

International Workshop
on

CAPACITY BUILDING IN ASIA

"EARTH OBSERVATIONS IN THE SERVICE OF WATER MANAGEMENT"

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Working Group Report on Flooding

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1. SATELLITE SYSTEMS AND EARLY WARNING

- 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.
- 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 refinements 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.
- 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-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.
- Geostationary meteorological satellites' data and optical sensors' data aboard other earth observational satellites have also taken important roles to supplement microwave information and to evaluate hydrological conditions on land such as land use, vegetation cover, evapotranspiration, etc.
- Community based approach would be suitable for flash floods as it asks for immediate action at the community level.

2. 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.
- Detailed spatial information on flood hazard and vulnerability is necessary for the planning and implementation of flood management works as well as for defining the roles

of different stakeholder's in it. 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.

- A quick appraisal of the situation using satellite data after a flood disaster could be meaningful in resource allocation for rehabilitation and reconstruction.

3. 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
- Socio-economic vulnerability imparts greater impact on damage and economic loss

4. 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 and space resolution of the data and to improve the retrieval accuracy.
- Flood damage monitoring would require timely and cloud free, microwave 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.

5. 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.

6. FLOOD INFORMATION SERVICES

- Many countries do not have such information services at local levels.
- Those at the central government required to make decisions also suffer from non-availability of real time reliable data.
- There is communication gap between data providers, agencies and the end users.
- Acceptable risks and thresholds for warnings need to be defined in consultation with affected communities for FIS to be effective.
- 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 lose the potential impact they can have in risk reduction.

7. OVERCOMING THE LAPSES IN INFORMATION SERVICES

- 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.
- Linkage with WMO-HYCOS projects is highly recommended for effective implementations of hydrologic monitoring system.
- 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.

8. 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 Tran boundary river basins.
- There is a need of improved cooperation for real time data exchange and transmission among nations of the region.

RECOMMENDATIONS AND ACTION PLAN

- 1) 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.
- 2) Space agencies are requested to make available data for disaster management purposes especially rainfall and flood inundation in real time.
- 3) The realization GPM project is crucial for the implementation of flood forecasting and warning system in ungauged or poorly-gauged river basins, including Tran boundary ones.
- 4) More microwave imaging sensors are required for cloud-free flood disaster monitoring in a timely manner. Besides, their processing and application systems for flood analyses are also required.
- 5) 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.
- 6) 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.
- 7) 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.
- 8) In order to implement the demonstration projects, some volunteer members would draft a proposal as a GEO demonstration project starting from the fiscal year 2008. The preliminary draft would be reviewed by the volunteer members and be proposed at the next Flood WG, which is planned to be held, hopefully, in the 2nd Asian Water Cycle Symposium at Tokyo in January 2007.