD INITIATIVE

INTERNATIONAL FLOOD INITIATIVE

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In Close Collaboration with:



UNITED NATIONS
UNIVERSITY





IFI – FLAGSHIP PROGRAM

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- ✎ Bring **Disaster Risk Reduction targets into Sustainable Development Goals**
 - Make monitoring of the progress of Hyogo Framework for Action central to post-Hyogo Framework for Action.
- ✎ Establish **standard methodology of monitoring risk in a seamless manner from individual localities to the globe scale**
 - Identify the current and anticipated exposure level to hazardous areas (population and properties)
 - Quantify the effectiveness of measures taken for reducing risk (structural and nonstructural)
 - Identify and quantify the positive benefits of floods
 - Identify the remaining risk as the benchmark
- ✎ Establish an **operational system for monitoring risk and implementing risk reduction actions**



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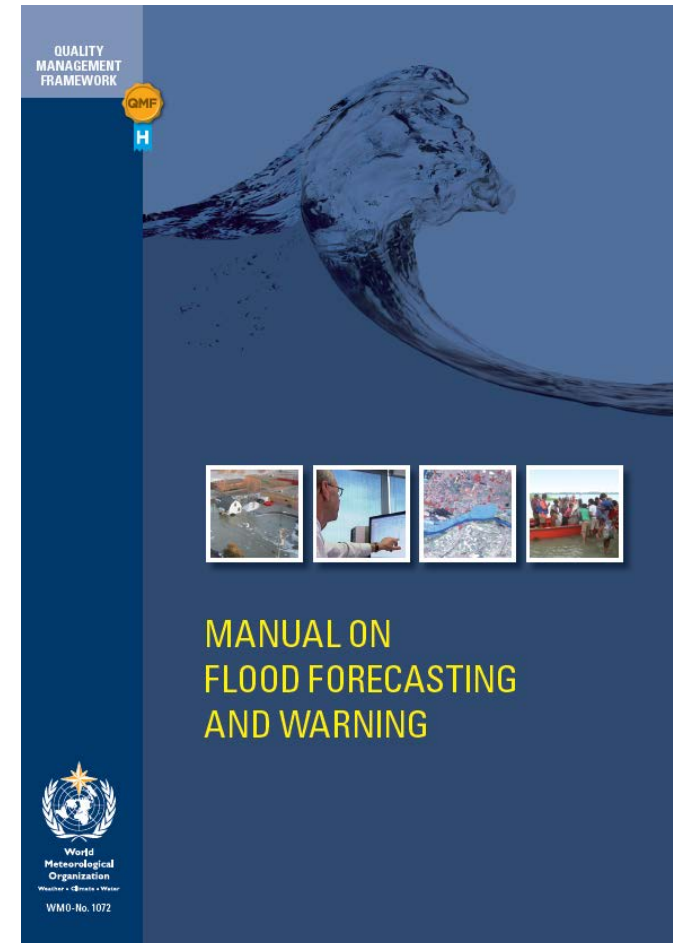
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WMO - Flood Forecasting and Warning Manual

- Provides basic knowledge and guidance to develop flood forecasting and warning systems
- Addressed to National Meteorological Services
- Not a step-by-step guide, rather examples of different practices and technologies for the components of a flood warning system:
 - Design of flood forecasting system
 - Implementation and operation of the system
 - Flood warnings
 - Training



Challenges in the Implementation of the FFI - Strategy and Action Plan

- **SAP is not sufficiently anchored in the Regions – except RA-II**
- **Slow process of actively promoting the implementation of SAP in NMHSs**
- **No M&E mechanism to monitor progress at regional and country level**
- **Second round of regional workshops on the SAP implementation not yet envisaged**
- **Lack of feed-back from countries on the adequacy of actions proposed**
- **Slow progress in the implementation of “demonstration projects”**



Thank you for your attention



