Geophysical Research Abstracts
Vol. 13, EGU2011-4861-2, 2011
EGU General Assembly 2011

Too Much Water, or Too Little Water? Droughts and Floods in the Ganges-Brahmaputra-Meghna Basin

Ali S Akanda (1), Dinesh Prashar (1), Shafiqul Islam (1,2)

(1) Tufts University, Civil and Environmental Engineering Department, Medford, MA 02155, USA (ali.akanda@tufts.edu) ,
(2) Tufts University, Water Diplomacy, The Fletcher School of Law and Diplomacy, Medford, MA 02155, USA

The Ganges-Brahmaputra-Meghna basin region of South Asia is home to over 500 million people. Water is intricately linked with the overall development framework of this region. Despite being known as a "water-rich" part of the planet, this region faces severe water shortages during the prolonged dry season, followed by intense monsoon precipitation and rapid rise in streamflow volumes. Bangladesh, the lowest riparian in the river system, experiences disastrous droughts and floods almost every year causing immense suffering to its population. Existing deterministic flood forecasts with short lead-times (3-7 days) and a poor dissemination network are insufficient for adequate contingency planning. In addition, no operational capability exists for forecasting dry season flow in these rivers. The strong seasonal and inter-annual variability of these large transboundary river basins pose a great challenge to water users and managers alike on how to best manage the water resources in a sustainable manner. Rapid urbanization, increasing water demand and upstream diversions, an uncertain climate future, and geopolitical realities further complicate the situation, putting hundreds of millions at risk in this region.

This study focuses on the Ganges-Brahmaputra-Meghna system to investigate how a seasonal forecasting approach can aid water resources planners and policy makers of this region. We compare precipitation, streamflow, snow cover, temperature data, as well as relationships with regional climatology at monthly, seasonal, annual and decadal scales to analyze possible impacts on river basin management, public health, agricultural, and ecosystem parameters. We describe the variability of low flow in the Ganges and the Brahmaputra and attempt to identify the primary drivers of discharge during the dry season. We present a model to estimate and forecast dry season discharge using parameters that can overcome the restrictions placed by lack of ground observational data. Preliminary results show a strong potential of forecasting dry season flow in the Brahmaputra based on remotely sensed snow cover estimates and air temperature in the upper Himalayas. Streamflow forecasts with monthly to seasonal lead-times and an effective disseminating system can improve the situation by providing the necessary time for dry season water management, crop plantation, public health intervention, and river navigation.