Flood Hazard Mapping and its Utilization for Flood Disaster Mitigation

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Session “Flood control and mitigation measures”
International Workshop “Water and Disasters”
December 14, 2004
London, CANADA
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Public Works Research Institute (PWRI)

- History 1922: Established
  1979: Relocated to Tsukuba
  2001: Re-organized into two institutes (PWRI and NILIM)
- Staff: 219 (including 151 researchers)
- Land area: about 560,000m²
- Number of research topics: 200
- Budget (FY 2004): 6 bil. JPY (55 mil. US$)
Recent extreme floods - Tokai heavy rain (2000) -

Affecting 580,000 people, and economic loss: US$ 8 billion
Flooding in Japan this year
- Niigata Fukushima Rain (1) -
Floods in Japan this year
- Niigata Fukushima Rain (2) -

• After flood
  (The temple was washed away)

• Before flood
  (An old temple in the center of the red circle)
Flood characteristics of Japan

- **Destructive**: An old temple was washed away...
- **Flash floods**: Limited time for evacuation, therefore elderly and disabled people were drowned
- **Sedimentation & mud flows**: Difficulty for recovery
- **Dense land use in flood-prone areas**: Dilemma of recurrent flood disasters
More effective flood management

- Structural measures are effective, however,
  - Costly in particular in developing countries
  - Needing long time to produce tangible effects
  - Constrained by land acquisition or available resources

- Much more important to take non-structural measures such as:
  - Flood hazard map
  - Flood forecasting and early warning
  - Adequate land use and regulations…
Flood hazard map

- **Functions:**
  - Providing **inundation & evacuation information**
  - Easily understandable and publicized through joint efforts with communities
  - Useful for local residents for early evacuation

- **Effects:**
  - Mitigating damage by smooth evacuation
  - Raising people’s awareness and enhancing their capability/resilience
Flood hazard map: Example

Making residents prepared for flood risks by showing flood risk information & evacuation guide.

(1) Flooding risks (by simulations)

(2) Evacuation centers such as schools and community centers

(3) Evacuation routes free from barriers

Started in the late 90s in Japan, already produced in over 300 municipalities
Effectiveness

Whether or not people saw the flood hazard map beforehand makes big differences to the way they evacuate.
(Source: Assoc. Prof. Katada, Gunma University)
Flood mapping of the world

- On-going flood mapping in the world:
  - USA: Flood Insurance Rate Map (NFIP)
  - Canada, UK, Sweden, Norway, Swiss…

- Examples in developing countries:
  - South Africa, Sri Lanka, Guatemala, Venezuela, Costa Rica, Bolivia and others…

- Initiatives by international organizations:
  - WMO/UNESCAP Typhoon Committee
  - EU action plan/ flood initiative
  - CDERA, MRC…
Further prospects

- After the preliminary survey on the ground…
  - Investigating climatic-geographic conditions
  - Considering local conditions/ situations
  - Considering socio-economic development stage
  - Link with development & disaster mitigation
  - Effective for adequate land use
  - Toward improved planning & risk mitigation
  - Public involvement & community participation
  - Develop people’s/ community’s self-reliance through raising awareness & enhancing capability.
**Objective**

- Acquire professional knowledge necessary to produce flood hazard maps
- Enhance understanding of its effectiveness
- Seek application in his/her own country

**Framework**

- 5-year planning (JFY 2004-2008)
- Annually 16 trainees from 8 countries of Asia
- Date: January 25 – February 19, 2005 (4 weeks)
- Place: Tsukuba, Japan (PWRI & JICA)
Training course Details

Curriculum:

- Lecture on mapping process and its effects
- Introduction of good practices of the world
- Field study in a nearby flood-prone area
- Site visit to advanced areas in mapping
- Report and discussion

Lecturers:

Professors, Researchers and Experts from the governments, institutes and private sectors…
Benefits of training course

For trainees:
- Acquisition of knowledge, experiences and skills
- Communication with other trainees
- Advocate in his/her own country
- Promoter of further actions
- Follow-up /continual monitoring of implementation
- Permanent networking for information exchange

For trainers:
- Accumulation of information
- New indications and hints through interaction with lecturers and trainees
- Improvement of existing practices
- Stimulate for further research
PWRI plans to contribute to mitigate water-related disasters by establishing a new center in this field.

- A global center to be established within PWRI under the auspices of UNESCO in autumn 2005
- Theme: Water hazard and risk management
- Activities: Research, Training, Information networking
- Partnership with UNESCO-IHP Networks, UN agencies & other key organizations of the world
Pillar Activities

- Research
- Training & Capacity building
- Information networking
- Data/Information
- Results/Outcomes
- Knowledge
- Curriculum
- Participation
- Network
Training Activities
- PWRI’s experiences and plans -

- Long experiences for over 35 years, including River & dam engineering, Sabo engineering...
- Long- & short-term training for experts/practitioners (students & professionals exchange, internship)
- And planning a new training course on Flood Hazard Mapping

Total Number of Trainees/Countries 101/27 in FY 2003
Research Activities

Scientific & academic research on water-related hazards & its risk management;

- Contribution to major global initiatives (WWAP, UNESCO/WMO joint IFI/P…)
- Hydraulic / hydrological prediction, observation, modeling and analysis (GFAS)
- Risk assessment & management technologies on water-related hazards and impacts of climate change … and others
Information Networking

- Knowledge base & information network by:
  - Collecting, compiling & providing useful information
  - Interacting with the UN, WWAP, IHP & other international initiatives (IFNet, JWF...)

- Synergies to research & training
  - Dissemination of research outcomes, and feedbacks for further research
  - Development of linkage with trainees, and recognition of local needs
Future milestones of preparatory works

- Development of pilot projects
- Active participation in thematic discussions for knowledge exchange and substantial contribution
  - Jan. 2005: World Conf. Disaster Reduction (JAPAN)
  - Apr. 2005: UN CSD-13 (New York, USA)
  - And others (International & regional forums, academic & practical WS…)
- Approval at the 33rd UNESCO General Conference (Autumn 2005)
Thank you very much for your attention.

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