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# Overview and Purposes of the South Asia Flash Flood Guidance System (SAsiaFFGS) Follow-up Operational Workshop (Step 4 training)



**WMO OMM**

World Meteorological Organization

Organisation météorologique mondiale

# Introduction

- “Recent findings of the WMO country-level survey where of the 139 countries, 105 indicated that flash floods were among the top two most important hazards around the world and require special attention”.
- “On the average, these events kill more people worldwide than any other [weather-related] natural disaster -in an average year, flash floods kill over 5,000 unsuspecting people and cause millions of dollars of property damage”(WMO 2008).



# Flash Floods

WORLD METEOROLOGICAL ORGANIZATION (WMO):

„A flood of short duration with a relatively high peak discharge”

AMERICAN METEOROLOGICAL SOCIETY (AMS):

„A flood that rises and falls quite rapidly with little or no advance warning, usually the result of intense rainfall over a relatively small area”

Flash floods represent **forecast and detection challenges** because they are not always caused simply by meteorological phenomena.



# Flash Floods in South Asia

- In the South-Asia region, flash floods account by far for most of the lives lost in flood events.
- Since flash floods can occur at any time and any place and affect lives, property and infrastructure in the region, there is an urgent need to prioritize efforts that aim to improve the detection and forecasting of flash floods threats that would enable the mandated national authorities to undertake appropriate measures to safeguard the population at risk from the disastrous effects of flash floods.



INDIA



# Flash Floods in South Asia



**BANGLADESH**



**BUTHAN**



**NEPAL**



**SRI LANKA**



# Flash Flood Guidance System

- Flash floods are hydrometeorological phenomena requiring an integration of meteorology and hydrology in real time with an infusion of local information and expertise to deliver reliable flash flood warnings.
- FFGS is designed to provide forecasters with **readily and accessible observed and forecast data**, and other information to produce flash flood watches and warnings for a location.
- Hydrometeorological analysis and assessment of the FFGS products is necessary to make decision on whether to issue watches or warnings. Therefore, a forecaster's input is essential for the success of the warning process.



# Beginning of the FFGS



- In 2001 HRC, a non-profit public benefit corporation located in San Diego, in collaboration with the U.S. National Weather Service, began the development of regional FFGS to support flash flood warnings.



In 1998, Hurricane Mitch struck Central America, leaving more than 11,000 people dead, destroying hundreds of thousands of homes and causing more than \$5 billion in damages. Floods, flash floods, landslides and mudslides brought on by heavy rainfall washed away entire villages, and the majority of the countries's crops and infrastructure were destroyed.

# Flash Flood Guidance (FFG) System



Flash Flood Guidance System with global coverage (Resolution 21, World Meteorological Congress-XV) enhances early warning capabilities of the NMHSs, currently **covers more than 60 (sixty) countries** and **more than two billion people** around the world saving lives and decreasing economic losses.

The WMO Commission for Hydrology (CHy) jointly with the WMO Commission for Basic Systems (CBS) and in collaboration with the US National Weather Service, Hydrologic Research Center (HRC), and USAID/OFDA have developed the concept of the Flash Flood Guidance System (FFGS) with global coverage.

The concept has been endorsed by the Fifteenth WM Congress and is being implemented through a series of regional projects with funding from USAID.



# Regional FFGS Projects

**The following regional Flash Flood Guidance (FFG) projects have been implemented or under implementation:**

- **Central America FFG (CAFFG)** (Operational): Costa Rica (Regional Centre RC), Belize, El Salvador, Guatemala, Honduras, Nicaragua, and Panama;
- **Southern Africa Region FFG (SARFFG)**: (Operational) Botswana, Lesotho, Malawi, Mozambique, Namibia, South Africa (RC), Swaziland, Zambia, and Zimbabwe;
- **Mekong River Commission FFG (MRCFFG)** (Operational): Cambodia (RC), Lao People's Democratic Republic, Thailand, and Viet Nam;
- **Black Sea and Middle East FFG (BSMEFFG)** (Operational): Armenia, Azerbaijan, Bulgaria, Georgia, Israel, Jordan, Lebanon, and Turkey (RC);
- **South East Europe FFG (SEEFFG)** (Operational): Albania, Bosnia-Herzegovina, Croatia, Moldova, Montenegro, Romania, Serbia, Slovenia, The Former Yugoslav Republic of Macedonia, and Turkey (RC);

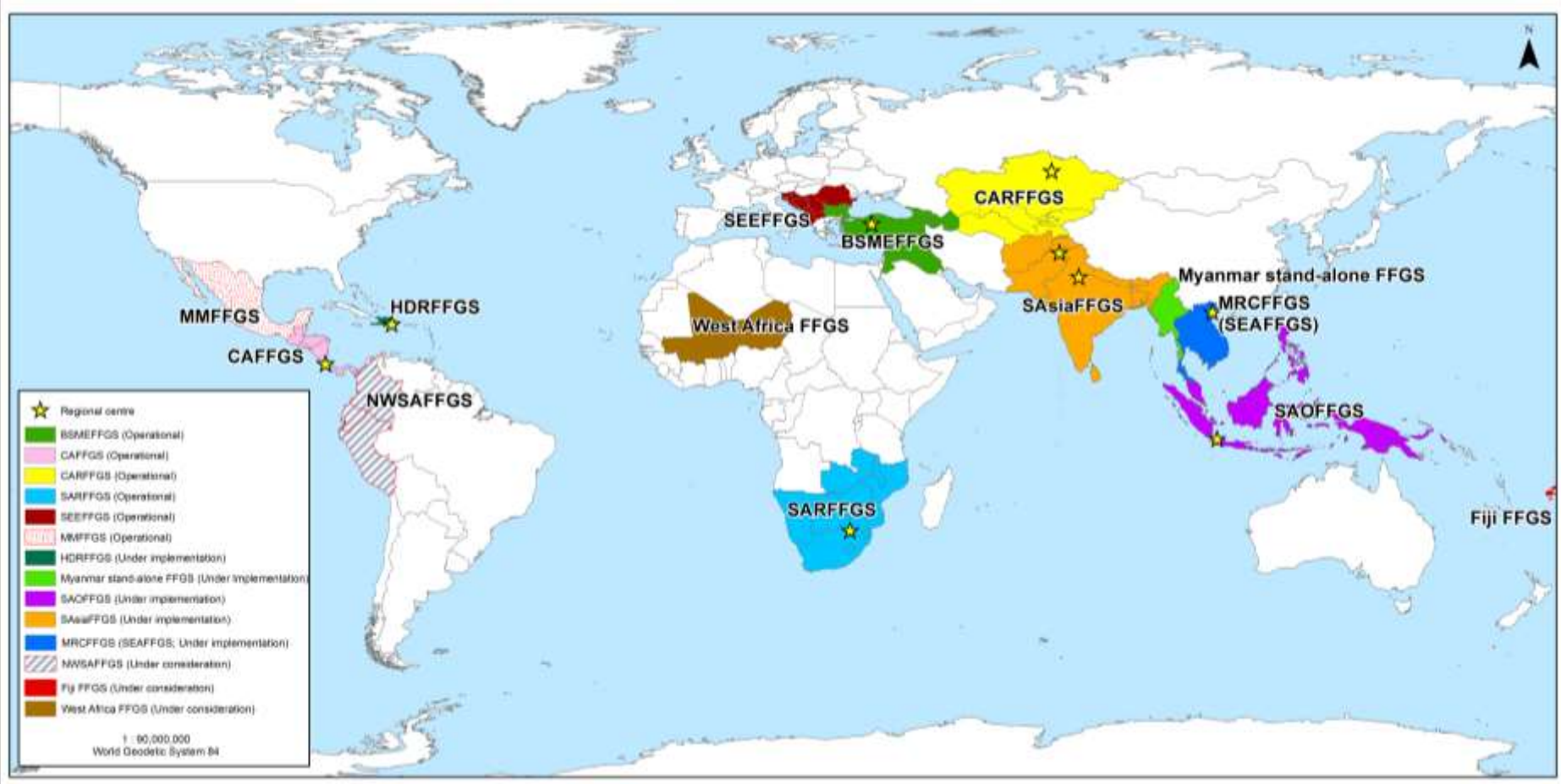


# Regional FFGS Projects

- **Central Asia Region FFG (CARFFG) (operational):** Kazakhstan (RC), Kyrgyzstan, Tajikistan, Turkmenistan, and Uzbekistan;
- **Southeastern Asia-Oceania FFG (SAOFFG) (under implementation):** Brunei Darussalam, Indonesia (RC), Malaysia, Papua New Guinea, Philippines, Singapore, and Timor-Leste;
- **South Asia FFG (SAsiaFFG) (under implementation):** Bangladesh, Bhutan, India (RC), Nepal, Pakistan (RC), and Sri Lanka;
- **Pakistan-Afghanistan FFG (under implementation);**
- **South East Asia FFG (SEAFFG) (under implementation):** Cambodia, Lao PDR, Thailand, and Viet Nam;
- **South America Pilot FFG (Completed):** Zarumilla River Basin (Peru and Ecuador);
- **Haiti and Dominican Republic FFG (HDRFFG) (being upgraded):** Dominican Republic and Haiti;
- **Myanmar FFG System (under implementation);**
- **Northwest South America (NWSAFFG) (Under implementation):** Colombia, Ecuador and Peru.



# Regional FFGS Projects



# Objectives of the FFGS with Global Coverage

**The main objectives of the Flash Flood Guidance System with global coverage is to:**

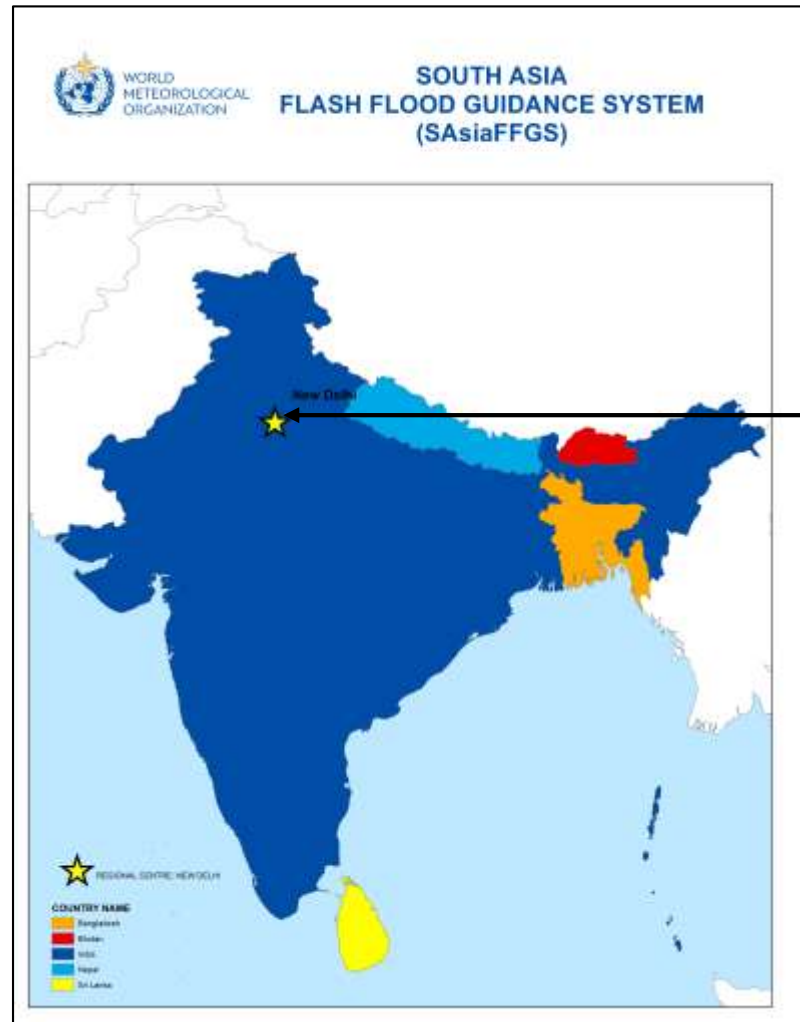
- Enhance NMHSs capacity to issue flash flood warnings and alerts;
- Mitigate adverse impacts of hydrometeorological hazards;
- Enhance collaborations between NMHSs and Emergency Management Agencies;
- Generate flash flood early warning products by using state-of-the-art hydrometeorological forecasting models;
- Provide extensive training including on-line training to the hydrometeorological forecasters;
- Foster regional developments and collaborations; and
- Support WMO Flood Forecasting Initiative.



# Regional Components

## The Participating NMHSs are to:

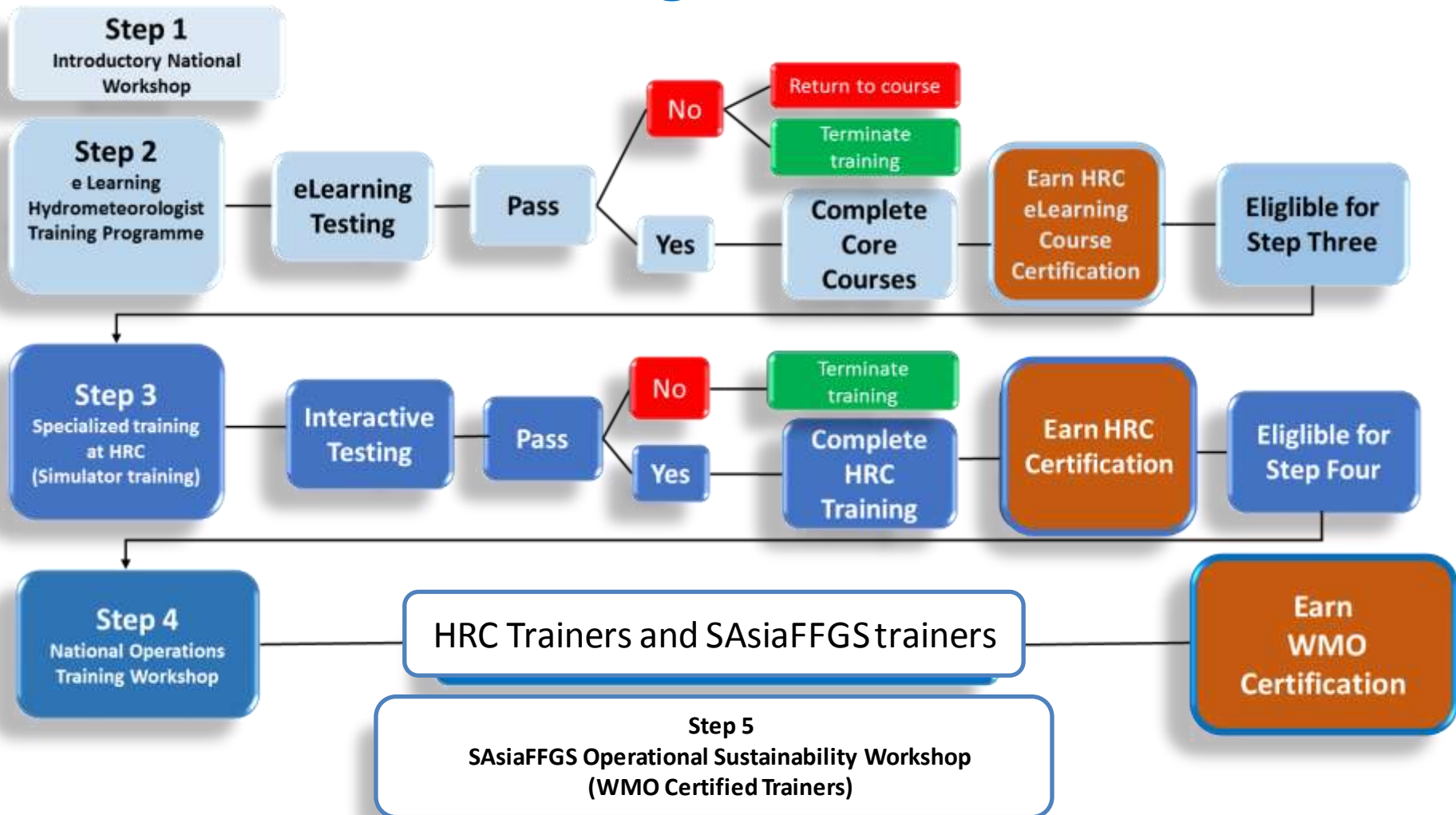
- Prepare and issue flash flood warnings and alerts to the public and national agencies including DMA,
- provide historical and in-situ local data to the FFG system developer through the RC,
- participate in the Flash Flood Hydrometeorologist Training Programme (Steps 1-5), and
- conduct verification studies.



## The Regional Centre is to:

- Provide FFGS forecast products and data to the participating countries,
- collaborate with WMO and its project partners to implement flash flood hydrometeorologist training programme,
- evaluate FFG products from the regional perspective and conduct verification study in collaboration with the participating NMHSs, and
- have good IT infrastructure for data exchange and internet connection.

# Flash Flood Hydrometeorologist Training Programme



# eLearning (Distance Learning) (Step-2 Training)

## Elements of Meteorology

- Factors necessary to produce heavy rainfall
- Elements necessary for deep moisture convection
- Characteristics of flash flood producing storms
- Examples of flash flood producing storms
- Meteorological processes that contribute to flash floods

## Elements of Hydrology

- Water cycle
- Surface hydrology
- Sub-Surface hydrology
- Flash Floods-unique properties.

## GIS

- Description of GIS-introduction of concepts and application of QGIS
- Applied use of GIS-as related to flash floods
- Manipulation of the Flash Flood Guidance products data using QGIS
- Practical exercises.

## Remote Sensing

- Satellite rainfall
- Radar rainfall
- Land Surface Remote Sensing

## FFGS

- Description of FFGS concepts and applications
- Types of analysis available using the FFG model
- Practical exercises using the Flash Flood Guidance model.



# Participants of On-line (Step 2) and Operational Training at HRC (Step 3)

Country	Names
Bangladesh	Mr Mohammad Arifuzzman
Bangladesh	Ms Tahiya Tarannum
Bhutan	Mr Sonam Tashi
India	Mr Askor Raya Subbarayan Kumarasamy
India	Ms Hemlata Motiram
Nepal	Mr Bikash Nepal
Nepal	Mr Sunil Pokharel
Sri Lanka	Mr Malinda Millangoda
Sri Lanka	Ms Prema Hettiarachchie

San Diego, CA, USA, March 2018





# Objectives of the Workshop

- **Objectives of the SAsiaFFG Step 4 Training are:**
- Review the SAsiaFFG technical background and system development;
- Operational use of the SAsiaFFG products through hand-on exercises;
- Review and evaluate the SAsiaFFG products for elected past events through case studies;
- Evaluate the performances of participants who successfully completed Step 2 and Step 3 training to be qualified for the WMO Certified Trainer.



# Thank you

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**WMO OMM**

World Meteorological Organization

Organisation météorologique mondiale

For more information please visit:

<http://www.wmo.int/ffgs>

<http://www.hrcwater.org>