

# GLOBAL FLASH FLOOD GUIDANCE AND EARLY WARNING PROGRAMME PARTNERSHIP

## THE NEED

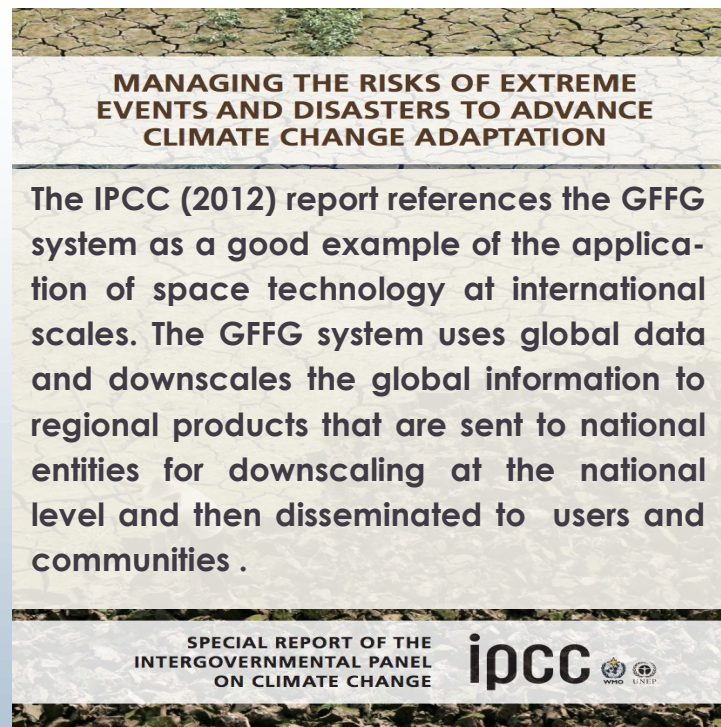
- ◆ Flash floods are among the top weather-related hazards globally and have the highest mortality rate (deaths/people affected).
- ◆ Flash floods kill an average of 5,000 people per year around the world impeding economic development.
- ◆ Flash floods claim lives in high latitude regions and the tropics, in the developing world and in industrialized nations; affecting the lives and properties of people and destroying public infrastructure.
- ◆ Most countries still lack the capability to observe, evaluate and predict flash flooding, issue flood warnings, and coordinate response.
- ◆ Least developed and developing countries suffer the greatest loss of lives and livelihoods due to lack of resources to detect imminent flash floods and to warn the population at risk.

This need led to the development and implementation of the

**Global Flash Flood Guidance (GFFG) System Programme.**

## The Global Flash Flood Guidance (GFFG) System Programme: An Expanding Network of Partners

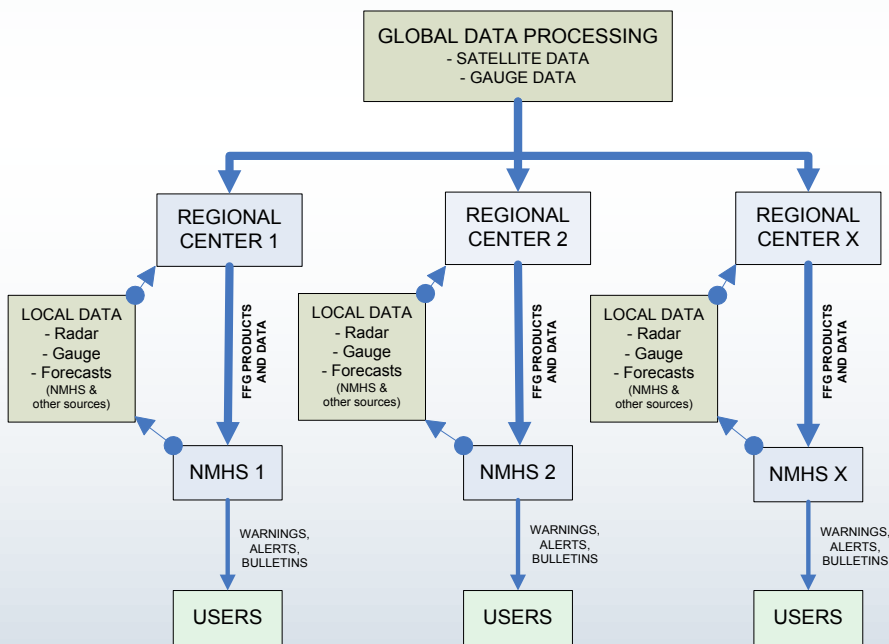
In February 2009, a Memorandum of Understanding (MOU) was signed among the World Meteorological Organization, the U.S. Agency for International Development/Office of U.S. Foreign Disaster Assistance, the U.S. National Oceanic and Atmospheric Administration/National Weather Service, and the non-profit Hydrologic Research Center (HRC) to work together under a cooperative initiative to aid in reducing loss of lives due to flash floods globally. Under this MOU the four organizations are collaborating in the design, development, and implementation of the GFFG worldwide.



*The GFFG programme is a public benefit effort on the part of all the partners.*

## Overview of the GFFG Programme

The GFFG Programme is an approach to address flash floods on a global scale with regional components. Doing so allows the programme to be done more cost-effectively and is more sustainable. The implementation of Flash Flood Guidance Systems globally is a programme to provide a guidance tool for National Meteorological and Hydrological Services to develop flash flood warnings. The programme partners' approach is to develop an end-to-end system that provides the data and information, analyses, communications and protocols to provide accurate and timely warnings.



GFFG Programme Schematic Showing the Flow of Data and Information from Global to Regional to Local Users

## GOAL OF THE GFFG PROGRAMME

The GFFG programme goal is to implement technologies that provide guidance for early warnings of flash floods in countries where no such flash flood early warning capacity exists. The four partners work together and collaborate with Meteorological and Hydrological Services in order to ensure success.

HRC has developed the computational modules of the GFFG system, implements the systems and provides forecaster training. The other partners provide the needed expertise for the political, technical, and administrative aspects of the programme. This includes access to in-situ and remotely sensed global data for system implementation and operation.

*GFFG implementations are cooperative development programmes in order to build capacity within the NMHSs for detecting and warning for flash floods.*

## Flash Flood Guidance System Components

### Flash Flood Guidance

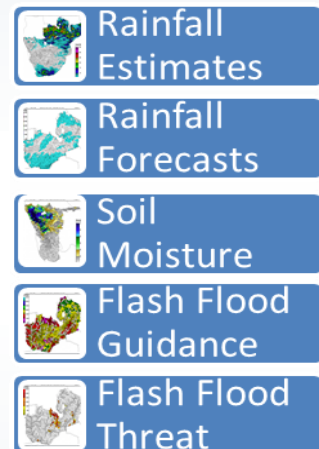
Flash Flood Guidance is the amount of rainfall for a given duration over a small basin needed to create minor flooding (bankfull) conditions at the outlet of the basin. For flash flood occurrence, durations up to six hours are evaluated and the basin areas are of such a size to allow reasonably accurate precipitation estimates from remotely sensed and in-situ data. Flash Flood Guidance then is an index that indicates how much rainfall is needed to cause minimal flooding in a basin.



Credit U.S. Geological Survey

Measuring Bankfull Flow

The technical components of the flash flood guidance system utilize the available real-time data from onsite gauging stations and from remote sensing platforms (e.g., radar or satellite) together with soil moisture accounting models to produce flash flood guidance estimates of various durations over small flash-flood-prone catchments. The system can use these estimates, together with observed or short term forecasts of precipitation to produce flash flood threat in a given catchment.

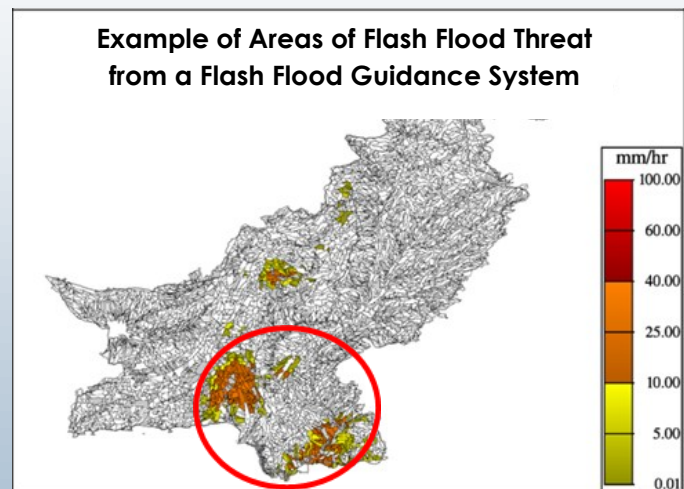


Core Flash Flood Guidance System Products Available to Forecasters to Develop Flash Flood Warnings

### Flash Flood Threat

Flash Flood Threat is the amount of rainfall of a given duration in excess of the corresponding Flash Flood Guidance value. The flash flood threat, when used with observed or forecast rainfall, then is an index that provides an indication of areas where flooding is imminent or occurring and where immediate action is or will be needed.

Example of Areas of Flash Flood Threat from a Flash Flood Guidance System



## Regional Implementations of the Flash Flood Guidance System

The partners have been implementing regional elements of the global system in various locations throughout the world. These projects are in varying stages of development and implementation including:

- Central America (7 countries)
- Southeast Asia (5 countries)
- Chiapas, Mexico
- Hispaniola (2 countries)
- Southern Africa (7 countries)
- Black Sea/Middle East (8 countries)
- South Asia (7 countries)
- Southeast Europe (9 countries)
- Central Asia (5 countries)



As the implementations of regional and national programme components increase, the number of Regional Centers and National Meteorological and Hydrological Services (NMHSs) that are the project partners is steadily increasing.

---

### CONTACTS

Dr. Wolfgang Grabs, WMO, [wgrabs@wmo.int](mailto:wgrabs@wmo.int) Dr. A. Sezin Tokar, USAID/OFDA, [stokar@usaid.gov](mailto:stokar@usaid.gov)  
Dr. Konstantine Georgakakos, HRC, [kgeorgakakos@hrc-lab.org](mailto:kgeorgakakos@hrc-lab.org)

---



IPCC, 2012: Managing the Risks of Extreme Events and Disasters to Advance Climate Change Adaptation. A Special Report of Working Groups I and II of the Intergovernmental Panel on Climate Change [Field, C.B., V. Barros, T.F. Stocker, D. Qin, D.J. Dokken, K.L. Ebi, M.D. Mastrandrea, K.J. Mach, G.-K. Plattner, S.K. Allen, M. Tignor, and P.M. Midgley (eds.)]. Cambridge University Press, Cambridge, UK, and New York, NY, USA, 582 pp.