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Mitigating the impacts of floods in South and Southeast Asia

The challenge

One-third of the world's terrain is considered flood-prone, and around 80% of the global population lives on this land. In the last decade of the twentieth century alone, about 1.4 billion people were directly or indirectly affected by floods and about 100,000 lost their lives.

Floods in South and Southeast Asia cause immense damage and distress. However, they are also part of a natural cycle that delivers tangible benefits to ecosystems and the communities that depend on them. The challenge, therefore, is to mitigate the deleterious impacts of floods while retaining the benefits that inundation can bring.

One critical aspect of this is flood insurance. For poor communities, affordable insurance for flood-related crop loss is rarely available. However, if insurers could more accurately identify the recurring patterns of floods in a particular area, they would be better placed to offer farmers reasonably priced products for extreme weather events. This would help communities manage land development more effectively, and allow home owners to make better informed financial decisions regarding the protection of their property.

Further research is needed to provide disaster agencies and agricultural insurers with the following:

(a) Good quality, high-resolution maps and satellite images.

(b) Better classification of urban and industrial areas and settlements that are inundated, which were derived from up-to-date flood footprint satellite images.

(c) Computer models that can generate an overview of flooded areas quickly and precisely to assess damage and better estimate future flood risk.

Did you know?

- Floods, which are often seen as merely destructive, can also be beneficial and contribute to irrigation, flood recession farming and fisheries.
- Solutions to flooding issues can, if chosen wisely, yield significant benefits for drought protection, agricultural production and ecosystem health. However, the spatial distribution of costs and benefits is often very uneven.
- In South and Southeast Asia, many communities make full use of the annual cycle of floodplain inundation and recession for crop cultivation, fisheries and livestock husbandry.
- In the Lower Mekong River Basin:
  - Annual costs of floods: USD 60-70 million.
  - Annual benefits of floods: USD 8-10 billion.

Objectives of the research

- Provide national and regional decision makers with accurate information to understand the benefits of inundation, as well as the need to provide protection from the damaging impacts of floods.
- Help farmers in selected areas to optimize the use of floodwaters for growing crops.
- Assist insurance companies to assess and monitor risks when floods damage agricultural land.

Floods in Pakistan in 2010 as viewed by Landsat 5 satellite imagery (*source*: Image provided by the United States Geological Survey [USGS] Landsat Program).

Our approach

Until recently, flood mapping using satellite imagery could only show the areas covered by water, but not the depth.

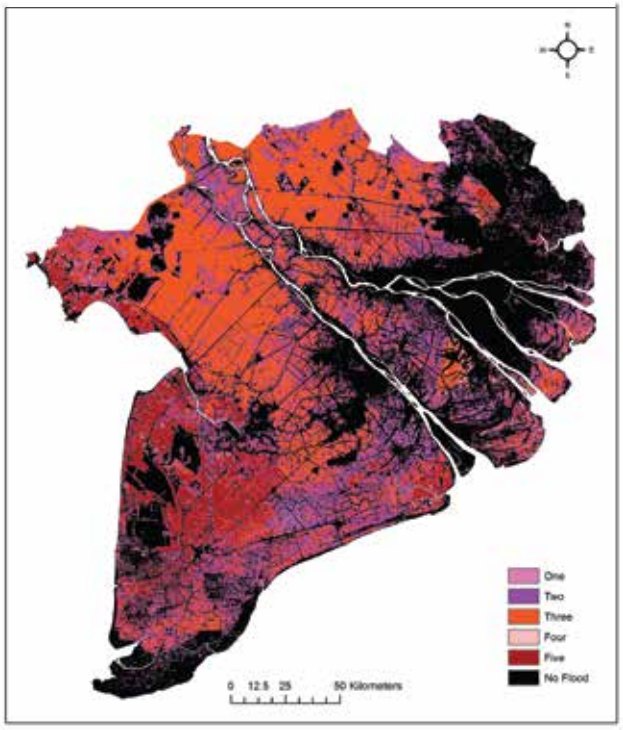
Digital geospatial flood inundation mapping is a powerful new approach that can show the extent and depth of floodwaters on the land surface in real time. Flood inundation can be mapped between 10 m and 250 m in near real-time. This technology has already proved its worth as a tool for relief and emergency services.

Our research will evaluate this new technology more broadly, both for the above and for agricultural flood insurance.

The International Water Management Institute (IWMI) is using the above techniques, along with constantly updated remote sensing datasets for South and Southeast Asia, to analyze flooding patterns in more detail. Further analysis will show how changes in population, land use or climate may affect future inundation patterns. Based on this, IWMI is partnering with government agencies, disaster management centers and private insurers, so that these tools can be used to help inform decision making. The flood maps developed will enable a consistent, risk-based approach to be implemented.

A number of products and services that are relevant to floods will be provided via IWMI's Water Data Portal:

- Online flood inundation mapping products and tools for South and Southeast Asia are freely available via IWMI's website:
  waterdata.iwmi.org/pages/Products.php
- Data provided by optical and radar satellites will be used to generate timely maps of flood inundation.
- Optical satellites will map flood-risk areas, and assess the damage and impact.
- Radar images can be used in all weather conditions, and are thus highly suitable for ongoing flood mapping and monitoring when cloud cover may obscure land images.



Inundation patterns in the Mekong Delta over the course of 5 years (2007-2011). Dark areas were never, or only very rarely, detected as being inundated, whereas colored regions were inundated up to 65 times. Areas most frequently flooded during the rainy season are located in the northern and southwestern Mekong Delta.

Photo: CC: Sarah Depper on Flickr

Our partners

National Disaster Management Office, Lao PDR; Department of Disaster Management, Maharashtra, India; Department of Disaster Management, Bangladesh; Disaster Management Centre, Sri Lanka; Irrigation Department, Sri Lanka; United Nations Office for Outer Space Affairs (UNOOSA); World Bank; and various nongovernmental organizations and specialized research institutions, including the National Agriculture and Forestry Research Institute (NAFRI), Lao PDR; and the Indian Council of Agricultural Research (ICAR), India.

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The CGIAR Research Program on Water, Land and Ecosystems (WLE) combines the resources of 11 CGIAR centers, the Food and Agriculture Organization of the United Nations (FAO), the RUAF Foundation, and numerous national, regional and international partners to provide an integrated approach to natural resource management research. WLE promotes a new approach to sustainable intensification in which a healthy functioning ecosystem is seen as a prerequisite to agricultural development, resilience of food systems and human well-being. This program is led by the International Water Management Institute (IWMI) and is supported by CGIAR, a global research partnership for a food-secure future. wle.cgiar.org

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