

Report – Flood Working Group



CAPACITY BUILDING IN ASIA

“EARTH OBSERVATIONS IN THE SERVICE OF WATER MANAGEMENT”

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Questions for flood WG (1/2)

- 1. How reliable are the forecasts of floods? How can Earth Observations be used to make them more accurate?**
- 2. How do satellite systems support early warning systems for floods?**
- 3. Often local conditions (e.g. moist ground, etc.) create vulnerabilities in advance of large flood events. To what extent can flood vulnerability be assessed by Earth Observations? What steps are needed to take full advantage of satellite data for monitoring vulnerability?**
- 4. What are the main causes of damage arising from floods? How is satellite information used in monitoring the damage due to floods? What can be done to increase its usefulness? Are there new types of sensors and satellite missions that you would recommend to improve their effectiveness?**

Questions for flood WG (2/2)

- 5.** What developments (e.g., new sensors, new missions, new networks, research, etc) are needed to enable Earth Observations (satellite and in-situ data) to make more significant contributions to flood analysis and management?
- 6.** Are there limitations in flood information services at national and local levels that arise because of data and information communication problems? What is the nature of these problems and what can be done to overcome them?
- 7.** Do any aspects of flood management in East Asia need to be dealt with on a transnational or international basis? Are there ways in which GEO, IGOS-P and WMO can help in addressing these problems?
- 8.** Are floods increasing in Asia? What is the evidence? What aspects of the impacts of these events could be mitigated by the more effective use of satellite and in situ information? What would be the components of an ideal system that would ensure that these benefits were realized?

SATELLITE SYSTEMS AND EARLY WARNING (1/4)

- **Mr. Kera of IFNet/IDI reported the significance of GFAS (Global Flood Alert System). GFAS offers an end-user-friendly web-based service to deliver satellite-based rainfall product including a service to deliver e-mails to alarm extremely heavy rainfall events. Although this is just a heavy rainfall alert, this will be a good trigger information for real flood forecasting and warning in a river.**
- **In most parts of Asia, flood forecasting, warning and response systems are yet to be established. The existing flood forecasting and warning systems are also limited to forecasting water levels in some major rivers, which is difficult for the end users to interpret.**
- **Hence, the most important issue in Asia is to expand the network of flood forecasting and warning systems.**

SATELLITE SYSTEMS AND EARLY WARNING (2/4)

- **Reliability of flood forecasts, basically, depends on the availability and reliability of meteorological and hydrological data. In the case of flash floods, rainfall forecast is indispensable. Their accuracy is not sufficient yet. Further refinement are required.**
- **Although the accuracy of satellite-based rainfall product is not fully clarified and to be further studied, such a new data could be still of some help for ungauged basins.**
- **Experiences from India suggest that satellite data are found to be useful in GLOF monitoring.**

SATELLITE SYSTEMS AND EARLY WARNING (3/4)

- **Compromise might have to be made between lead time and accuracy in flood forecasting.**
- **Combination of satellite-based rainfall product with ground-based observation would help to increase the accuracy of the product.**

Suggestions

- **IFNet/GFAS should prepare web-based feedback system for end users. The group members should give feedbacks to IFNet regarding GFAS.**
- **A balance has to be maintained between R&D and operation so that the end users get benefited from the recent technological advances.**

SATELLITE SYSTEMS AND EARLY WARNING (4/4)

- **Satellite-based rainfall data could be a source for near real time flood forecasting, especially, for ungauged or poorly-gauged river basins, which could in turn enable to implement the primary early warning systems even for ungauged basins. Further improvement of data availability and accuracy are required.**
- **Satellite images capturing the peak stage of flood can be used for flood risk assessment and planning mitigation measures.**
- **Remotely-sensed data can be used for calibrating flood analysis models.**
- **Satellite data can be used to monitor the catchment and flood plain dynamics.**
- **Community based approach for flash floods is required.**

FLOOD VULNERABILITY ASSESSMENT

- **Initial conditions play important roles in generating floods. But the knowledge and technology to collect data on a wider scale, quantify and model these conditions are limited. Not event-based but continuous modeling approach would take care of the impact of initial conditions.**
- **Low frequency microwave satellite data could be of use to correlate soil moisture to runoff estimation.**
- **The impact analysis of the change of catchment conditions such as land use on hydrology and water resources is one of the promising applications of satellite data.**
- **Satellite data are useful for mapping elements at risk and for performing risk and loss assessment studies, planning mitigation measures and carrying out their benefit cost analysis.**

MAIN CAUSES OF FLOOD DAMAGES

- Population growth and increased urbanization**
- More people living on marginal lands prone to flood hazards**
- Unplanned settlements**
- Increased environmental degradation**
- Higher vulnerability of industrialized societies**
- Maybe, global warming and climate change**

INCREASING USEFULNESS OF SATELLITE INFORMATION

Disseminating information on existing state of the art technology and available products and their applications would enhance full utilization of the satellite derived information.

It is important to shorten the delay time of the data delivery, to improve the time & space resolution of the data and to improve the retrieval accuracy.

Flood damage monitoring would require timely and cloud free/MW, high resolution images, which are not easily available at present. Even if available, they are not cost efficient for the developing countries.

To take advantage from the JAXA's satellite data, authorized members of the Sentinel Asia can request JAXA to observe a disaster area. Also user agencies can benefit from the satellite data posted in Sentinel Asia's Website.

Expertise and capabilities development at individual and institutional level for making better use of satellite data deserve due attention.

Developments required for Earth Observations

- **The realization GPM project is crucial for the implementation of flood forecasting and warning system in ungauged or poorly-gauged river basins, including transboundary ones.**
- **More microwave imaging sensors and their processing systems are required for cloud-free flood disaster monitoring in a timely manner.**
- **Capacity building on the state-of-the-art technologies of satellite data and their processing and capabilities are required for developing countries.**

FLOOD INFORMATION SERVICES

- **Many countries do not have such information services at local levels**
- **Those at the central level also suffer from non-availability of real time reliable data**
- **There exists communication gap between data providers, agencies and the end users**
- **Acceptable risks and thresholds need to be defined**
- **Lack of well developed evacuation routes and shelter areas inhibit evacuation and post disaster activities**
- **Lack of coordination between central and local bodies, between local bodies and communities often makes the information services almost non existent.**

OVERCOMING THE LAPSES IN INFORMATION SERVICES (1/2)

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OVERCOMING THE LAPSES IN INFORMATION SERVICES (2/2)

It was suggested that an inventory of existing information services be prepared for the region. ICHARM would take a role in this investigation on the basis of cooperation of the group members.

Emphasis must be given in educating people about what to do when a warning comes. Without this even a sophisticated warning system is of no use.

TRANSNATIONAL ASPECT OF FLOOD MANAGEMENT

In order to improve the forecast accuracy and lead time, real time water level/rainfall data from further upstream is required and it suffers from problems of data communication and exchange, especially, in transboundary river basins.

There is a need of improved cooperation for real time data exchange and transmission among nations of the region.

Recommendations (1/2)

- **High resolution satellite data are important for flood damage reduction and risk management . These data can be utilized for preparing existing infrastructures inventories, especially, in high risk areas. Space agencies are requested to make such basic data easily accessible and available on a basin scale.**
- **Space agencies are requested to make available data for disaster management purposes especially rainfall and flood inundation in real time.**
- **The realization GPM project is crucial for the implementation of flood forecasting and warning system in ungauged or poorly-gauged river basins, including transboundary ones.**
- **More microwave imaging sensors are required for cloud-free flood disaster monitoring in a timely manner. Besides, their processing and application system for flood analyses are also required.**

Recommendations (2/2)

- **Capacity Development on data acquisition, information extraction and end user product generation for flood analysis and risk reduction is urgently required in almost all of the developing countries in Asia.**
- **Considering the disparity in existing capabilities among different countries as well as their varied needs, it is recommended to work out capacity development programs based on prior need assessment.**
- **Incorporating the above mentioned requirements, it is proposed to develop some demonstration projects in conjunction with the framework of AWCI, Sentinel Asia , etc. for the evaluation of applicability of earth observations in flood risk reduction.**