

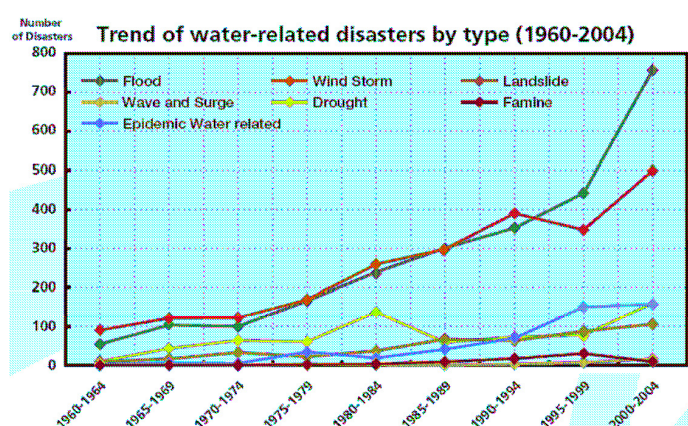
## A NEW MECHANISM FOR SOUND AND SUSTAINABLE INTEGRATED FLOOD MANAGEMENT

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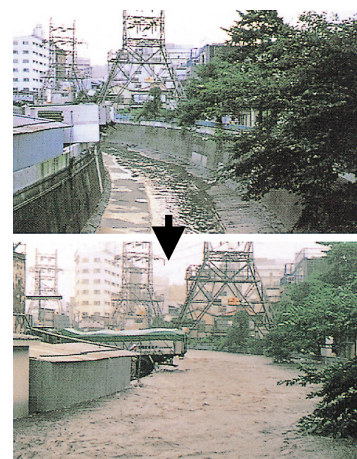
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Recent years have seen an apparent increase in flood events worldwide. A study based on the EM-DAT disaster database, conducted at ICHARM revealed that more between 2000 to 2004, 38 flood disasters in the Mekong riparian countries—Thailand, Myanmar, Laos, Cambodia and Viet Nam—killed over 2200 people. In the 2004 alone nearly 1300 flood and wind storm disasters with devastating human and economic impacts have occurred worldwide (Figure 1, [Technical Memorandum of PWRI#3992, 2005]). They are a number of stressors accounted to explain the increasing flood risk. While some are undoubtedly related to climate change, the increasing utilization of floodplains and reduction in the natural retention capacity of urban catchments in particular play a significant role. In this paper, Japan experience in flood management is introduced and its effectiveness is assessed with the aim to draw the lessons for building a new mechanism for sound and sustainable integrated flood management.



**Figure 1.** Global trends of water-related disasters. Made by ICHARM based on CRED-EM-DAT database



**Figure 2.** Threat of flood from small scale rivers, Kanda River, 1993

### Setting the scene

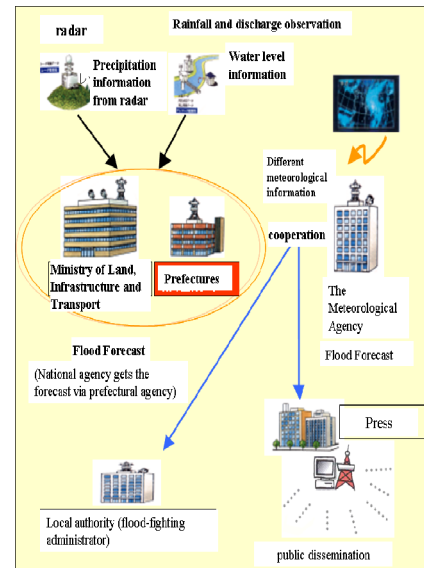
This population increase has brought with it progressive urbanization and considerable economic development. As a result of such rapid urban development of flood risk zones and concurrent delays in the construction of flood mitigation facilities many regions in Japan becomes highly vulnerable to urban flood damage. In face of such increase in flood damages, an integrated flood control mitigation plan unifying river improvement and flood damage mitigation measures in the basin as whole was drawn up. In recent years and particularly in urbanized area many flood disaster occurred in small and medium scale river (see Figure 2). This has called to settle a wellbalanced safety degree against flood in large, medium and small scale rivers as a primary issue.

### Flood management and mitigation measures

In Japan structural and nonstructural measures for flood protection are put in place to insure a holistic approach to flood management. Until recently, flood protection was mainly accomplished by structural measures. However, especially for rivers in city areas, restrictions against smooth implementation of river works made structural measures more and more difficult to implement in a short period.

## Policy and Institutional Development

The implementation of these measures was supported by large policy and institutional development. The *River Law* is the main legislative instrument determining flood and water management policies within the country; it has been amended several times to reflect changing needs in flood management, water use and environmental protection over the decades. To reflect the public opinion into the river improvement plan the Basic Policy for River Improvement was also enacted. The Flood Fighting Law was also revised to seek the abatement of flood damage via new practices of flood forecast and publication of hazard maps, etc. Furthermore, following the Tokai flood disaster in 2004, the River Law newly states that “Special Emergency Project as Counter Measures against Terrible Disasters in River” should be undertaken in areas where important damages occurred due to floods, along other measures with goal of achieving comprehensive flood management.

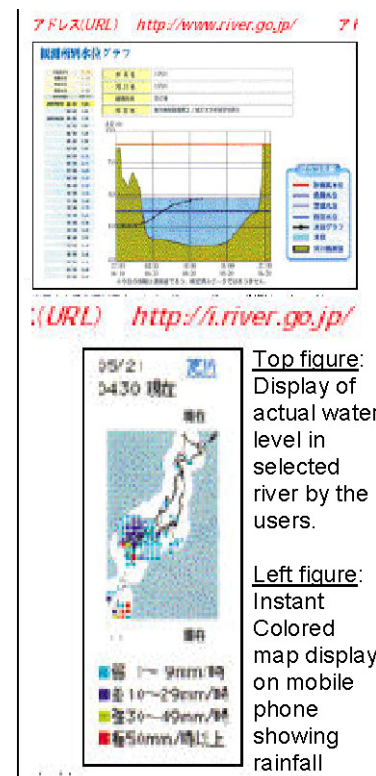


**Figure 3.** Mechanism of flood-forecasting and warning dissemination

## Technological Advancement in Flood Management

The nonstructural measures in urban area are developed with the aim to (1) decrease the runoff by means of storage of water in the basin (infiltration of rain water, etc.), and (2) promote disaster mitigations through regional disaster prevention plans, local ordinances and distribution of hazard maps. In this direction flood forecasts and warnings have constituted an important mitigation tool. At the back bone of these systems are the collection and transmission of hydrometeorological data for the daily management of rivers. Thousands of rain gauges and water level stations throughout the country are operated by national and prefectural river authorities. Figure 3 depicts the integrated information system for flood forecasting and warning dissemination in Japan. At the end user level, information can be reached to individuals by several ways including the media, fax and telephone, speakers mounted on the towers, oral communications in block associations and others.

In 1982, a single extreme rain with a Japan’s record breaking 187mm/h rain caused an extreme flash flood killing/missing 299 people in the city of Nagasaki. This disaster taught the government an important lesson on the emerging needs for real-time dissemination of flood-related information to municipalities and to the public. In response to the lesson, in 1985 the government established Foundation of River & Basin Integrated Communications (FRICS) under the auspices of the Ministry of Land, Infrastructure and Transport (MLIT, former Ministry of Construction), with financing from the central government and the prefectures as well as subscriptions from private companies working in the water and environmental sectors. The FRICS gathers data on rain fall from 23 precipitation radar bases in addition to the above mentioned traditional groundbase information. The strength of FRICS systems rises undoubtedly from the smooth processing of the multi-sources mega data in a user-friendly manner and their distribution onto users according to their needs. FRICS has developed



**Figure 4.** Dissemination of river and weather information through website and mobile phone.

about 500 frames for use by its information service, which is also available to the public through a website, cell phones and mobile Internet. Figure 5 shows a typical display of instant dissemination of river and weather information on the internet and mobile phone. In Nagoya City where the Tokai heavy rain occurred, over 700 fixed point observation system was introduced, calling for the cooperation of residents for the provision of information on water levels and on the situation of flood levels and damages.

Nevertheless, many people ignore or slight flood information on hydroclimate conditions or flood warnings: many don't recognize flood hazard maps. Some studies suggest human's psychology called normalcy bias is the main reason. To cope with this people's behavior, flood managers started to disseminate real-time current images through optical fiber cables and CCTV cameras. CCTV cameras are being installed for river monitoring throughout the country. CCTV images from rivers are displayed on multivision monitors in River Offices. Constant securing of personnel to monitor these images, prolonged simultaneous monitoring of many camera images, and immediate recognition of and response to warning are required during for flood disaster alert periods. The national and local TV media broadcasts some images.

### **Adapting Flood Management strategies to local needs**

International Centre for Water Hazard and Risk Management under the auspices of UNESCO (ICHARM) was officially launched on March 6, 2006 after three years of continuous discussions and coordination with national, regional and international organizations including the Mekong River Commission. ICHARM set its noble goal to be the world premiere center of excellence to provide and assist implementation of best practicable strategies needed by local, national and regional communities to manage risks from water related disasters. As seen in its mission statement, "needs driven" approach is the guiding principle of the three pillars of ICHARM activities, namely research, training, and information networking.

In aim ensure a sustainable progress and implementation of its activities ICHARM is initially focusing on flood issues. The choice was directed by the global increasing trend of flood disasters, as shown in Figure 1, and of the severe impacts on human life and properties [Technical Memorandum of PWRI#3992, 2005]. The proposal to establish a Regional Flood Center, based in Phnom Penh, is clear evidence of the increasing awareness of the Mekong riparian countries for the emerging needs to build effective and sustainable integrated approach in flood management. It is clear that successful flood management programs require a strong research and technological development to filling the gap between scientist, policy makers and practitioners, a strong institutional and legislative base. In this direction we believe that ICHARM has an important role to play in support of the mission and activities of the Regional Flood Center in each aspect of the flood management processes. Among the major programs that have received a strong international endorsement from all international institutions working in flood management is the International Flood Initiative (IFI). The IFI is based on the concept of integrated flood management and aims to ensure that an end-to-end process of flood management is put in place in a balanced manner, duly considering prevention and mitigation measures and the positive and negative impacts of floods. This initiative will be a major UNESCO and WMO led contribution to meeting the Millennium Development Goals (MDGs) and to the UN International Decade for Action, "Water for Life" (2005-2015) and UN Decade on Education for Sustainable Development. ICHARM has been designated to serve as the secretariat of IFI and will make its expertise and findings shared with the Mekong river scientist and experts and for support of proposed Regional Flood Center.

### **Integration of Capacity Building and Research Development at ICHARM**

Integrated capacity building strategies and research must be developed to address the several critical needs to achieve sustainable progress in flood management, including ways to (1) facilitate communication, knowledge exchange and know-how sharing between scientists, practitioners and decision makers, (2) enhance organizational and Institutional development, and (3) enabling and

empowerment of the leaders of the future to have the information, technology, skills and support to exercise responsibly their new authority at all levels and furthermore to implement adaptive forms of governance. Research is needed to determine methods for building the capacity of communities to undertake new responsibilities and the capacity of governments to take on new roles as partners in development. Research is also vitally needed to identify the critical areas where enhanced capacity is needed to achieve sustainable progress for reducing the negative impact of flood on our societies.

To achieve these challenges ICHARM's global approach in this direction is believed to play a leading role. Through information networking activities, ICHARM directs itself to be the world's clearing house of flood management knowledge and technologies. In view of the adaptive management principles involved this cannot be accomplished with the traditional one-way flow of information from developed countries to developing countries. Holistic flood management requires advanced engineering knowledge and clear understanding of the local conditions, the interaction of natural and social systems and the people in place. For instance, the introduction of a flood forecasting and warning system requires applicability assessment and adaptation work to ensure efficiency to applied nation and community. At the same time, proposal of effective warning dissemination needs not only a deep understanding of the social and natural systems, but the psychological personality of the target locality. High technologies such as radar, satellite, information dissemination tools such as via Internet and mobile phones should be assessed in terms of effectiveness at local scales in the society, cost benefit and maintenance among other various aspects. Therefore, ICHARM principle is to develop flood management research in close alliance with local engineers, scientists and decision makers who are very well knowledgeable of the local conditions. In other words, to emerge sustainable outcomes in the real sense of capacity building, ICHARM is going to pursue integrated research and capacity building for local engineers and practitioners in the Mekong River Basin.