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SERVIR's flood forecasting system proving itself in Bangladesh

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SERVIR's Jason-2 satellite-based flood forecasting system, now under testing in Bangladesh, accurately detected the monsoonal flood wave swelling from the north in the upstream Indian region of the Brahmaputra basin and tributaries last week. Heavy rain, continuing to pour for days across Bangladesh and in areas of India, engorged the Brahmaputra, Jamuna (the local name for Brahmaputra inside Bangladesh), and Teesta rivers. Rushing waters disintegrated several flood control embankments. According to the Daily Star Newspaper of Bangladesh, over 3500 families have already been displaced, and many acres of crop fields have been damaged.

To supplement their current flood forecasting system, which is limited in its ability to detect flood waves propagating upstream from within India, the Flood Forecasting and Warning Center (FFWC) /Bangladesh Water Development Board is testing SERVIR's Jason-2 forecasting application. The system is being used experimentally during this 2014 monsoon season in preparation for operational use next year.

So far, it's passing with flying colors -- even helping -- during this monsoon season.

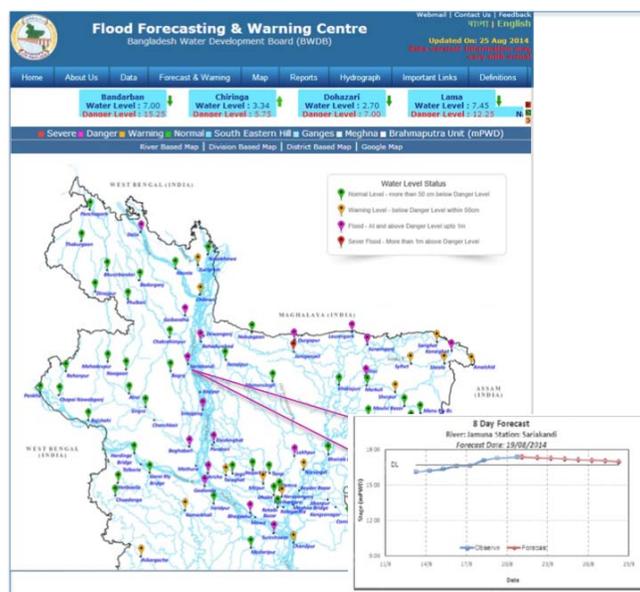
"Jason-2 data ... is helping to grow our confidence in our river level projections," explains FFWC senior engineer Arifuzzaman Bhuiyan. "We have to ... convey information...about what the situation will be. This answer we cannot give properly using our existing 3/5 days forecast. Here we apply the judgment based on Jason-2- and weather-based forecast information. To predict Brahmaputra/Jamuna River levels is a major challenge during monsoon, and Jason-2 is doing well."



Photo credit: IWM

Current flood warnings in Bangladesh are issued only 3 to 5 days in advance. Longer lead times are needed for better flood management. Unfortunately, although the rivers that feed the flooding in Bangladesh originate far beyond the country's borders, the data on river levels in upstream countries is not available in real-time from conventional ground-based networks.

Bypassing the need for ground-based data from beyond Bangladesh's borders, the Jason-2 system overcomes this problem.



This graph depicts the Jason-2 river level forecast as waters rose in recent days.

"Jason-2's radar altimeter measures the precise distance between the satellite and the river surface at points where the satellite crosses overhead," explains SERVIR Applied Sciences Team Member Faisal Hossain. "The data, available almost immediately, reveals the river's height at the point of crossing, so flood risks downstream can be assessed."

Jason-2 tracks levels of the Ganges and Brahmaputra Rivers more than 600 miles upstream of Bangladesh and produces daily 8-day flood forecasts of water levels for several water stations. And best of all, the system requires only 30 minutes of processing time.

Since June 2014, FFWC has been successfully producing 8-day Jason-2 based forecasts of water levels at major river locations of Bangladesh on a daily basis and making this information available on their [website](#). This is made possible with the technical support from the Institute of Water Modeling (IWM) of Bangladesh and SERVIR. IWM has helped lay the solid technical foundation for FFWC to manage the Jason-2 system independently.

FFWC is now using the satellite technology and the processing tools on its own. The 8-days advance notice is the longest lead time FFWC has ever been able to produce. After the system performance evaluation is completed this monsoon season, FFWC hopes to launch a full scale Jason-2 based forecasting system for the public for 2015.

Hossain and his team of remote sensing experts, with active support from the SERVIR project and the International Centre for Integrated Mountain Development (ICIMOD), developed the Jason-2 satellite-based solution. Based on successes so far, Hossain has even bigger plans for the future.

His plans include a series of "star" altimeters – including the ICESat-2 laser altimeter, Jason-3, Sentinel 3A/3B, Cryosat-2, and SWOT -- that will be launched within the next 2 to 6 years. This constellation of altimeters will provide an unprecedented global view of Earth's surface water, which is being redistributed by humans via diversion, withdrawal, and release from dams. As human regulatory controls on water render the use of stand-alone hydrologic-hydraulic models less adequate, the ability of these additional "eyes in the sky" to provide more frequent, accurate observations becomes increasingly important.

"This suite of altimeters will constitute a unique 'compound eye' on many of the tricky surface water problems that otherwise can't be solved in an easy and cost-effective way," says Hossain. "Considering what our single altimeter system is accomplishing, imagine what we can do with a whole constellation of altimeters. We can offer forecasting improvements for agencies worldwide and empower them with tools that allow independent management. FFWC's success with Jason-2 this year proves that it is possible."

NOTES:

SERVIR is a joint development initiative of [NASA](#) and [USAID](#), working in partnership with leading regional organizations around the globe, to help developing countries use information provided by Earth observing satellites and geospatial technologies for managing climate risks and land use.

See <https://www.servirglobal.net/Global/Articles/tabid/86/Article/1320/bangladesh-flood-forecasting-and-warning-center-adopts-satellite-based-flood-fo.aspx> for more information about the Jason-2 system and how it works.

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