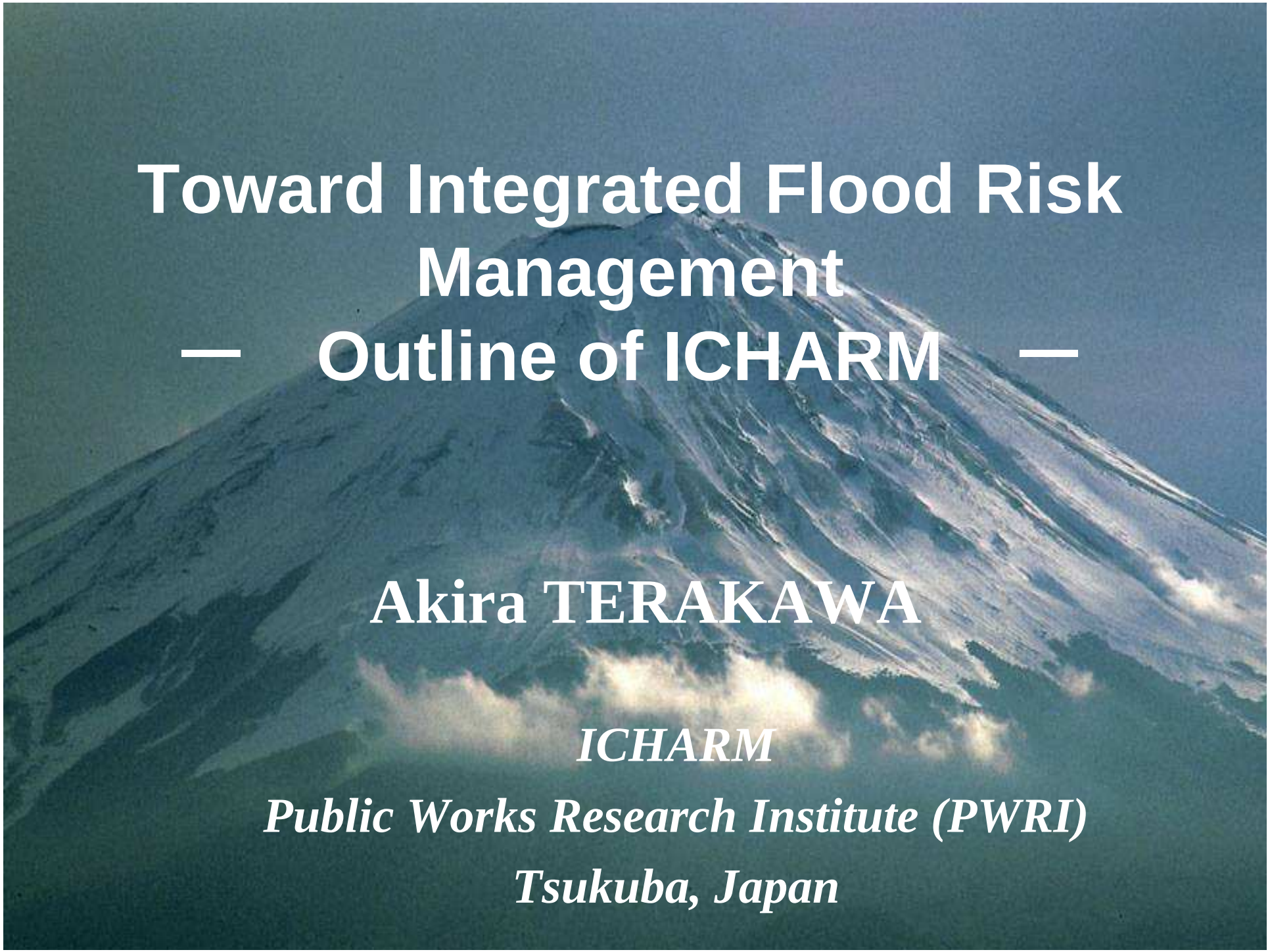


Toward Integrated Flood Risk Management
— Outline of ICHARM —

Akira TERAKAWA

ICHARM

Public Works Research Institute (PWRI)

Tsukuba, Japan

International Centre for Water Hazard and Risk Management

(ICHARM)

under the auspices of UNESCO

Background: Birth of ICHARM

- **IDNDR 1990-1999 & ISDR 2000-, MDGs, WSSD, Hyogo Framework of Action 2005 etc.**
- **ICHARM was proposed by the Japanese Government and approved at UNESCO 33rd General Conference, October 2005**
- **Agreements signed by UNESCO, G of Japan & PWRI on March 3, 2006**
- **ICHARM was established on March 6, 2006**
  - **A UNESCO Category II Global Center hosted by Public Works Research Institute (PWRI), Tsukuba, Japan**

Public Works Research Institute

(PWRI)

- History
  - 1927: Established
  - 1979: Relocated to Tsukuba
    (Area:126ha, Staff: 550)
  - 2001: Re-organized into two institutes
    (PWRI and NILIM)
  - 2006: Merged with Civil Engineering Research Institute of Hokkaido

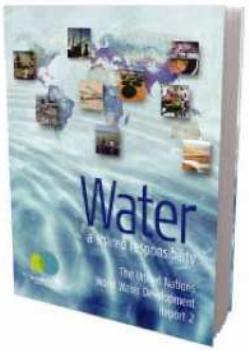
- Staff : 389 (including 266 researchers)
- 14 research groups with 37 research teams
- Budget (FY 2006): 10 bil. JPY (82 mil. USD)

Missions of ICHARM

The mission of ICHARM is to function as an international center for providing and assisting the implementation of the most practicable strategies to prevent and mitigate water related disasters (floods, droughts, sediment-related disasters, tsunamis, storm surges, water contamination, etc.) in the world.

※ Focus on flood related disasters at the initial stage

Research, Training and Information networking activities would be promoted in a combined manner



World Water Development Report II

- **Analyzing the flood risk in each region of developing countries**
- **Developing and disseminating an advanced flood alert system using artificial satellites, remote sensing and other advanced technologies**
- **Developing technologies for preparing and utilizing flood hazard maps appropriate for the local environment and social conditions**
- **Giving consultations to regions to help them plan and implement strategies and improve their social capabilities to prevent disasters by implementing alert systems and hazard maps**
- **Promoting studies on hydrological observation, hydrological forecasting and hydrological analysis, which will serve as the base**
- **Actively collaborating with the World Water Assessment Programme (WWAP), International Flood Initiative (IFI), and groups in charge of Global Environment Outlook (GEO) and Prediction in Ungauged Basins (PUB)**

Research

Data

Participation

Results and outcomes

Curriculum

Training of flood hazard mapping

Information networking

Knowledge

Network

Training

- **Creating a comprehensive international and interdisciplinary network of researchers and information on water hazard and risk management together with experts, researchers and those who have completed training**
- **Collecting, analyzing and dispatching information and experiences on water-related disasters**
- **Quickly organizing an investigative committee in the event of a serious disaster**
- **Holding and supporting workshops and symposiums**

- **Training personnel for comprehensive flood risk management in cooperation with universities and research institutes**
- **Giving training courses on practical methods of risk management to the staff of public institutes and decision-makers**
- **Giving training on flood hazard mapping, river engineering, and dam engineering to researchers and engineers**
- **Giving follow-up courses to those who have completed training in their home countries**

Research

- **Local studies** (Identification of the real needs of the people in diverse localities) → Diagnosis & Prescription
    - **Disaster (Flood) Preparedness Indices**
- **Flood Alert System** using satellite information (with JAXA, IFNet/GFAS/IFAS etc.)
- **Risk analysis and adaptation measures to global warming** (MEXT fund for 2007-2012)
  - JMA/MRI GCM (20km mesh) →
    - Development of risk indices,
    - Drawing a Global flood risk map,
    - Estimating Adaptation cost (structural & non-structural)
- **Flood Hazard Mapping**
  - methodologies to map in remote localities with poor data
  - effective and beneficial use of HMs in various conditions

Capacity Building

- **Training courses**
  - Flood hazard mapping course started in 2004
  - River and Dam engineering course started in 1969
- **Follow up program** for ex-trainees
- **Master course on Flood Disaster Management** with National Graduate Institute for Policy Studies (GRIPS)

Flood Hazard Mapping Training Course

Following up Seminar of FHM training course

(Jan. 30-Feb. 1, 2008 Guanzou, China)


Mr. Asikin from Indonesia participating
the seminar in Guanzou, China

Water-related Risk Management Course

A master's degree program
by GRIPS* and ICHARM/PWRI

Objective :

to develop trainee's capacity to practically manage the problems and issues concerning water-ralated disasters

Duration : 1yr from October to September

Language : in English

Course Program :

Lectures

Disaster Management Policy, Basic Subjects (Hydrology, Hydraulics), Integrated Flood Risk Management, Hazard mapping and Evacuation Planning, Sustainable Reservoir Development and Management, Control Measures for Landslide and Debris Flow, Introduction to International Cooperation

Hands-on Training session

Individual study

*GRIPS : Graduate Research Institute for Policy Studies (www.grips.ac.jp)

Water related Risk Management Course

Information Networking

- Collection of local site-specific information
  - **ICHARM Local Study Series**
  - **ICHARM Flood Year Book**
- Monitoring of the improvement of flood preparedness
- Analyses of global data sets → **policy effective information**
  - Lead organization of WWDR3 Risk management chapter

Cooperation with related organizations and programs

- Participating in international activities as a secretariat and a player, such as WWAP, IFI and Asia Pacific Water Forum
- Promoting joint projects in cooperation with existing UNESCO centres
- Maintaining and strengthening mutually cooperative partnerships with affiliate research institutes by exchanging personnel and conducting joint researches
- Building a close collaboration and appropriately sharing responsibilities with diverse related international programmes such as IF-Net, JWF and the Network of Asian River Basin Organizations (NARBO) to achieve synergy among the respective activities
- Planning and implementing research and training projects in cooperation with funding organizations such as the Japan International Cooperation Agency (JICA), Asia Development Bank (ADB) and World Bank (WB)

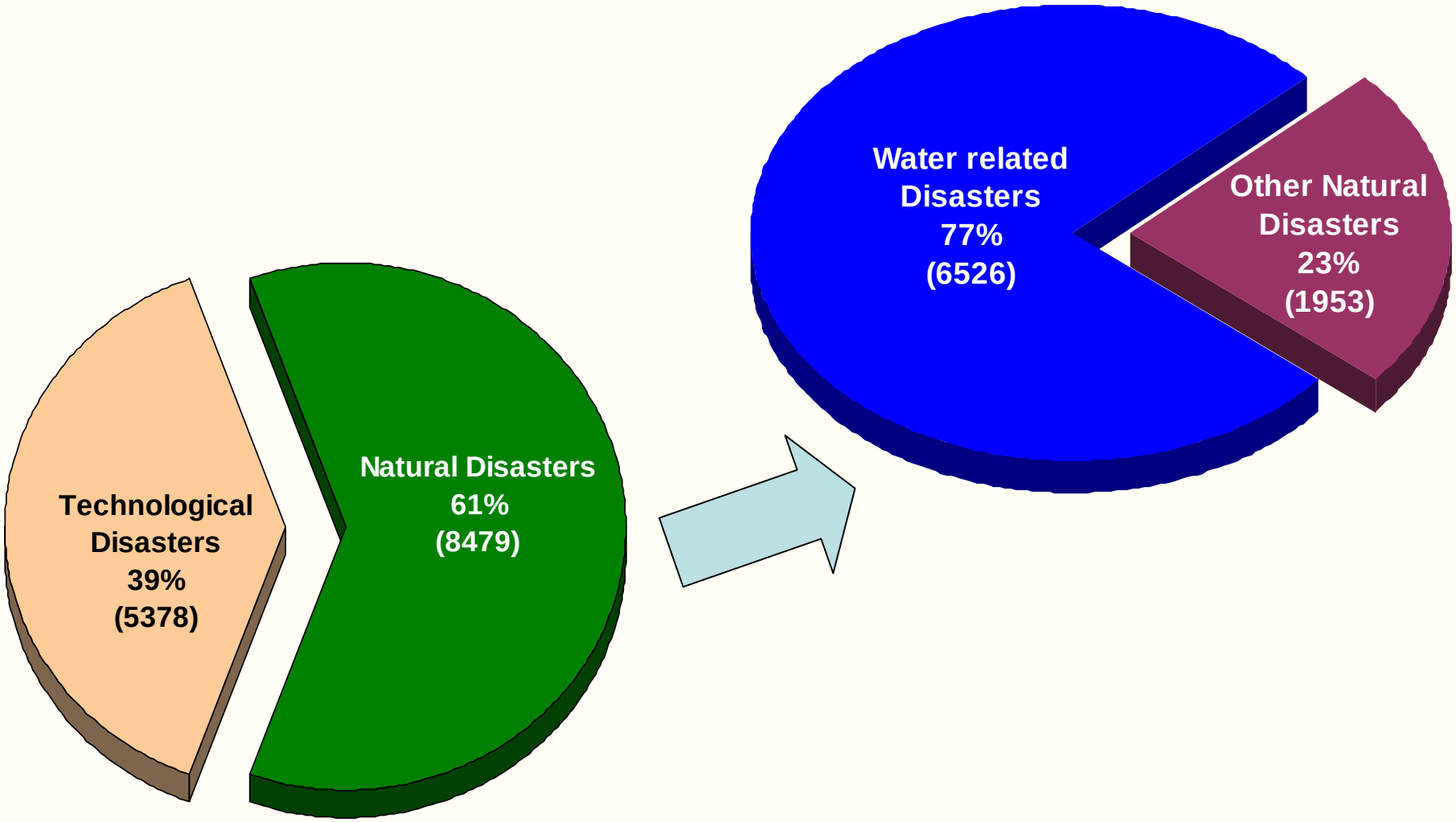
Asia-Pacific Water Forum (APWF)

http://www.apwf.org

- Launched during the WWF4 in Mexico
- to contribute to sustainable water management in order to achieve the targets of the MDGs in Asia-Pacific region
- 1st Asia Pacific Water Summit was held in Beppu, Japan on December 3 – 4, 2007
- 3 Priority themes
  - Water Financing
  - Water-related Disaster Management
  - Water for Development and Ecosystem
- ICHARM served as the leading agency for the theme of water related disaster management

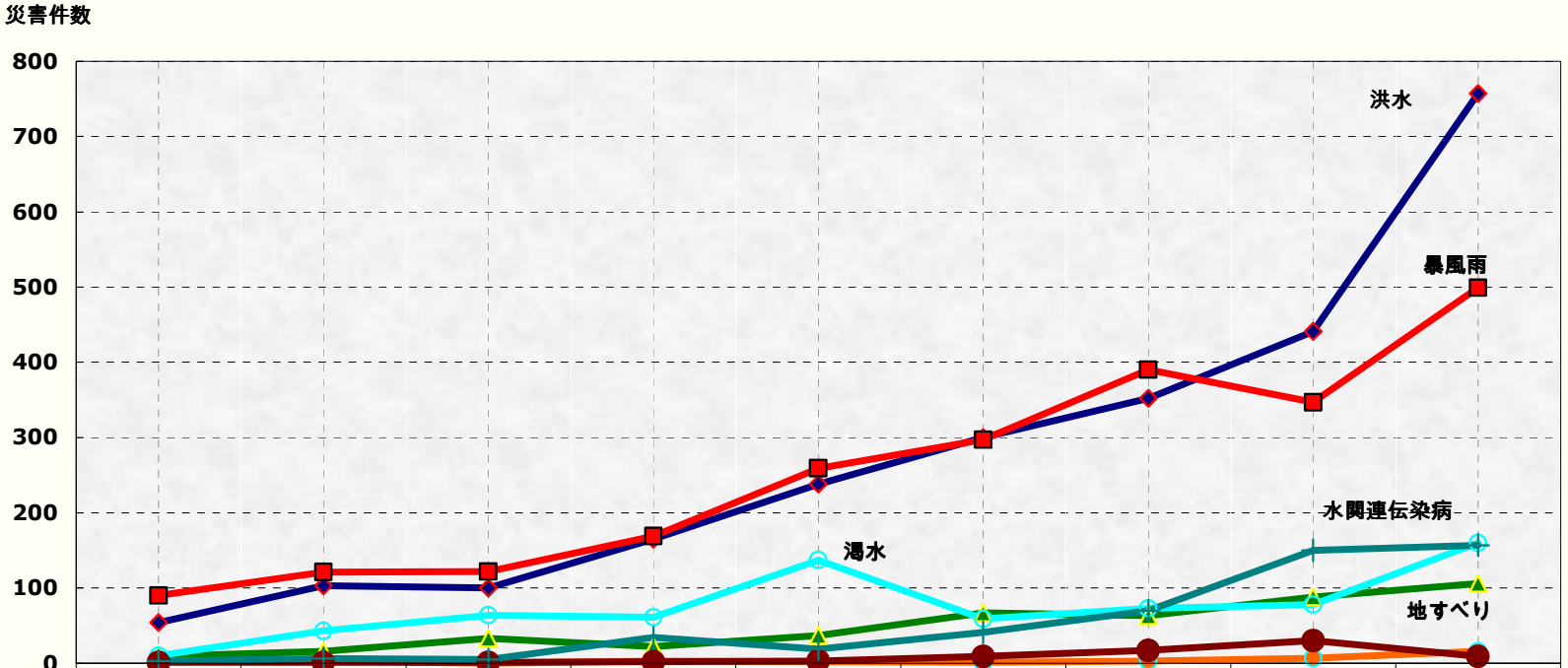
Recommendations agreed among the participants for Theme B session

- Integrate water-related Disaster Risk Reduction (DRR) into national development plans, recognizing **adaptation to increasing risks from climate change** as a “highest” priority issue.
- Recognize the **importance of IWRM** for water-related DRR and the need to strengthen comprehensive structural and non-structural measures
- Establish national and local goals/targets for water-related DRR, taking the **impacts of climate change** into consideration
- Develop **preparedness indices** for water-related DRR for the Asia-Pacific region
- Develop **water-related disaster warning systems** and human capacities
- Establish **regional knowledge hub** for Water-related DRR



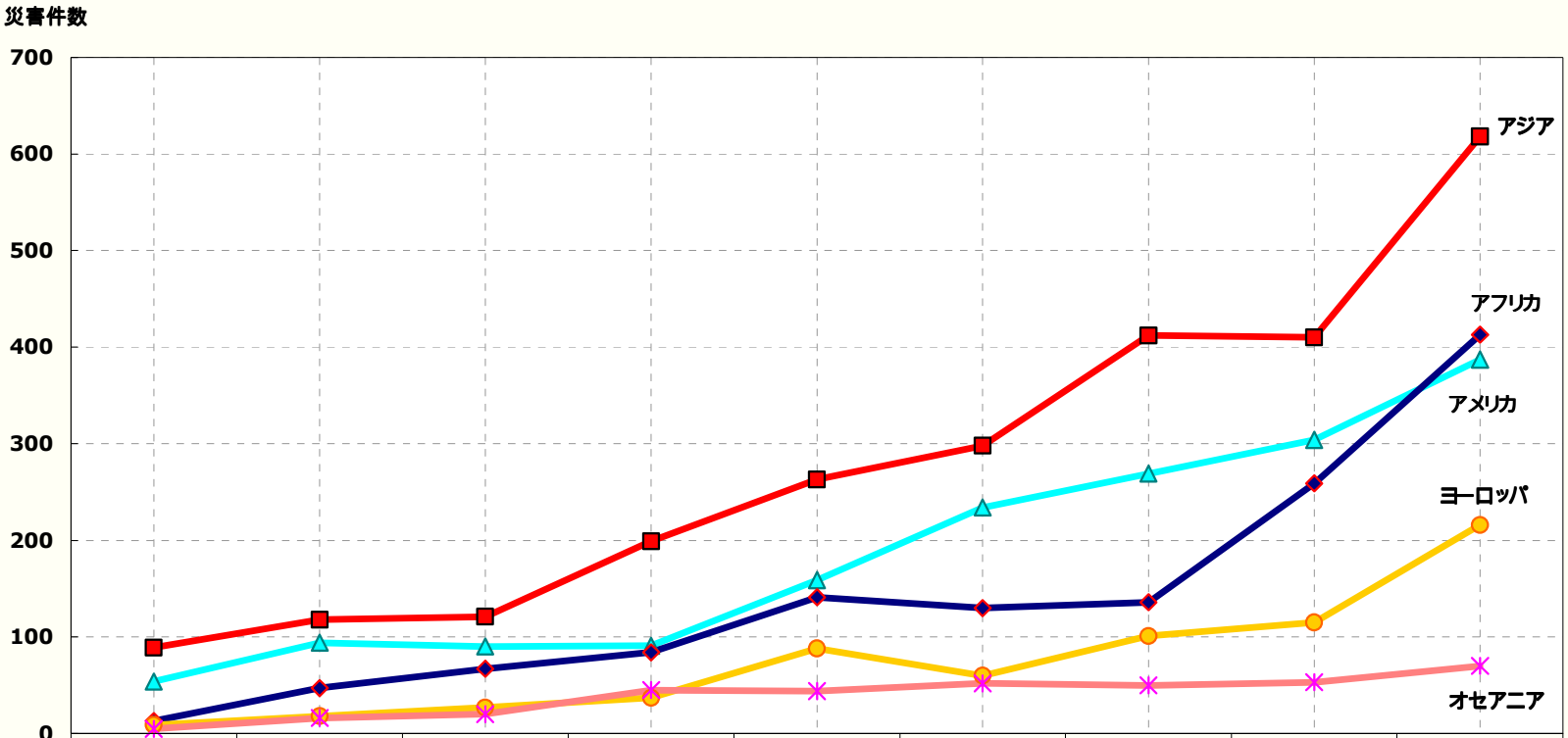
Disasters in the world (1960 - 2004)

※ **By PWRI using CRED Data**



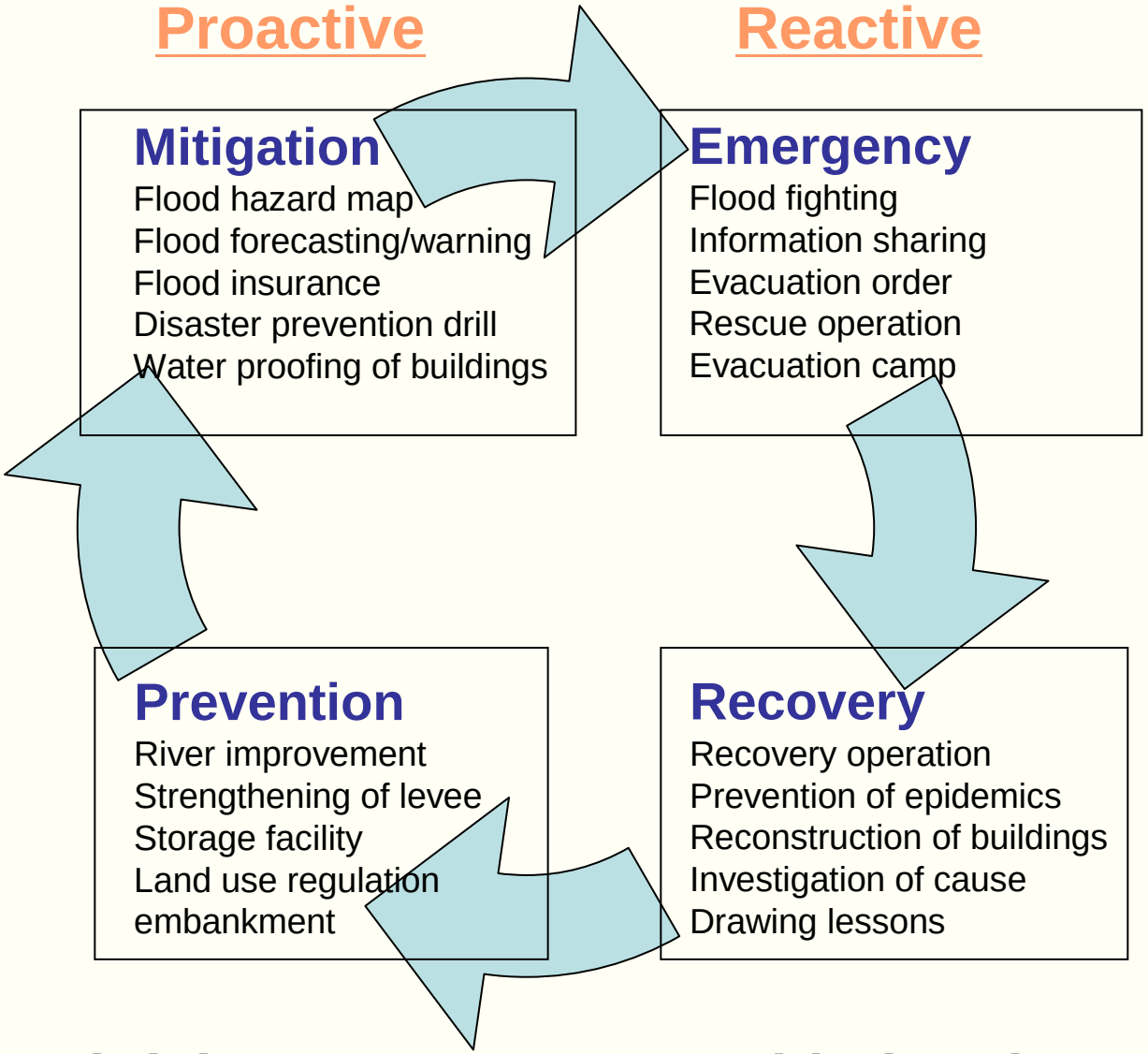
	1960-1964	1965-1969	1970-1974	1975-1979	1980-1984	1985-1989	1990-1994	1995-1999	2000-2004
洪水	54	103	100	165	238	300	352	441	757
暴風雨	90	121	122	169	259	297	390	347	499
地すべり	9	16	33	22	37	67	63	88	106
津波・高潮	3	3	0	3	2	1	3	7	16
渇水	10	43	64	61	137	59	73	78	160
飢饉	1	1	1	2	3	9	17	30	9
水関連伝染病	3	6	5	34	19	41	70	150	157

Annual trend of water related disasters (for each disaster)



	1960-1964	1965-1969	1970-1974	1975-1979	1980-1984	1985-1989	1990-1994	1995-1999	2000-2004
アジア	89	118	121	199	263	298	412	410	618
アメリカ	54	94	90	91	159	234	269	304	387
アフリカ	13	47	67	84	141	130	136	259	413
ヨーロッパ	9	18	27	37	88	60	101	115	216
オセアニア	5	16	20	45	44	52	50	53	70

Annual trend of water related disasters (for each region)



Integrated risk management considering the total balance of proactive and reactive measures is important

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)

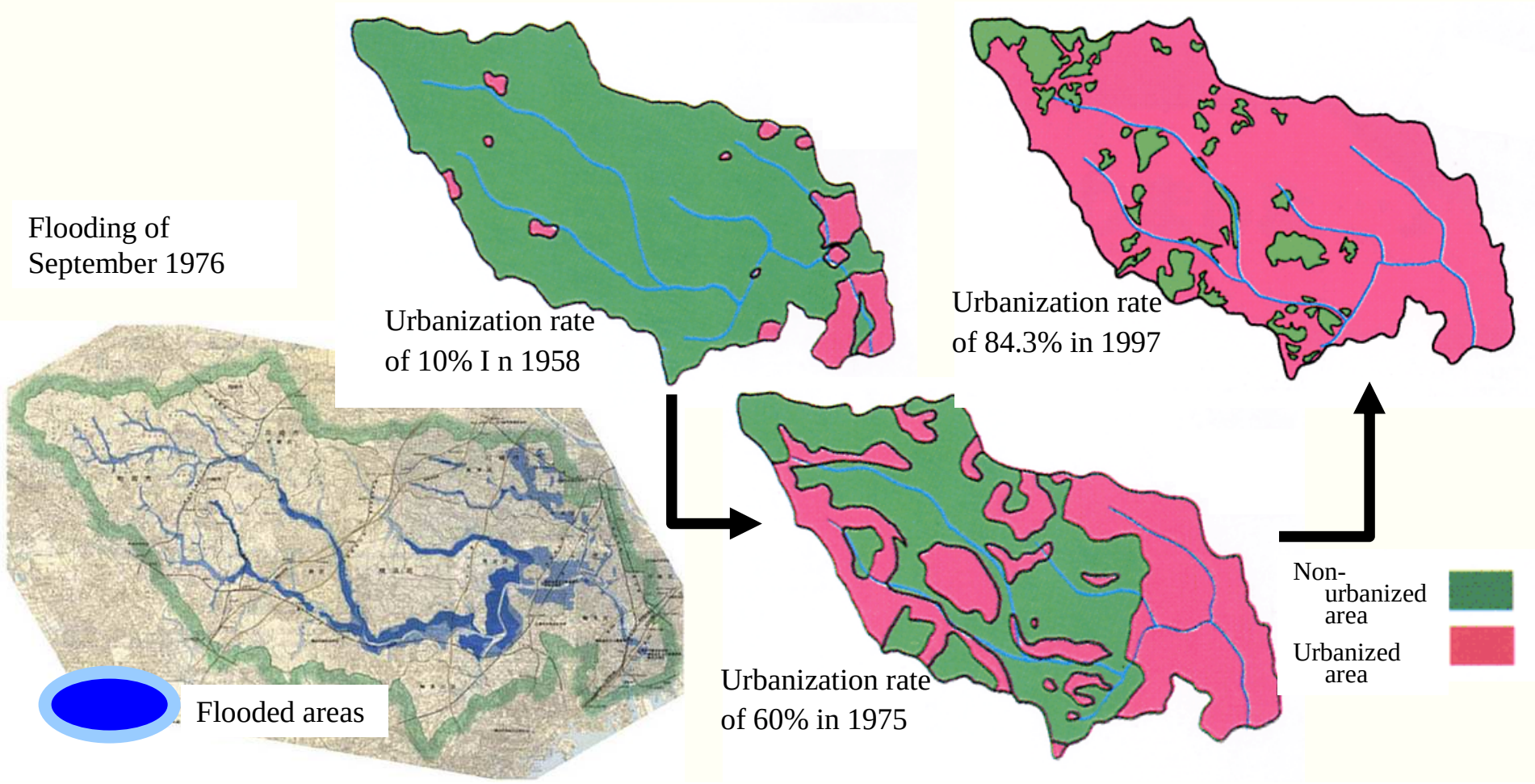
Cut the process chain of flood disasters in an integrated manner to maximize the net benefit to the region under various natural, social and economical conditions

Various Measures for integrated River and Basin management

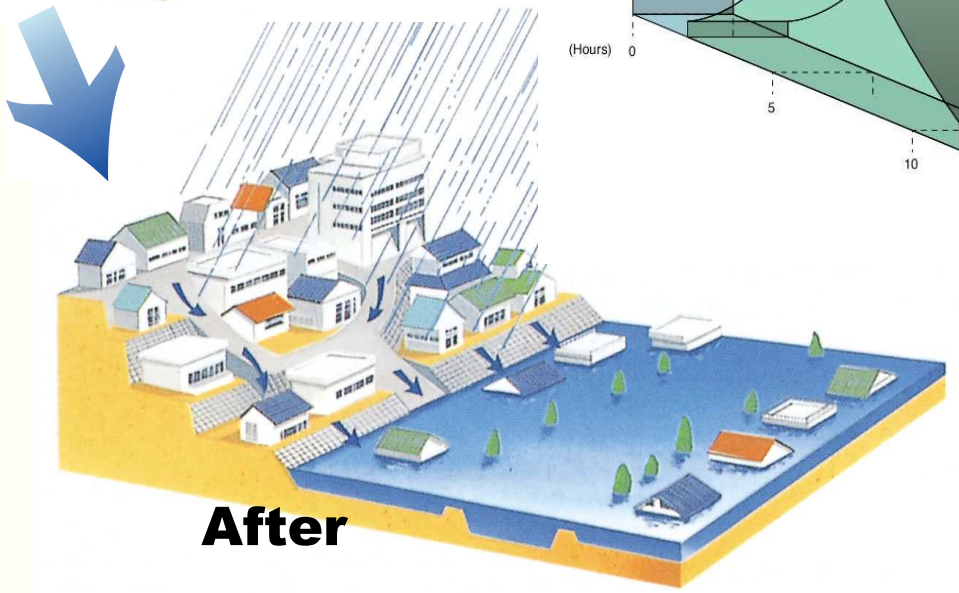
from 'Rivers in Japan', MLIT, 2003

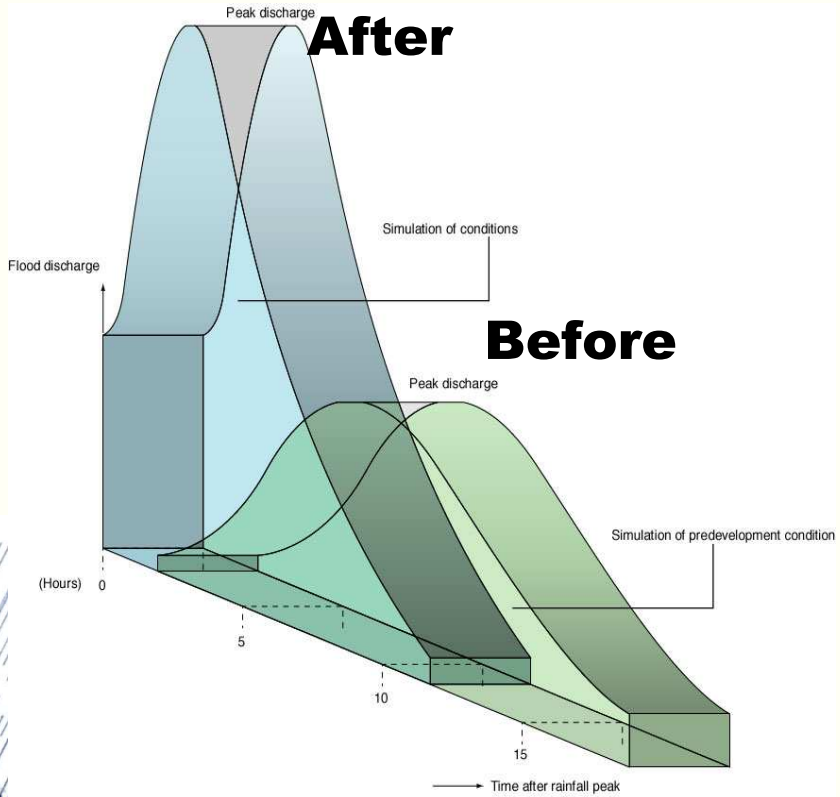
Extensive Housing Land Development has been in Progress in the Heights and Hilly Zones of the Suburban Areas in the Three Major Metropolitan Regions.

Developments of Heights and Hilly Zones: Tsurumi River (through Tokyo metropolis and Kanagawa Prefecture)



Effect of urbanization on flood runoff





Widening of river channel is difficult in the highly urbanized area

Tsurumi River

Source: “Tsurumi River and Renewal of Its Basin – Suggestions toward Formulation of Master Plan for Development of Tsurumi River Basin Water Resources”

Naka River and Ayase River

Source: Brochure “For Prptecing Our Town from Flood Disasters”

…⊿

Comprehensive Flood Disaster Prevention Measures

Basin Council

consisted of the representatives of the regional development bureau of MLIT, river related departments and the urban, housing and land department of the prefectural and municipal governments concerned, to discuss the implementation scenario of the comprehensive measures for the river basin.

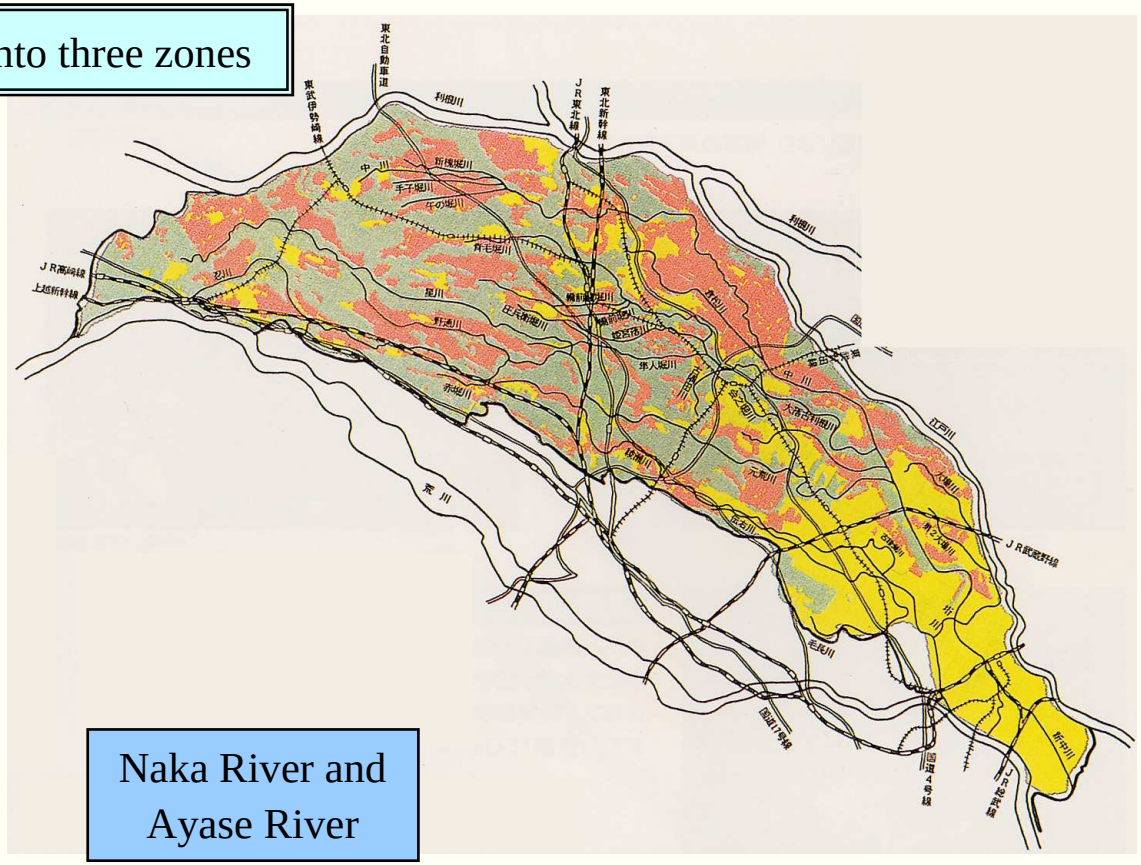
Basin improvement plan

The Council studies and selects concrete measures appropriate to the characteristics of the particular basin and make up a basin improvement plan.

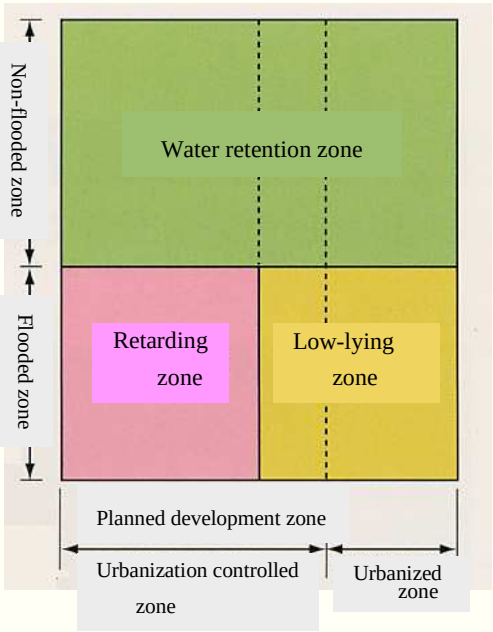
Basin Measures

With the basin divided into three zones, namely, Water Retention Zone, Retarding Zone and Low-lying Zone, basin improvement measures appropriate to the characteristics of the respective zones have been implemented.

Division into three zones



Naka River and Ayase River



Basin Improvement Plan

Retention areas

- Maintenance of controlled urbanization districts
- Conservation of nature
- Construction of reservoirs and regulating basins
- Installation of permeable pavements and seepage sumps

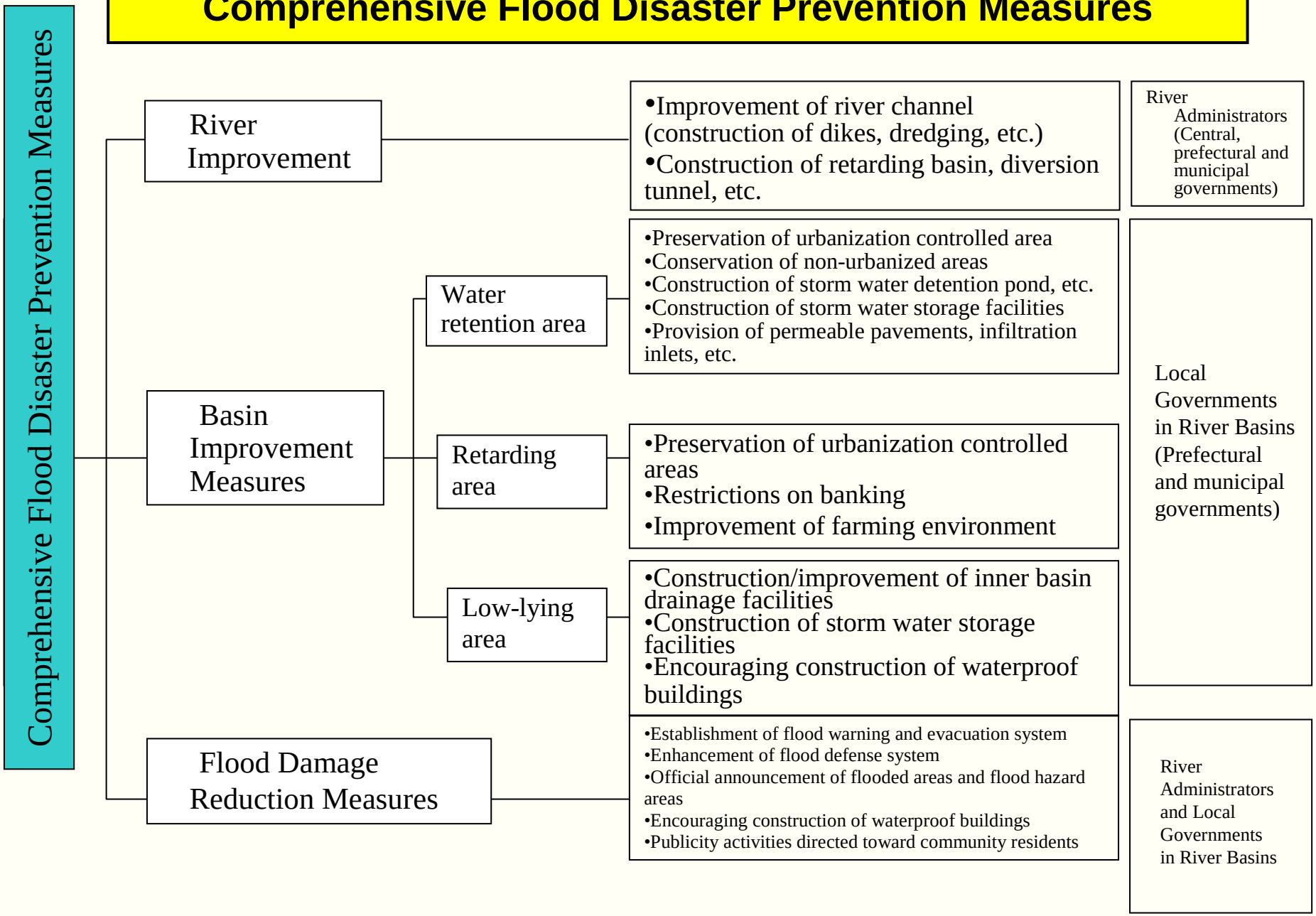
Detention areas

- Preservation of urbanization control zones
- Control of landfill
- Promotion of conditions favorable to agricultural activities

Low-lying areas

- Development of drainage facilities
- Construction of storage facilities
- Encouragement of use of flood-proof buildings

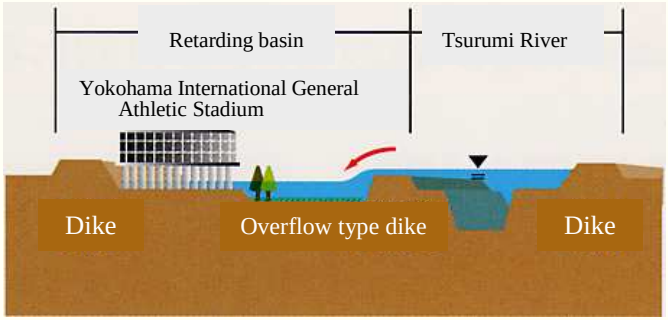
Comprehensive Flood Disaster Prevention Measures

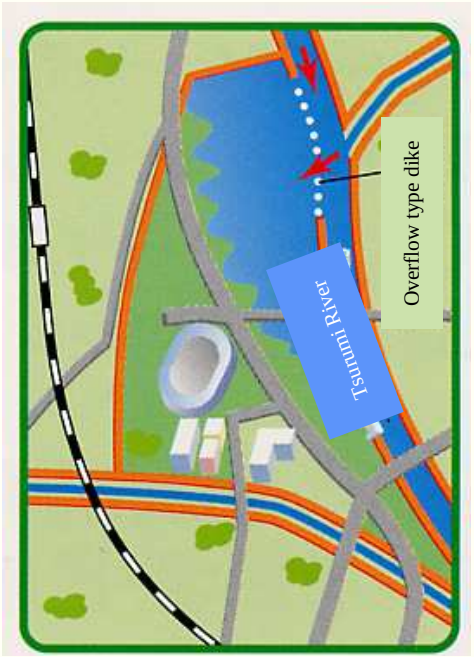


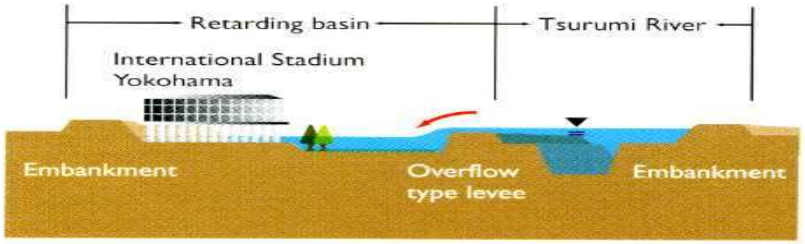
Example of Basin Measures

Construction of Retarding Basin and Diversion Tunnel

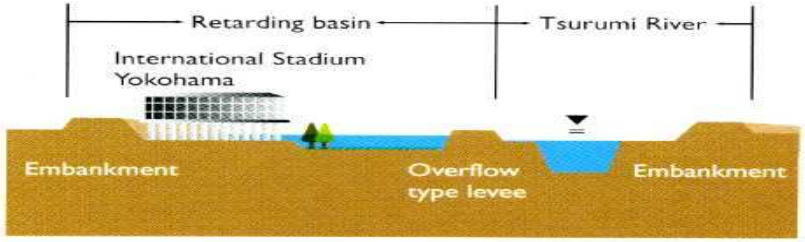
Multipurpose Retarding Basin for Tsurumi River



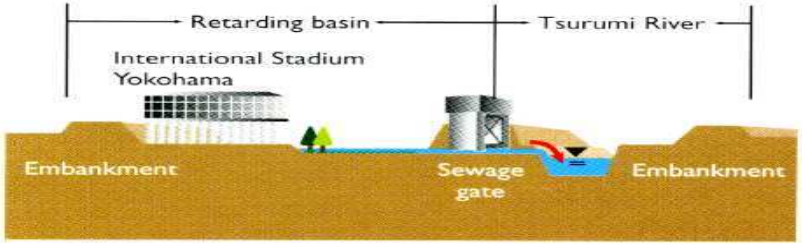




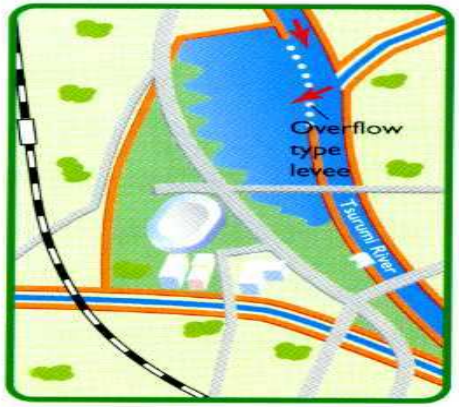
1 When it looks like a flood is going to cause the river to overflow, water from the river can flow over the overflow type levee into the retarding basin.

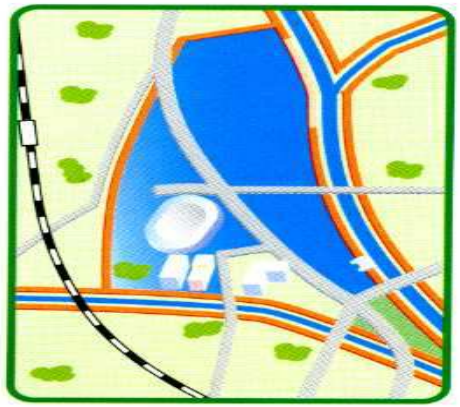


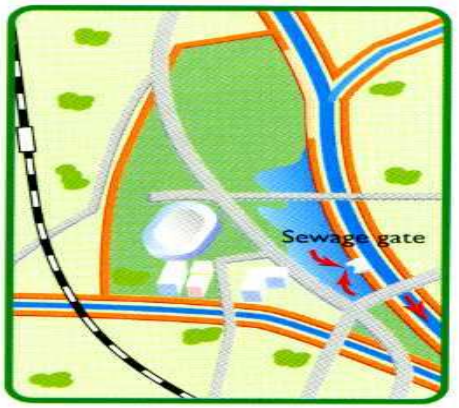
2 Floodwater is temporarily stored in the retarding basin.



3 When the water level of the river drops, the sewage gate is used to allow water to gradually flow back into the river.







Example of Basin Measures

Construction of Rainwater Storage Facilities

Shinkashi River

Example of Basin Measures

Construction of Permeable Pavements and Infiltration Inlets

Permeable pavement

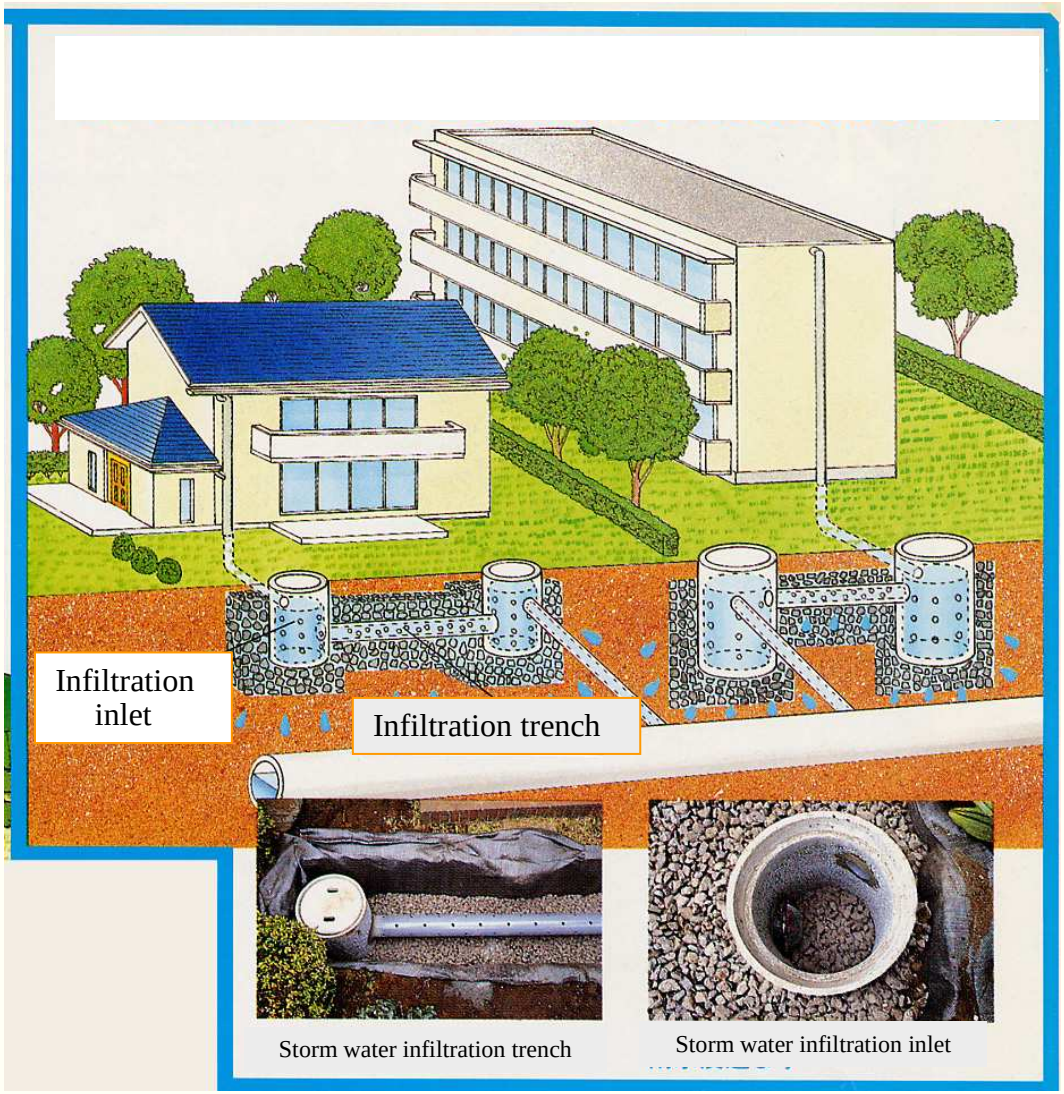
Permeable tile pavement

Tokyo Metropolis

Example of Basin Measures

Construction of Permeable Pavement and Infiltration Inlet

Storm water infiltration facilities



Damage Reduction Measures

Encouraging Construction of Waterproof Buildings

Tsurumi River

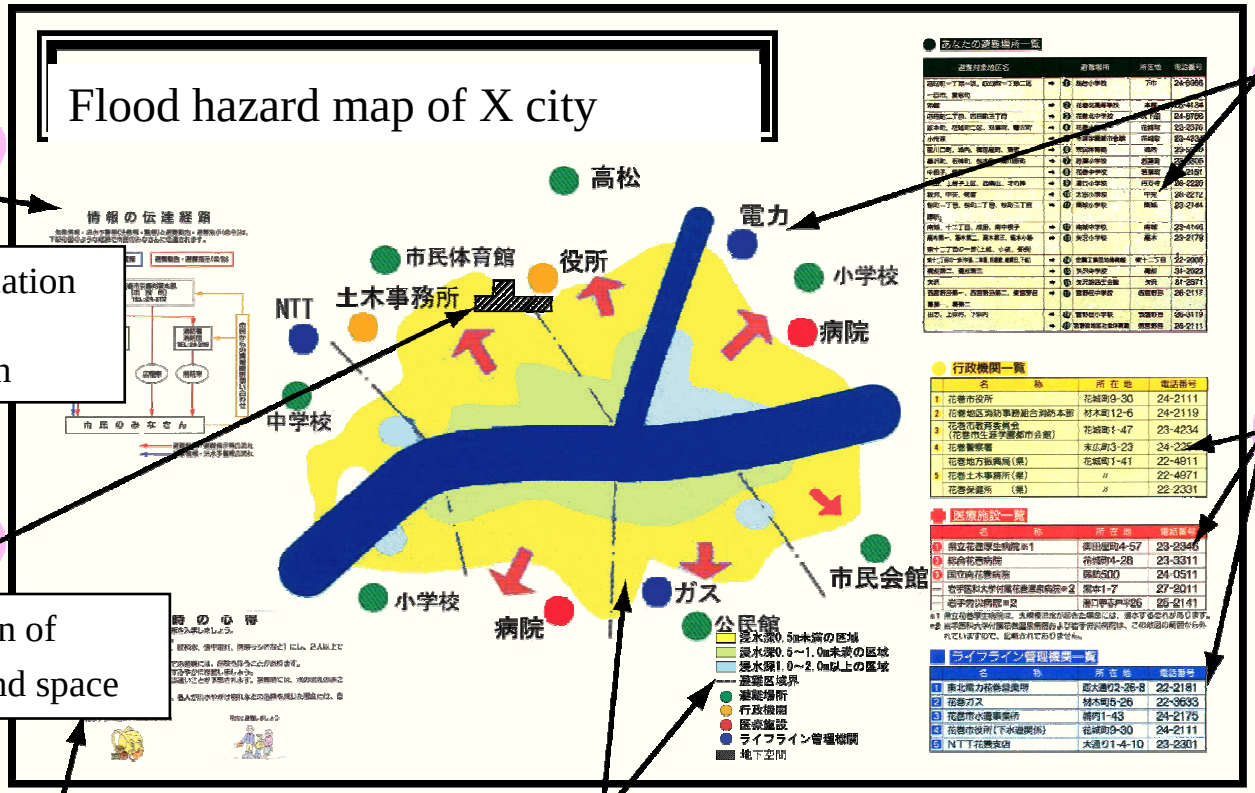
Constructed in a multipurpose retarding basin for the Tsurumi River, this building has adopted a piloti type structure to permit the use of the retarding basin during floods.

Located near the Tsurumi River, the building, learning from past experience, adopts a piloti type structure to protect it from flood damage.

Role of flood hazard map

1.Advance preparation **2. Damage mitigation in the event of a disaster**

3. Increasing awareness of disaster prevention



情報の伝達経路

Communication channel of information

地下空間の分布

Distribution of underground space

避難時の心得、持ち物

Hints / possessions on evacuation

避難先の位置、名称

Location / name of evacuation site

連絡先
- 行政機関
- 医療機関
- ライフライン管理機関

Contact information
-Administrative agency
-Medical institution
-Lifeline administrator

浸水想定区域、浸水深の明示

Flood-predicted area, flooded depth manifested

Process Chain of Natural Disasters

Hea y Rainfall

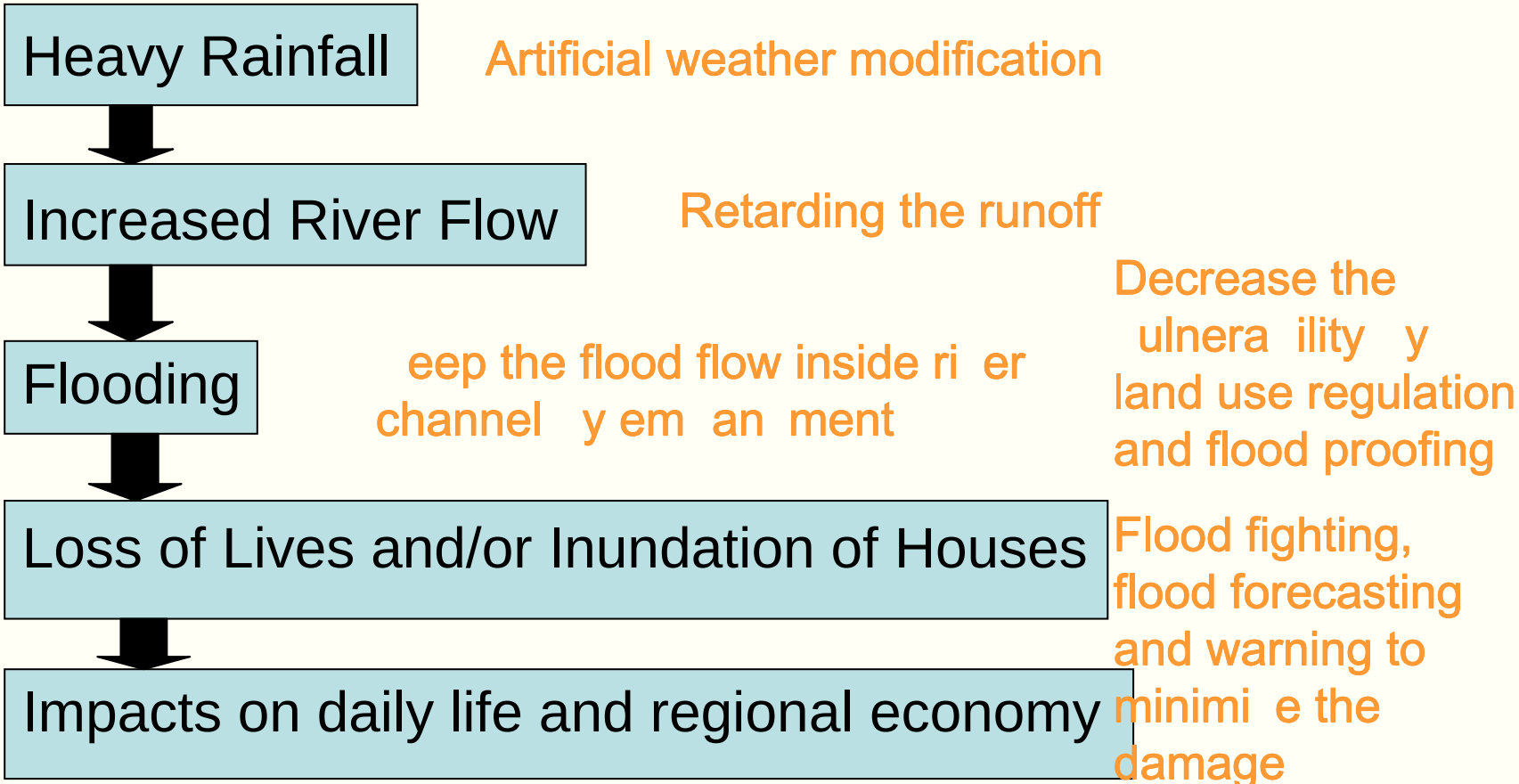
Increased Ri er Flow

Flooding

oss of li es and/or
inundation of houses

Hampering daily commodities supply
and/or Regional production acti ities

Flood Risk Management to cut Process Chain of Flood Disasters



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Thank you for your attention

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