



To view online and download Alerts, go to [www.unep.org/GEAS/](http://www.unep.org/GEAS/)

Sign up at [www.unep.org/GEAS](http://www.unep.org/GEAS) to receive Alerts through your E-mail

### IN THIS ISSUE

---



## Near Real-Time Environmental Event Alert

### Pakistan's Flood of the Century is a Global Disaster

Satellite images show the inundation of 160 000 km<sup>2</sup> of land in northwestern Pakistan, where the worst flooding in a century has killed at least 1 600 people, left two million homeless and affected 15 to 20 million

### Did You Know?

Rwanda in Central Africa receives the most flashes of lightning per square kilometre, while the polar regions receive the least (NASA 2009).



# Near Real-Time Environmental Event Alert

Thematic Focus: Disasters and Conflicts and Environmental Governance

## Pakistan's Flood of the Century is a Global Disaster

### Why is this issue important?

Northwestern Pakistan experienced its worst flooding in a century in late-July and early-August 2010. Unusually heavy monsoon rains led the Indus River to inundate areas far beyond its banks affecting the densely populated Punjab and other regions. More than 1 600 people have died, 2 million are homeless, and from 15 to 20 million people are affected (UN 2010). The floodwaters destroyed large parts of the infrastructure and crops in Pakistan's breadbasket.

The issue is a significant environmental disaster, since the area is primarily based on an agrarian economy. Some 6 879 655 ha of agricultural land have been submerged. In the Punjab alone, almost 404 685 ha of cotton-growing land was affected. The flood-affected lands could lose their crop and livestock producing capacity, with severe long-term impacts on both the environment and livelihoods. In addition, the floods will force more people to move to already crowded urban areas.

Figure 1: The districts affected by the Indus flooding. The flood wave initiated by the heavy rains can be tracked by river gauges as it perpetuates downstream (Source: OCHA 2010).





Figure 2: Satellite imagery (MODIS Terra) showing the extent of the flooded area in the worst affected area around the city of Sukkur (bottom, acquired 17 August 2010) in comparison to the river water one year earlier (top, acquired 18 August 2009). Note that clouds appear as turquoise-white (Source: NASA 2010).

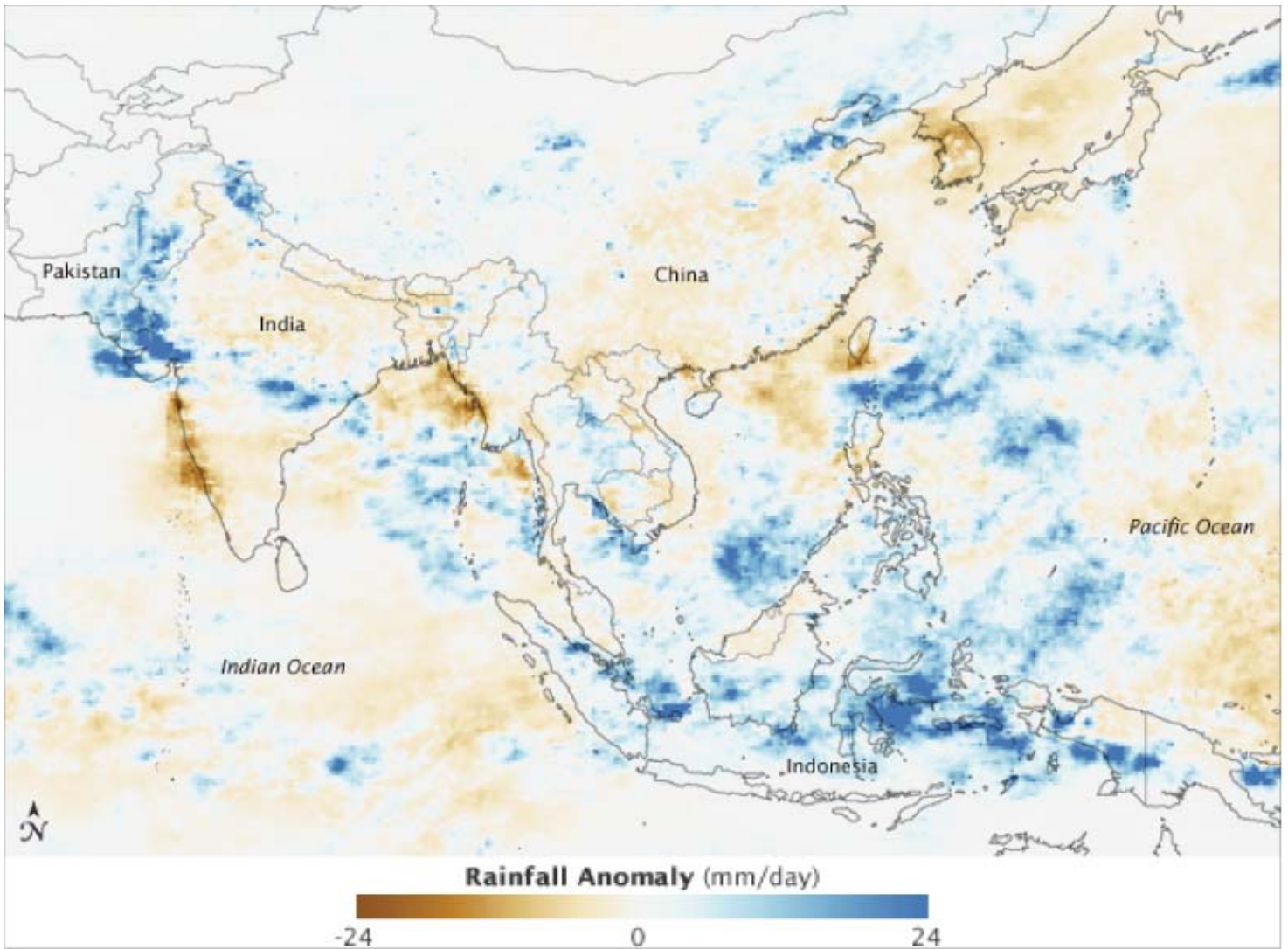
### What are the findings and implications?

The unusually high monsoon rains responsible for the flooding are part of an anomalous weather pattern across Asia causing floods and landslides in China and North Korea and heavy rains in Indonesia. Figure 3 shows the difference in rainfall from the regional average, illustrating the enhanced Asian Monsoon originating over the Indian Ocean. High summer temperatures on the Eurasian continent that suck in colder, moist air from the ocean, fuel the monsoon.

Not surprisingly, the heavy rains coincide with a heat wave in Russia.

By mid-August, 160 000 km<sup>2</sup> of land was inundated, an area larger than England, and the number of people needing shelter, food and emergency care exceeded the combined numbers affected by the Indian Ocean tsunami (2004), the Kashmir earthquake (2005), Cyclone Nargis (2008), and the Haiti earthquake (2010) (UN 2010).





**Figure 3: Rainfall patterns in Southeast Asia showing the rates of divergence from the average rates in the period 1-9 August 2010. Pakistan and Indonesia experienced especially high rainfall rates over the week (Source: NASA 2010).**

In 2009, the Food and Agriculture Organization of the United Nations (FAO), the World Food Programme (WFP), and the National Disaster Management Authority (NDMA) conducted a pilot project to strengthen response to riverine floods and hill torrents in the Rajanpur (Punjab) (FAO 2009). This newest disaster, however, overwhelmed domestic, NGO and UN response capacities. A lesson learned from the disaster is that although such events are rare and unpredictable, there is a need for renewed and up-scaled disaster preparedness, especially in light of the potential impacts of climate change on flooding patterns.



**A child sleeps on a bed surrounded by floodwater in his home in Khwas Koorona Village, Pakistan. An estimated 2.5 million of the province's 3.5 million residents have been affected by the disaster (Source: UNICEF 2010 via Flickr).**

**Near Real-Time Environmental Event Alert**

FAO. (2009). FAO Representation – Pakistan. Monthly Newsletter, Issue 2, February 2009. <http://un.org.pk/> (Accessed on 20 August 2010)

NASA. (2010). All images for Flooding in Pakistan : Natural Hazards. Available at: <http://earthobservatory.nasa.gov/> (Accessed on 12 August 2010).

OCHA. (2010). Pakistan: Situation Overview By Province - 20 August 2010. <http://www.reliefweb.int/> (Accessed on 23 August 2010).

UN. (2010). General Assembly calls for strengthened emergency relief to meet Pakistan's urgent needs after massive destruction caused by unprecedented, devastating floods. UN sixty-fourth General Assembly, 19th August 2010. <http://www.un.org/> (Accessed on 22 August 2010)

**Did You Know**

NASA. (2009). NASA Researchers Explore Lightning's NO<sub>x</sub>-ious Impact on Pollution, Climate. [http://www.nasa.gov/topics/earth/features/nox\\_lightning.html](http://www.nasa.gov/topics/earth/features/nox_lightning.html). (Accessed on 28 October, 2010)