Integrated Flood Risk Management - role of CHARM -

January 19, 2005

Akira TERAKAWA

Public Works Research Institute (PWRI)
Tsukuba, Japan
I am going to talk about

- Process Chain of Natural Disasters
- Concept of Integrated Flood Risk Management
- Comprehensive Flood Disaster Prevention Measures to cope with Urban Flood Problem
- Role of CHARM (International Center for Water Hazard and Risk Management under the auspices of UNESCO)
Process Chain of Natural Disasters

- Extreme Natural Phenomenon
  - Heavy Rainfall
  - Increased River Flow
- Driving Force
- Hazard
- Damage to Lives and Properties
  - Loss of lives
  - and/or inundation of houses
- Secondary Social and Economical Impact
  - Hampering daily commodities supply and/or Regional production activities
Flood Risk Management to cut Process Chain of Flood Disasters

Heavy Rainfall
- Artificial weather modification

Increased River Flow
- Retarding the runoff

Flooding
- Keep the flood flow inside river channel by embankment

Loss of Lives and/or Inundation of Houses
- Decrease the vulnerability by land use regulation and flood proofing
- Flood fighting, flood forecasting and warning to minimize the damage

Impacts on daily life and regional economy
- Prompt damage recovery to infrastructure facilities, financial aid and insurance
Integrated Flood Management

within the context of Integrated Water Resources Management (IWRM)

with a view to maximizing the efficient use of flood plains

and minimize the loss of life and properties

(‘Integrated Flood Management‘, the associate programme on flood management, c/o Hydrology and Water Resources Department, WMO)

Cut the process chain of flood disasters in an integrated manner to maximize the net benefit to the region under various natural, social and economical conditions
Various Measures for integrated River and Basin management

Various types of projects contribute to conservation of land and preservation of scenic landscapes.

Natural disasters are common in Japan. Urbanization has created new types of disasters (disruption of river flow, the triggering of landslides, etc.) and increased water demand. Cautious and sudden water shortages can paralyze cities and impact nearly every day and economic activities. We implement various projects to protect the land and people and to create safe and comfortable living environments within the active society.

- Small dams for water supply: Water shortage has been a problem in mountainous regions where there are no large water supplies available. Building small dams to supply water has improved living conditions in such places.
- Irrigation works and coastal irrigation projects: As part of local community development, partial construction or stream improvement projects help to preserve regional environmental characteristics.
- Drainage control measures: In cities, to prevent flooding and reduce the risk of accidents, underground water channels are established.
- Flood protection: Flood protection measures protect the areas affected.
- Maintenance of coastal environments: Creating promenades and planting trees along coastal areas enhances places for recreation and provides space for marine sports.

from ‘Rivers in Japan’, MLIT, 2003
Fukuoka Flood in 1999

(Source: MLIT)
Tokai Flood in 2000
(Dyke Break of the Shinkawa river 12th Sep. in Nishibiwajima town)
(Source : MLIT)
In the case of downpour in Fukui Prefecture in July 2004, 283mm/day was recorded at Miyama Observatory.

(Source: MLIT)
Inundated situation of Sanjo City, Niigata Prefecture after downpour in July 2004. 421 mm/day of rainfall was recorded at Tochio Observatory. (Source : MLIT)
Geographical condition of Japan Island (Kanto Region)
Geographic Conditions of Japan

- 70% of land is covered with forests and mostly mountaneous
- 50% of population and 75% of assets are concentrated in flood plains (10% of land)
- Heavy rainfall occurs during the rainy season in June-July and in the typhoon season in August-October
- Rivers are short and steep, causing sharp hydrograph
- The ratio of maximum/minimum discharge is extremely high (about 100 for Tone River)
The Tsurumi River basin in Kanagawa Prefecture has seen a much higher population growth rate than the national average.
Urbanization rate of 10% in 1958
Urbanization rate of 60% in 1975
Urbanization rate of 84.3% in 1997

Flooding of September 1976

Extensive Housing Land Development has been in Progress in the Heights and Hilly Zones of the Suburban Areas in the Three Major Metropolitan Regions.

Developments of Heights and Hilly Zones: Tsurumi River (through Tokyo metropolis and Kanagawa Prefecture)
Reduction of Water Retention and Retarding Functions of River Basin Results in Increase in Peak Discharge.

Flood discharge at Ochiai Bridge

Rainfall depth considered

After 80% development in future

Actual conditions as of 1975

As of 1958

Undeveloped river basin

(By simulation)

Source: Interim Report (June 1977) of Tsurumi River Basin Flood Disaster Prevention Planning Committee
Widening of river channel is difficult in the highly urbanized area

Tsurumi River

Naka River and Ayase River


Source: Brochure “For Protecting Our Town from Flood Disasters”
Comprehensive Flood Disaster Prevention Measures

1. River Improvement
   - Improvement of river channel (construction of dikes, dredging, etc.)
   - Construction of retarding basin, diversion tunnel, etc.

2. Basin Improvement Measures
   - Preservation of urbanization controlled areas
   - Conservation of non-urbanized areas
   - Construction of storm water detention pond, etc.
   - Construction of storm water storage facilities
   - Provision of permeable pavements, infiltration inlets, etc.

3. Flood Damage Reduction Measures
   - Preserving urbanization controlled areas
   - Restrictions on banking
   - Improvement of farming environment
   - Construction/improvement of inner basin drainage facilities
   - Construction of storm water storage facilities
   - Encouraging construction of waterproof buildings

- Establishment of flood warning and evacuation system
- Enhancement of flood defense system
- Official announcement of flooded areas and flood hazard areas
- Encouraging construction of waterproof buildings
- Publicity activities directed toward community residents
the International Centre for Water Hazard and Risk Management under the auspices of UNESCO (CHARM)
Framework of CHARM

- Accumulated knowledge and experience trying to overcome water-related disasters
- Global network such as IFNet for internationally sharing valuable information

Contribution to prevent or mitigate water-related disasters in the world
Pillar Activities of CHARM

- Research
- Data/Information
- Results/Outcomes
- Participation
- Knowledge
- Network
- Information networking
- Curriculum
- Training & Capacity building
Activities
- Research -

- Contribution to international projects such as WWAP and IFI/P (UNESCO/WMO)
- Hydraulic / hydrological prediction, observation, modeling and analysis
- Risk assessment and risk management technologies for water-related hazards under various socio-economic, geographic and climatic conditions
PWRI has long experience in conducting JICA training courses for over 35 years.

including

- River and dam engineering
- Sabo engineering

Activities

- Training and Capacity building -

Total Number of Trainees/Countries
101/27
in FY 2003
Information networking will be synergized with research and training activities in order to enhance integration and coordination:

Through the information network…

- Research output will be widely disseminated
- Feedback from countries / regions will be reflected in the research projects
- Trainees will develop domestic links to their own countries/ regions
- Local needs for training items would be clarified
Practitioners and Experts of Developing Countries

International Collaboration

UNESCO IHP and related international organ (WMO, ISDR, UNU ...)

International & Regional Organ (MRC, NGO ...)

Foreign Governments

Academic & Scientific Research Institute

Private Sector

International Financial Institution (WB, ADB ...)

Related Organ in Japan (NILIM, IDI, JWF...)

Collaboration Partnership Network

Research Group

Research on Flood Management

CHARM

Capacity Building

Personal & Information Network

Practitioners and Experts of Developing Countries
Thank you for your attention

http://www.unesco.pwri.go.jp