

## **ICHARM calls for an alliance for localism to manage the risk of water-related disasters**

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**Abstract** The International Center for Water Hazards and Risk Management (ICHARM) under the auspices of UNESCO was established in Tsukuba, Japan in March 2006. It is a UNESCO Category II centre established by the Government of Japan and hosted by the Independent Administrative Institution Public Works Research Institute (PWRI). It was established to meet the world need for action against increasing water disasters associated with the dual pressures of intensifying meteorological hazards and increasing societal vulnerability. ICHARM wishes to respond to the global expectation by delivering the best practicable strategies to local communities under different conditions. Therefore it will take the approach of *localism*, a principle that takes into account local diversity of natural, social and cultural conditions, being sensitive to local needs, priorities, development stage, etc., within the context of global or regional experiences and trends. Localism inevitably necessitates the alliance of all the concerned groups. ICHARM calls for *an alliance for localism* to manage the risk of water-related disasters.

**Key words** alliance; flood management; ICHARM; localism; vulnerability

### **ICHARM prône l'entente locale pour la gestion des risques de catastrophes liées à l'eau**

**Résumé** Le centre international de gestion des dangers et risques liés à l'eau (Acronyme anglais ICHARM), placé sous les auspices de l'UNESCO a été créé à Tsukuba (Japon) en mars 2006. C'est un centre UNESCO de catégorie II créé par le gouvernement du Japon et hébergé par l'Institut de recherche des travaux publics (Acronyme anglais PWRI), qui est une institution administrative indépendante. Il a été créé pour satisfaire le besoin d'actions se manifestant à travers le monde contre l'accroissement des catastrophes provoquées par l'eau sous l'action conjuguée de l'intensification des aléas météorologiques et de l'augmentation de la vulnérabilité sociale. ICHARM souhaite répondre aux attentes qui se manifestent partout en fournissant les meilleures stratégies aux communautés locales dans leurs diverses situations. Il promouvra donc une approche locale qui implique nécessairement la collaboration de tous les partenaires concernés. ICHARM prône l'entente locale pour la gestion des risques de catastrophes liées à l'eau.

**Mots clefs** collaboration; gestion des crues; ICHARM; approche locale; vulnérabilité

## **INTRODUCTION**

ICHARM (the International Center for Water Hazards and Risk Management) under the auspices of UNESCO was established in Tsukuba, Japan, on 6 March 2006. It is a UNESCO Category II centre established by the Government of Japan and hosted by the Independent Administrative Institution Public Works Research Institute (PWRI).

It is three years since the concept of ICHARM was proposed by UNESCO Director-General Koichiro Matsuura, in agreement with the Ministry of Land Infrastructure and Transport (MLIT) of Japan, at the Ministerial Conference of the Third World Water Forum in Kyoto in March 2003. It took much effort by many people to bring it to reality, and especially by staff at PWRI, UNESCO, MLIT, and the Japanese Ministries of Foreign Affairs, and of Education, Culture, Sports, Science and Technology (MEXT).

According to a report prepared by the UNESCO Director General for the 171st Executive Board (UNESCO, 2005), a UNESCO Category II Centre is a centre established, financed and managed by the government of a host country (a UNESCO member country) to support the activities of UNESCO by agreement between UNESCO and the host country. As part of the activities of the UNESCO International Hydrological Programme (IHP), seven such centres preceded ICHARM. The oldest is IRTCES (International Research and Training Center for Erosion and Sediment) established in Beijing, China, in 1984 and hosted by IWHR (Institute of Water Resources and Hydropower Research). ICHARM is among the five Category II Centres endorsed by the UNESCO General Conference in October 2005. There are eleven Category I Centres that are supported and managed jointly by UNESCO and the respective host countries as an integral part of UNESCO. UNESCO-IHE (Institute for Water Education) in Delft, The Netherlands, established in 2003 is the newest one within this category.

## **THE NEED FOR ICHARM**

### **Increasing hydro-meteorological disasters**

The need for the establishment of ICHARM was in fact forced by the increasing frequency and severity of water-related disasters all over the world. According to the disaster database collected by the Belgian Université Catholique de Louvain's Centre for Research on the Epidemiology of Disasters (CRED) and analysed by ICHARM (Merabtene & Yoshitani, 2005), the following increases are observable for the period from 1970 to 2004. Here, by the CRED criteria, the recorded events are either: more than 10 people died, more than 100 people were affected, more than US\$10 000 was lost, or the government declared a state of emergency.

- The number of excess-water disasters (i.e. floods, cyclone, storms, land slides and storm surges) increased from nearly 50 to 250 disasters per year on average (the number of disasters in 2002 was as high as 300 events).
- The number of affected people increased from 50 to 300 million on average. More than 5000 people are killed almost every year.
- While in terms of the number of events nearly 40% of flood-related disasters occur in Asia, the percentage of the global number of affected people that are located in Asia is always over 90%. Of the global total affected by flood and windstorms alone, on average, 95% were in Asia.
- Of the global death toll, more than 90% also occur in Asia (by flood and windstorms alone, 86% are in Asia).
- Economic losses are also of great concern and, on average, the greatest proportion occur in Asia (i.e. 43%, cf. Americas 35%, Europe 19%, Oceania 2%, Africa 1%).

From such statistics, it is obvious that:

- The number of people affected by, and the casualties due to excess-water disasters have increased, especially since 1990, and more recently the severity has increased, particularly since 1998. The China flood in 1998 killed more than 3000 people, affected a total of 250 million people, destroyed 2.9 million houses and ruined more than 9 million hectares of crops (Yoshitani *et al.*, 2003). The Cambodia and Vietnam flood in 2000 killed 347 people in Cambodia and 448 in Vietnam. The economic damages were US\$80 million and US\$350 million in Cambodia and in Vietnam, respectively (International Federation of Red Cross and Red Crescent Societies, 2005). The European floods in 2002 were devastating and costly in the Elbe and Danube rivers, and were preceded by the Oder flood in 1997, the UK floods in 2000, and the Rhine/Meuse floods in 1993 and 1995. In 2005, Hurricane Katrina took more than 1330 lives and more than 4000 people are still reported missing; the estimates of insured property losses vary considerably between about US\$20 billion and US\$60 billion (Knabb *et al.*, 2005), while the total damage is assumed to be over twice the insured losses, that is about US\$96 billion (White House, 2006).
- The area affected is expanding to all continents and regions including areas that historically were seldom affected such as arid countries, for instance Iran, Egypt, Morocco and Yemen, as well as East and Central Europe. Nevertheless, Asian countries are by far the most affected with nearly 90% of the global number of people killed.
- Most human losses are concentrated in the developing countries while the economic losses are high in the developed countries. The human casualties are clearly a function of poverty.

The years 2004 and 2005 were extraordinary years with the Banda-Aceh Earthquake and Tsunami, which reportedly killed over 200 000 people (ADRC, 2004), and the Pakistan Earthquake that killed 73 338 (International Federation of Red Cross and Red Crescent Societies, 2005). But in the rest of the years analysed (1970–2004), the majority of the casualties were due to excess-water disasters.

### **UN initiatives against disasters**

Responding to such devastating reality, the United Nations has taken a series of actions since the 1990s. The United Nations International Decade for Natural Disaster Reduction (IDNDR) took place in 1990–1999 followed by the United Nations International Strategy for Disaster Reduction (UN/ISDR). The World Conference on Natural Disaster Reduction convened by IDNDR in Yokohama, Japan, in May 1994 adopted the Yokohama Message “*Yokohama Strategy and Plan of Action for a Safer World*” emphasizing the importance of prevention and preparedness as an integral part of national development. The United Nations World Conference on Disaster Reduction (WCRD) organized by UN/ISDR in Kobe, Japan, in January 2005 adopted “*The Hyogo Framework for Action 2005–2015: Building the Resilience of Nations and Communities to Disasters*”. It emphasizes the importance of assisting the poor and weak people with public–private partnerships to reduce their vulnerability to hazards.

The initiative of this type most directly related to ICHARM is the International Flood Initiative (IFI) initiated by UNESCO IHP in 2002. It was formally established by UNESCO, WMO, UN/ISDR and the United Nations University in 2005 at the WCRD event. It is an initiative to specifically focus on reducing the risk of flood disasters. The mission statement of IFI reads: “*The International Flood Initiative promotes an integrated approach to flood management, at the same time reducing social, environmental and economic risks that result in and from floods and increasing the benefits from floods and the use of flood plains*” (UNESCO-WMO Joint-task Team, 2005). Here also, development is considered an important aspect of disaster reduction. It clearly states that floods do bring about benefits too.

It was under such circumstances that the preparatory activities for the establishment of ICHARM started. When Dr Tadahiko Sakamoto proposed the plan for ICHARM at the UNESCO-IHP 16th Inter-Governmental Council (IGC) in 2004, as many as 27 nations and international organizations expressed their support, one after the other. It was said to be the first time that so many countries had expressed support for a proposal at the UNESCO-IHP IGC. It is obvious that the support reflects the concern regarding the spread and intensification of flood disasters all over the world and the need for a global centre to serve for management of the flood risk. ICHARM is a realization of such expectation. It also serves as the secretariat of the IFI.

## **INCREASING SOCIETAL VULNERABILITY TO WATER HAZARDS**

Risk is conventionally expressed as a product of hazard and vulnerability with the notation:  $Risk = Hazard \times Vulnerability$  (Blaikie *et al.*, 2004) where *Risk* is the probability of harmful consequences or expected losses, *Hazard* is the potentially damaging physical event or human activity (frequency and magnitude), and *Vulnerability* is the conditions which increase the susceptibility of a community to the impact of hazards (exposure, value, susceptibility) (Inter-Agency Secretariat of UN/ISDR, 2004).

The current problem of the increasing risk of water-related disasters is due to the fact that both the *Hazard* and the *Vulnerability* are increasing. Hydro-meteorological hazards seem to be increasing due to global warming, and societal vulnerability is increasing due to population increase and economic development. In the case of earthquakes, the hazards may have been similar for tens of thousands of years with some periodicity in some localities. But hydro-meteorological hazards are increasing due to global warming associated with greenhouse gas emissions resulting from human activities. These two causes make hydro-meteorological disaster management more difficult and serious.

### **Increasing hydro-meteorological hazards**

The European floods in 1997, 2002 and 2005, Chinese floods in 1998, 1999 and repeating every year in 2002–2005, Hurricanes Katrina and Rita in 2005, the first observed South Atlantic hurricane in March 2004 (first since satellite observation started), 10 typhoon hits in Japan in 2004 while since 1951 the annual maximum was only 6 typhoons, etc., seem to indicate the intensification of meteorological extremes.

But the detailed statistics to indicate this intensification are not necessarily available. It is extremely difficult to generalize the recent trend of meteorological extremes. This is because in many regions reliable observations are not available for periods long enough to judge a trend. The extreme events are occurring sporadically and the variation is different in different regions. But nevertheless, some observations indicate the intensification of extremes.

The third *IPCC WG-II Report* (2001) says at 4.3.2: “*There is evidence that the frequency of extreme rainfall has increased in the United States (Karl & Knight, 1998) and in the UK (Osborn et al., 2000); in both countries, a greater proportion of precipitation is falling in large events than in earlier decades*”. The *Extreme Meteorology Report* (JMA, 2005) reports that in Japan the frequency of extreme hourly precipitation exceeding 50 mm and 80 mm, and of daily precipitation exceeding 200 mm and 400 mm, are found to increase in every 10-year average from 1976 to 2004.

### **Increasing societal vulnerability**

Society and individuals are becoming more and more vulnerable to natural hazards. Any changes in contemporary society such as population increase, economic development, urbanization, industrialization, deforestation, expansion of residential areas, increased labour mobility, population ageing, etc., make society more vulnerable to natural hazards. Civilization itself is the process of making people and society more vulnerable to natural hazards as they become more reliant upon artificially built environments.

This is due to the Second Law of Thermo-dynamics. An artificially created environment is in a state of lower entropy than the natural environment and will always collapse into a state of higher entropy unless a supply of additional energy is maintained to control nature and protect the artificial environment. It suggests two ways of managing natural hazards: high investment to create and maintain the defences of the artificial environment, or to live with nature avoiding the creation of artificial environments. Both strategies are practiced in the world today. A good combination is necessary and depends on societal conditions such as available land area, habitation, culture and, above all, the national economy.

Poverty and whatever factors prevent society from development are the causes of increasing vulnerability. Wars and poor governance are the most serious ones. In any nation, if she is committed to a war, intra- or international, there is no room for investment for disaster prevention. Lack of economic resources is important but cannot compare with the importance of governance. If society cannot properly organize itself to effectively utilize limited resources, especially human resources, the consequences are tragic. If society is wise enough to manage itself and best utilize the given resources, any achievement is just a matter of time.

### **ACTIVITIES OF ICHARM**

Considering the reality of the double pressures presented by both natural hazards and societal vulnerability to water-related disasters in the world, ICHARM has set out the following mission plan (ICHARM, 2006). This is still a working proposal and open for

discussion by the global community. Comments are especially welcome from those who wish to collaborate with us in reducing the risk of water-related disasters.

### *Objective*

To be the world Centre of Excellence to provide best practicable strategies to localities, nations, regions and the globe to manage the risk of water-related disasters including flood, drought, landslide, debris flow, storm surge, tsunami and water contamination.

It is surprising that there was no global centre focused on water-related disasters before ICHARM. ICHARM would like to act as a world Centre of Excellence for risk management, as a think tank and as an education centre. The products to be delivered will be the best practicable strategies for managing water-related risk addressed to local communities under different conditions. ICHARM takes the approach of *localism*, a principle that takes into account local diversity of natural, social and cultural conditions, being sensitive to local needs, priorities, development stage, etc. within the context of global or regional experiences and trends. To implement activities based on such localism and to reduce societal vulnerability under the given local realities, a strong alliance is necessary to work with individuals, institutes and any organizations throughout the world that are working at the forefront with localities and their problems. ICHARM will try to nurture synergy between these individuals and groups by building a network of experts and organizations working for localities around the world. ICHARM calls for *an alliance for localism* to manage the risk of water-related disasters.

### *Guiding Principles*

- To be needs driven rather than supply driven, responsive to respective local realities.
- To prescribe tailored strategies to realize integrated risk management under the multifaceted social, economic, institutional and cultural conditions as well as technological availability.
- To produce policy effective information and raise public awareness to promote societal action.
- To promote Research Development and Capacity Building jointly, to bring science to where it is most needed.
- To work in alliance with all the related organizations of the world to mutually complement resources and expertise and to create synergy in implementation.
- To serve as a think-tank for water hazards and risk management of the world and play a central role of its strategic promotion.

ICHARM recognizes that there is high international expectation of the Japanese technology developed at PWRI which has made Japanese urbanization and economic development possible in the hazardous Asian Monsoon region. ICHARM is of course

ready to supply whatever ICHARM has in its inventory but recognizes that such a domestic inventory is not nearly enough. As natural and socio-economic conditions differ in different regions and localities, ICHARM has to be able to deliver the strategies that are needed in any locality, and so requires an international inventory. This is necessary for the localism that ICHARM wishes to commit to.

To be needs driven for any locality, the strategies should inevitably follow the principles of integrated risk management where all possible means, social to technical, in a society should be utilized to meet its natural and social constraints.

ICHARM's most important mission is to lead societies to be more conscious of disaster risk. The political commitment is especially important. To this end, ICHARM aims to produce *policy effective* information that can be used by politicians to persuade parliaments and competing administrative sectors. This is a challenge but absolutely necessary if ICHARM wishes to alter societal attitudes to disaster risk. ICHARM will not overlap the effort of collecting large quantities of disaster information such as undertaken by Université Catholique de Louvain (Belgium), Munic Re (Germany) and Dartmouth University (USA), but will focus on reading and interpreting them, in combination with a wider range of statistics and documents, to derive policy effective information. The information should be global for the global agenda but should be local and site specific for helping local communities. The challenge of studying local reality with local experts and managers will be one of the main activities of ICHARM.

Another of ICHARM's main guiding principles is to ensure that research development programmes integrate with capacity building programmes. Science should be developed and owned by the people who need it and will benefit from it, otherwise, the advancement of science will always enlarge the science divide between nations and between peoples. Science should not become an engine for pumping resources from developing countries to developed countries but one for sharing them. ICHARM wishes to develop an advanced technology for satellite-based hydro-meteorological forecasts and their dissemination worldwide. It considers that such a development should be made jointly with the people who need it most although they may live furthest from it. This is only possible by promoting research development programmes jointly with capacity building programmes.

### *Management Strategy*

- To be the information clearing house and the broker of knowledge and technology for the world and so to deliver whatever is available to wherever it is needed in the world.
- To make the Japanese and PWRI experience and human network available world wide.
- To promote joint work with researchers and engineers in developing countries in alliance with universities and related institutes worldwide.
- To function, in substance, as a UNESCO centre with internationally recruited staff and English as an operating language.
- To promote external fundraising jointly with the researchers and administrators of various nations and international institutes.

In order to achieve the objectives of the Guiding Principles, ICHARM will manage the centre in as friendly a way as possible with many people and institutions mobilizing information, technology, people and funds. The resources available anywhere should be delivered wherever they are needed. The PWRI expertise is the basis of the operation. Collaboration with universities and other research institutes will be the central core of alliance, bringing the engineers and researchers in developing countries into the top science team. To assure this function, ICHARM will be operated as an international centre.

### **Initial activities**

Initially, ICHARM will place its priority on risk management in relation to *flood-related disasters*, i.e. excess water disasters including flash floods, continental floods, landslides, debris flows, storm surges and tsunami. Specifically, the centre conducts research, training and information networking activities to reduce societal vulnerability. Based on the Japanese and PWRI's experience and technologies, ICHARM integrates and carries out the following activities in active collaboration with relevant organizations in Japan and abroad.

#### *Research*

- Flood risk analyses in diverse localities in developing countries.
- Development of flood warning systems that use satellite observations and other advanced technology.
- Development of flood hazard mapping procedures able to meet various environmental and social conditions.
- Development of community water hazard risk aversion systems based on advanced flood warning and flood hazard maps, and other methods.
- Promotion of basic research on hydrological measurement, analysis, and forecasting to support ICHARM activities.
- Participation in international research programmes such as the World Water Assessment Programme (WWAP), International Flood Initiative (IFI), Group of Earth Observations (GEO) and Predictions in Ungauged Basins (PUB).

Three subjects will be the initial foci of ICHARM research, that is: local studies, satellite use for flood forecasting and effective hazard mapping. Local studies should be developed with experts and responsible people working at the respective localities. ICHARM will collaborate with local institutes overseas on this.

For global distribution of satellite-based flood forecasting and warning, ICHARM will collaborate with universities and research institutes working on satellite remote sensing and hydro-meteorology. The non-governmental organization IFNet (International Flood Network) has already started an initiative called GFAS (Global Flood Alert System) with the same objective. ICHARM will collaborate closely with them, promote their activities and realize the idea of integrating research development with capacity building.



The hazard mapping studies will focus on methodology that is readily applicable in remote localities anywhere, and on investigating the effective use of hazard maps under different local conditions. Neither flood forecasting nor hazard mapping is useful unless it is built in as part of the daily life of the societal system in a sustainable manner. It is of no use to push the technology into a society which is not ready to accept or respond to it. This study is therefore essential to enable development of training courses on hazard mapping that are useful in practice.

ICHARM will serve as the secretariat of IFI and wishes to contribute to the flood-related disaster part of WWAP. It will contribute to any other programmes or initiatives that serve its objectives and relate to its activities.

### *Training*

- Training courses on practical risk reduction systems incorporating existing social diversities, for public officers and decision makers.
- Human resources development for integrated flood risk management in cooperation with universities and related institutes worldwide.
- Training courses on flood hazard mapping and river and dam engineering for researchers and engineers.
- Providing follow-up activities for course graduates in their home countries.

The basic training activity of ICHARM initially will be on hazard mapping and will be an extension of the JICA training course that has been held at PWRI since 1969. This training course will be part of the wider ICHARM interest in increasing local capacity to reduce societal vulnerability through comprehensive flood risk management. The training course programme will eventually cover various other subjects in collaboration with universities and other institutes. The theme of governance and societal transformation for productive and resilient society is an example of a course subject that will be targeted at decision makers and senior public officers.

As a post-training course programme, a follow-up consultation on early warning and preparedness and their effective use in local communities will be planned in collaboration with related professional programmes such as those of the various international aid agencies.

ICHARM wishes to look into the possibility of offering a training programme leading to a university degree, such as an International Flood Masters degree, in collaboration with Japanese and international universities and institutes.

### *Information Networking*

- Creation of a worldwide inter-disciplinary network of practitioners and researchers in the field of integrated water risk management and ICHARM course graduates.
- Collection, analysis and dissemination of information and experience regarding water-related disasters worldwide.
- Timely organization of investigation teams when catastrophic water hazards occur.
- Organization and sponsorship of workshops and symposia.

As a clearing house for flood-related information, ICHARM provides both an information and a human network. It collects and provides the basic information necessary to promote the mutual learning and exchange of water-related disaster experience and knowledge among nations and localities. The archive will include information such as flood events and statistics, governmental and non-governmental actions, commitments, judicial and strategic developments, research and technological developments, administrative and institutional developments, information about related personnel, and others.

ICHARM will not duplicate the function that is available elsewhere for collecting comprehensive data for disaster events, but aims to be a knowledge base that provides analytical results in the form of policy effective information. It will hold or sponsor workshops and symposia to promote communication and capacity building. It will help in crisis management with its full use of personnel, human networks and knowledge base when catastrophic disasters occur.

## CONCLUSIONS

The past 10 years records of devastating floods indicate a new era of water disasters in the world. The recent frequency of devastating floods all over the world and the numbers of people affected in developing countries reveal the following undeniable trends:

1. In recent decades, water-related disasters have spread to new parts of the world, intensified in magnitude and increased in frequency. Flood disasters now even occur in arid regions where people have seldom experienced them before.
2. This increase in disasters is a result of the dual pressures of increasing meteorological hazards and increasing societal vulnerability. Global warming seems to be intensifying the extreme meteorological phenomena. Urbanization, economic development and modern styles of living are making society more vulnerable to hydro-meteorological extremes.

In order to defend society from such dual pressures, many principles and strategies have already been discussed and proposed by many people. It is time for ICHARM to take action. At this first stage, ICHARM is focusing on flood-related disasters and providing research, training and information networking in response to real local needs:

1. The fundamental structure of societal vulnerability is different in different societies. Disaster risk management should therefore be locally based. Poverty and poor governance are the most decisive factors affecting vulnerability. The societal weak, such as the poor, the elderly and the handicapped are more vulnerable to hazards.
2. Societal consciousness of hazards is the engine of disaster risk management. As a think tank, ICHARM has to produce policy effective information by which politicians can commit themselves and persuade people to invest more resources, in competition with others, to the disaster management sector.
3. An alliance among all the organizations and programmes involved in disaster management, societal reform, economic development, community assistance, etc., is necessary to look into and focus on local reality and draw up practicable strategies. ICHARM calls for *an alliance for localism* to reduce water-related disaster risk in the world.

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