



Toward Integrated Flood Risk Management — Outline of ICHARM —

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(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



Training of flood hazard mapping

Data

Curriculum

Participation

Results and outcomes

Knowledge

Network

Information networking

- 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

- **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-related 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)

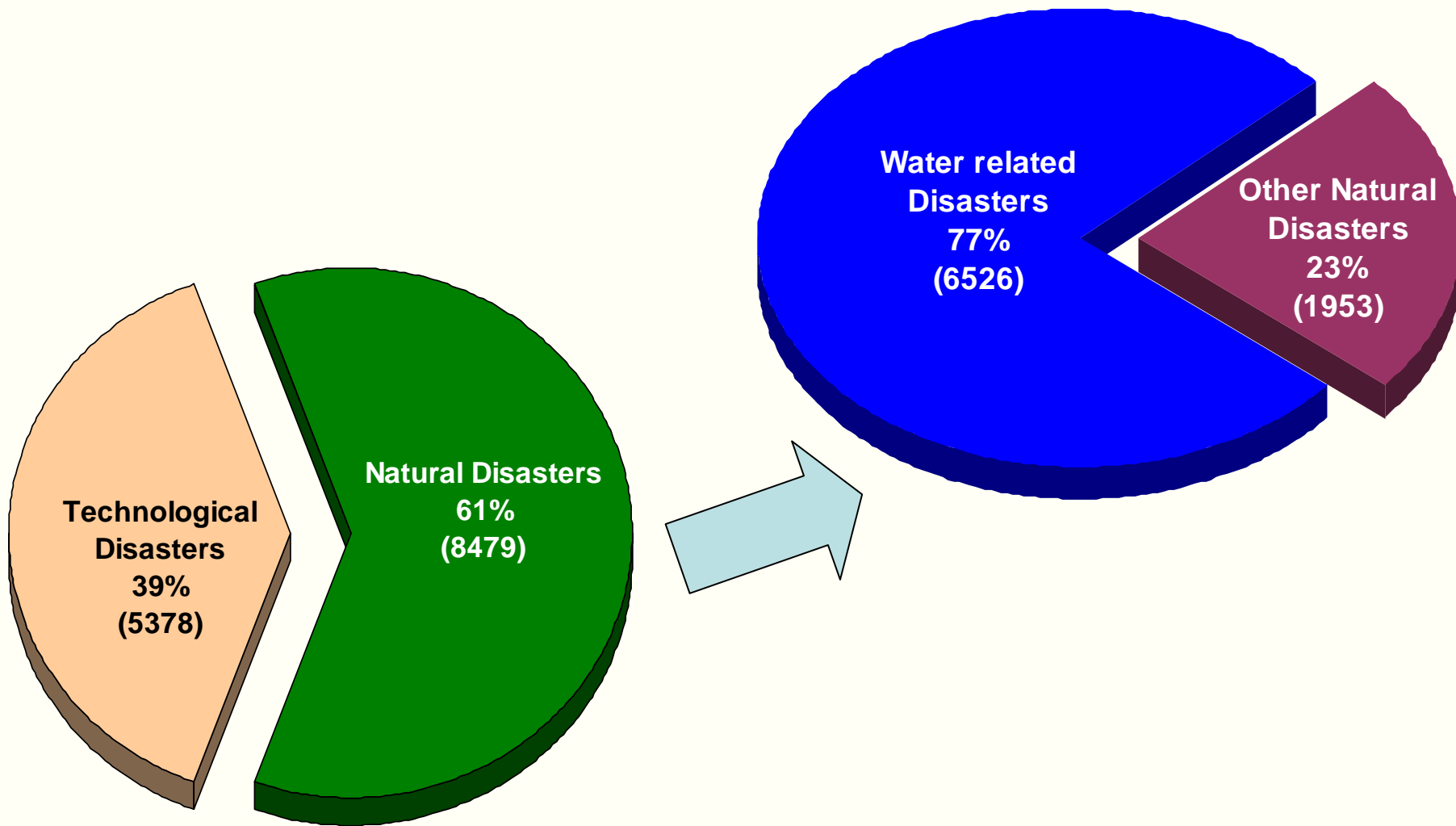
Asia-Pacific Water Forum (APWF)

<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

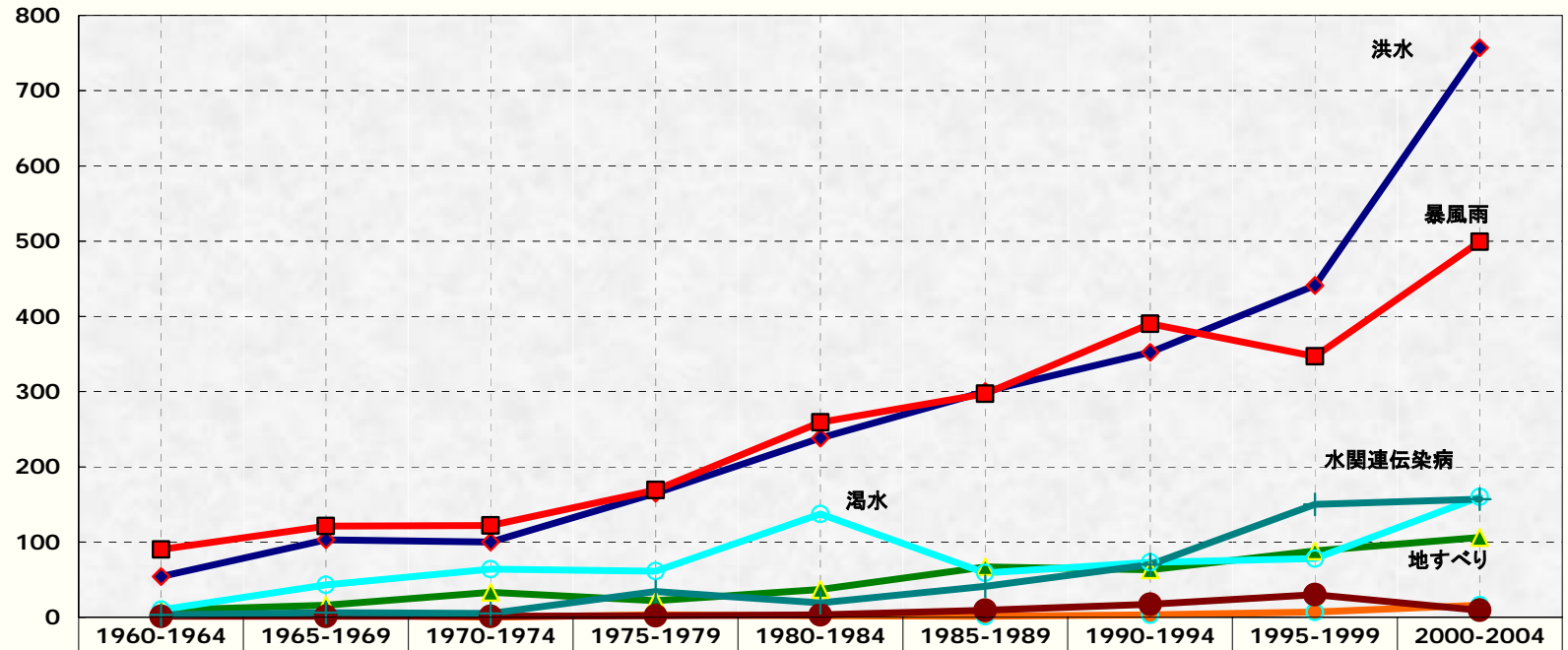
- Integrate water-related Disaster Risk Reduction (DRR) into national development plans, recognizing **adaptation to increasing risks from climate change** as a “highest” priority issue.
- Recognize the **importance of IWRM** for water-related DRR and the need to strengthen comprehensive structural and 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 CREDO Data

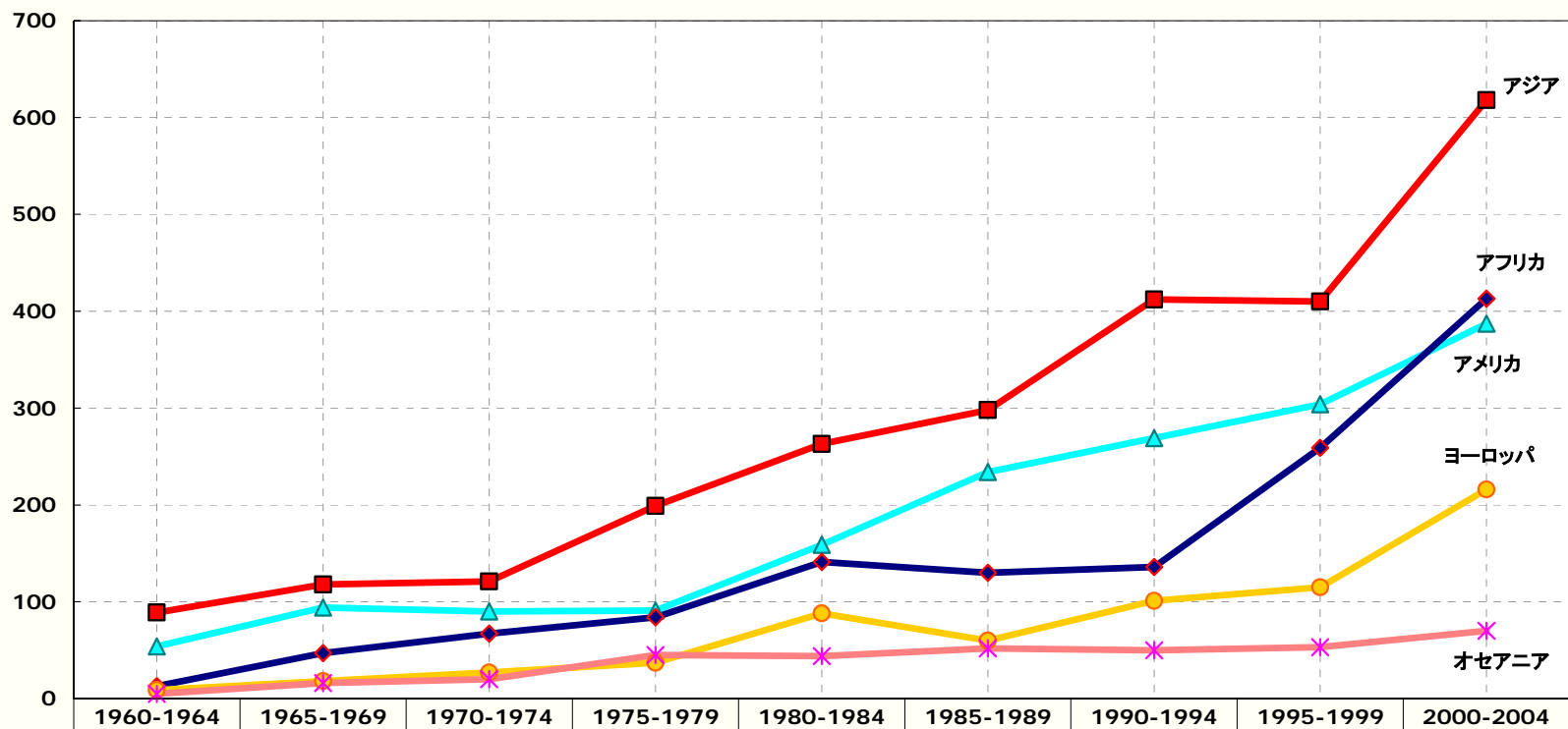
災害件数



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

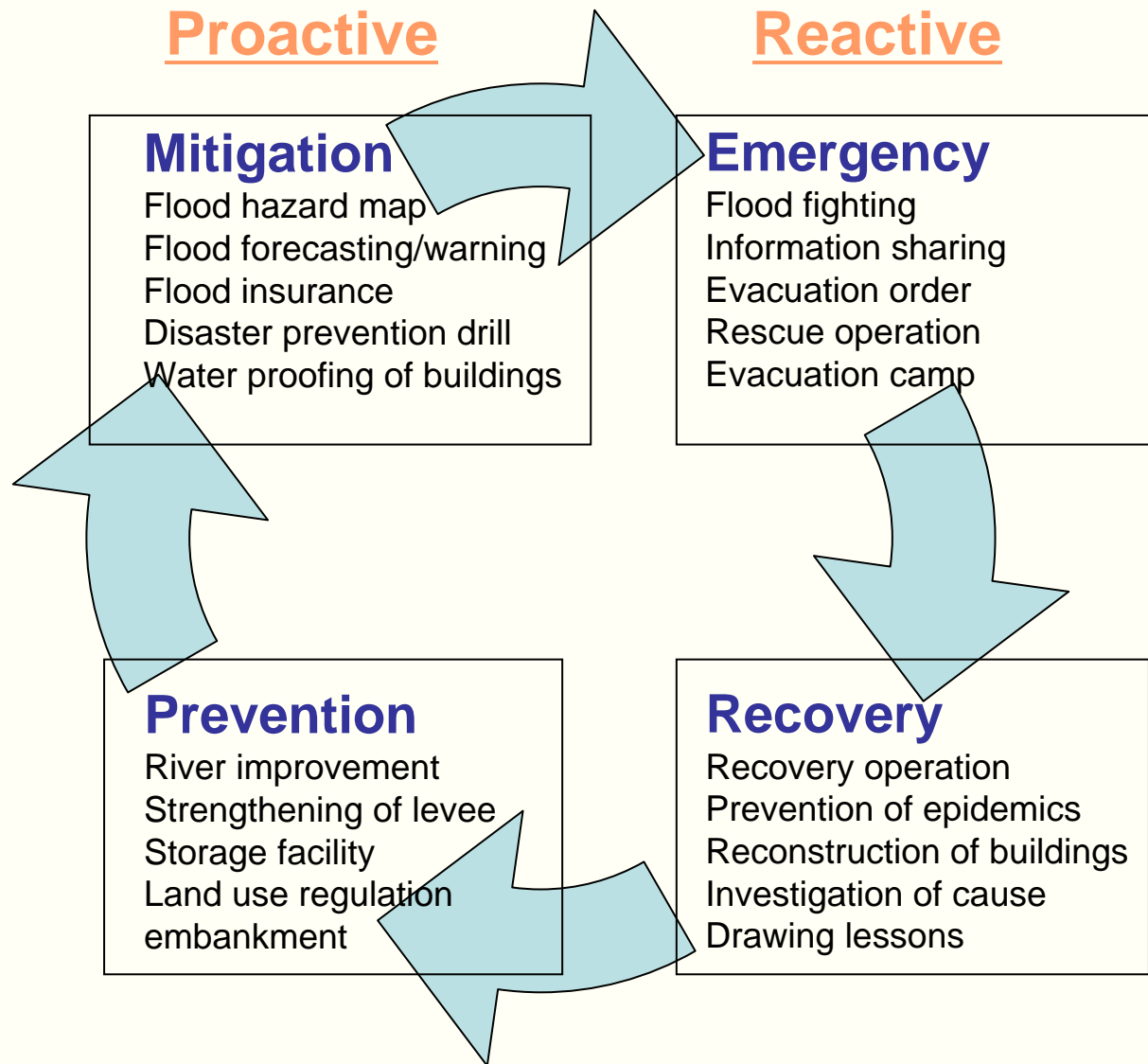
Annual trend of water related disasters (for each disaster)

災害件数



	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)

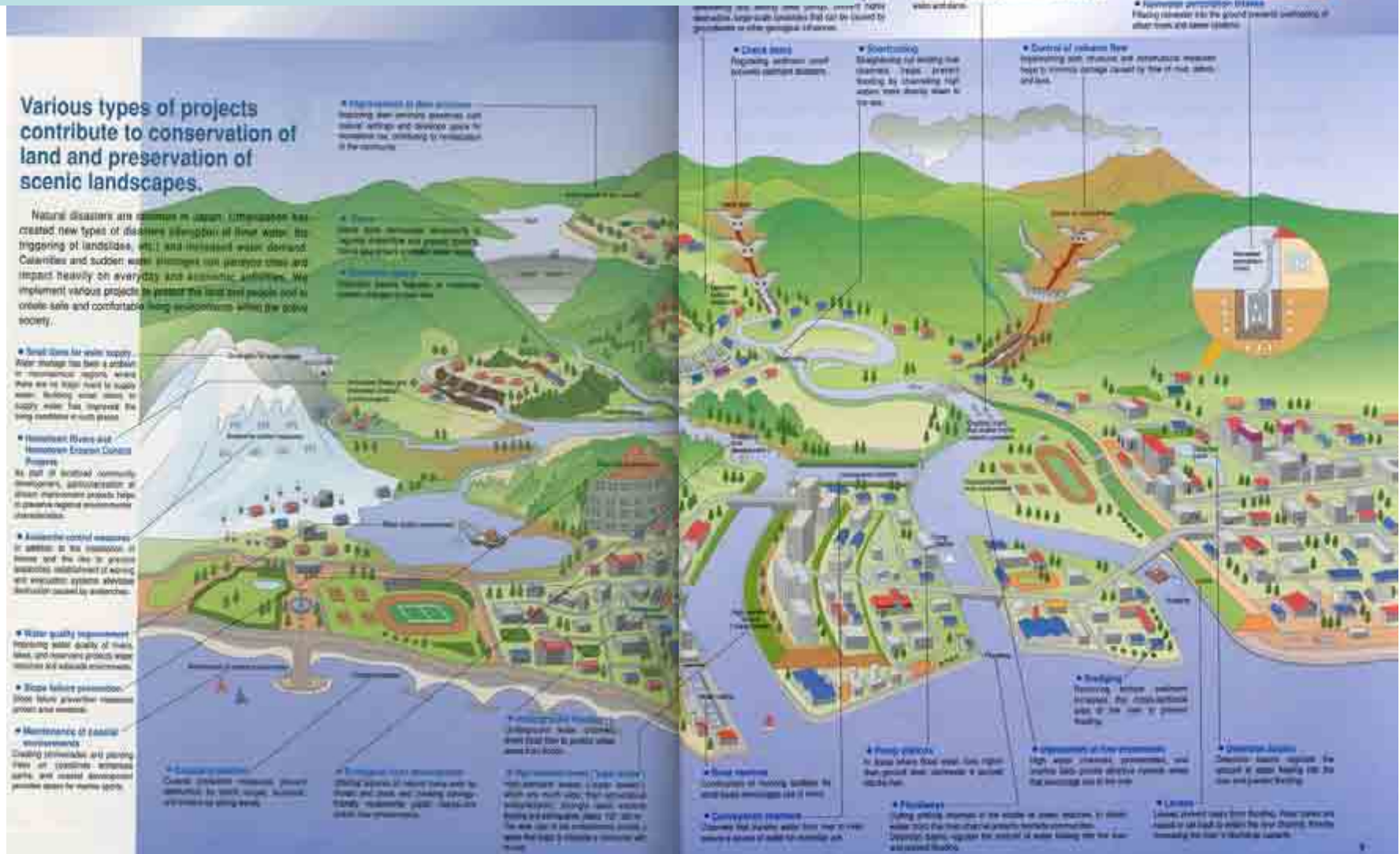
with a view to maximizing the efficient use of flood plains

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)

Flooding of
September 1976

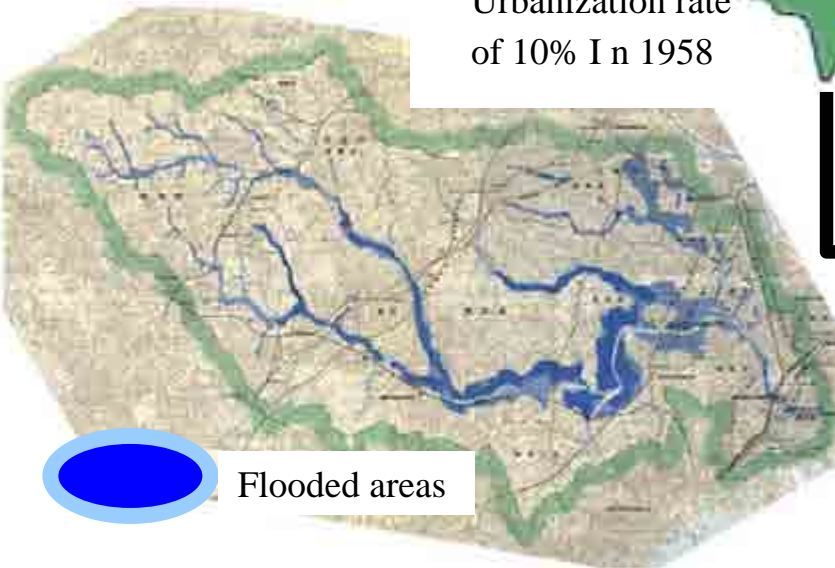
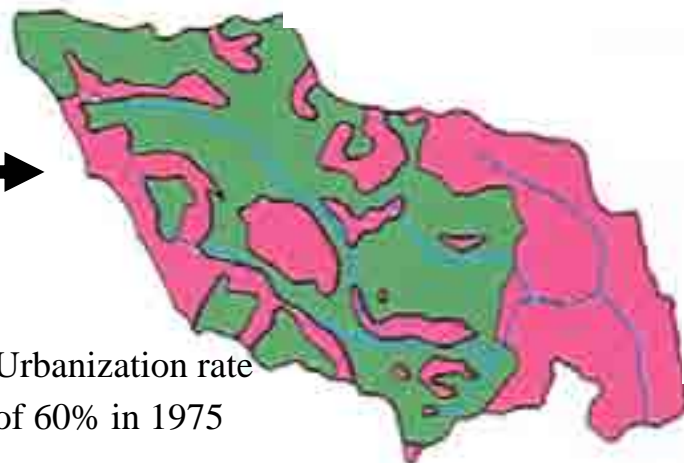
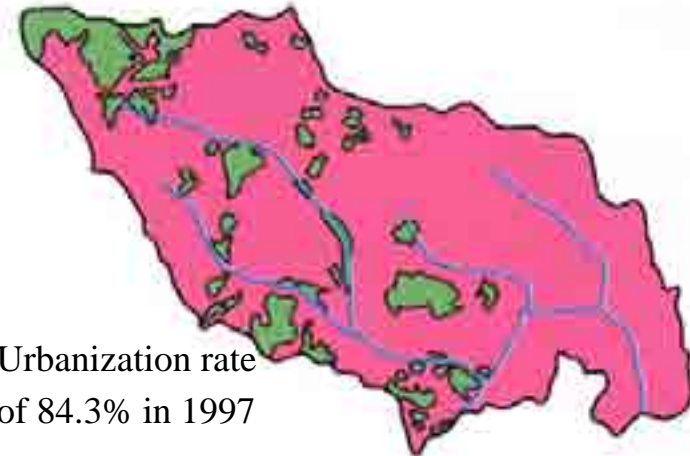
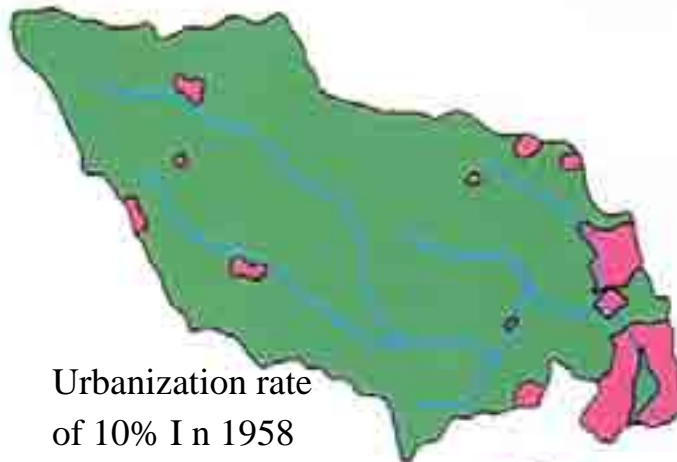
Urbanization rate
of 10% In 1958

Urbanization rate
of 84.3% in 1997

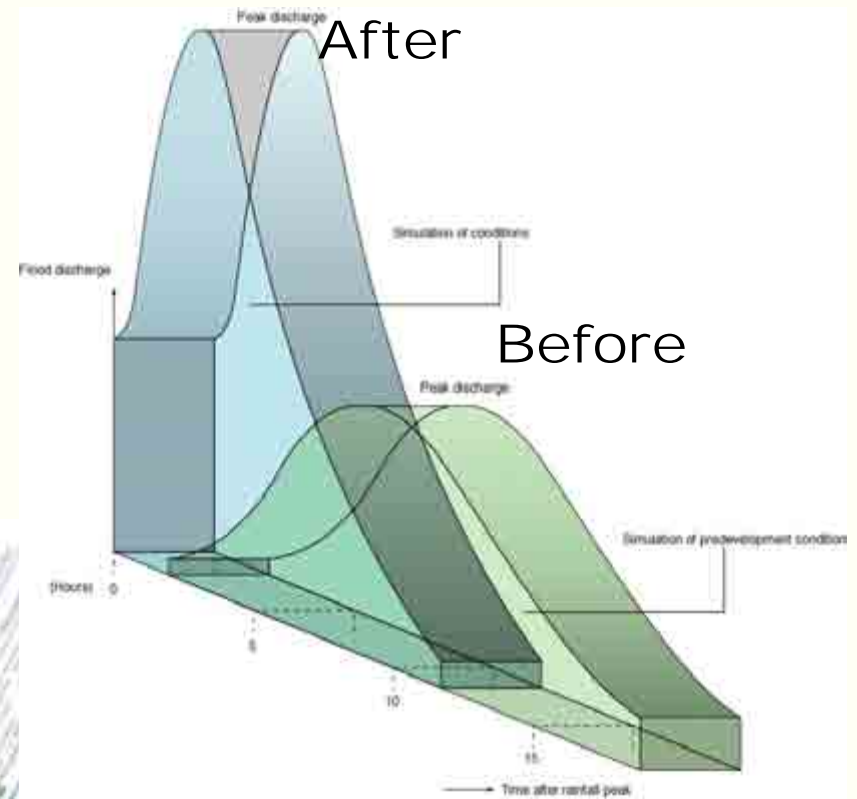
Urbanization rate
of 60% in 1975

Flooded areas

Non-
urbanized
area
Urbanized
area



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 Protecting 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.

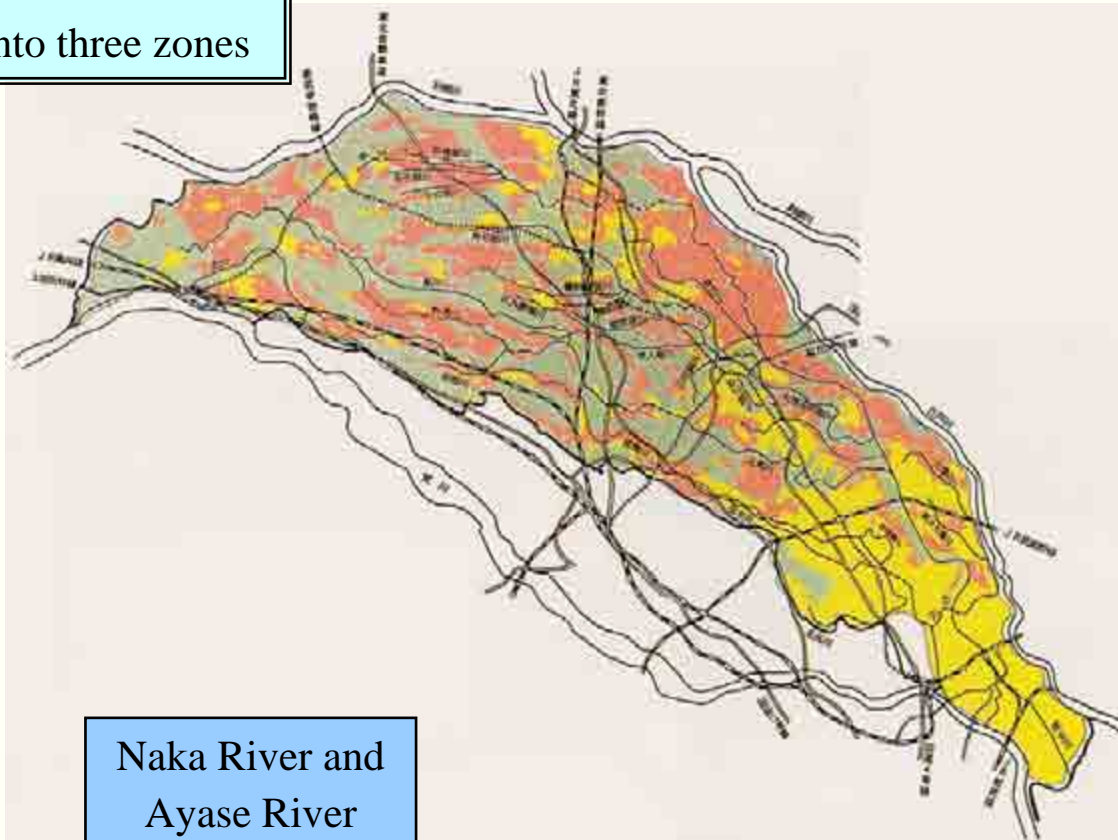
Basin improvement plan

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

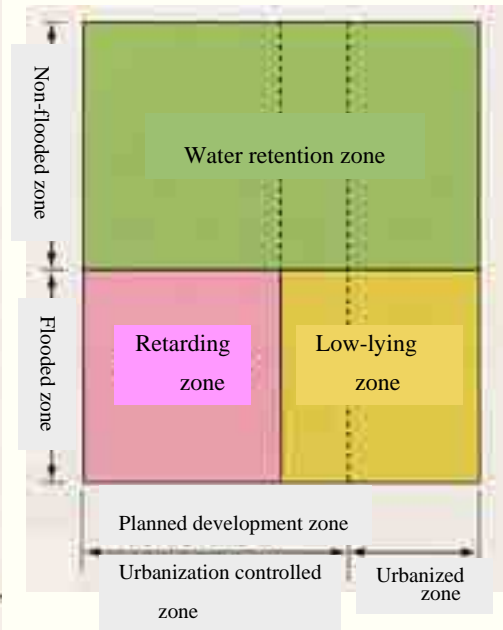
Basin Measures

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

Comprehensive Flood Disaster Prevention Measures

① River Improvement

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

River Administrators (Central, prefectural and municipal governments)

② Basin Improvement Measures

Water retention area

- Preservation of urbanization controlled area
- 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.

Retarding area

- Preservation of urbanization controlled areas
- Restrictions on banking
- Improvement of farming environment

Low-lying area

- Construction/improvement of inner basin drainage facilities
- Construction of storm water storage facilities
- Encouraging construction of waterproof buildings

Local Governments in River Basins (Prefectural and municipal governments)

③ Flood Damage Reduction Measures

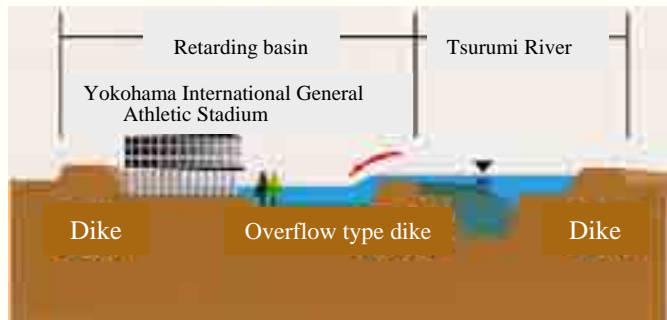
- Establishment of flood warning and evacuation system
- Enhancement of flood defense system
- Official announcement of flooded areas and flood hazard areas
- Encouraging construction of waterproof buildings
- Publicity activities directed toward community residents

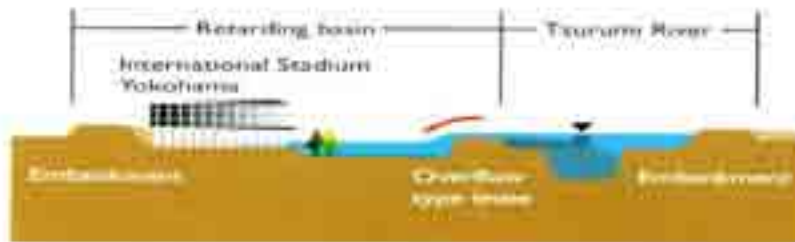
River Administrators and Local Governments in River Basins

Example of Basin Measures

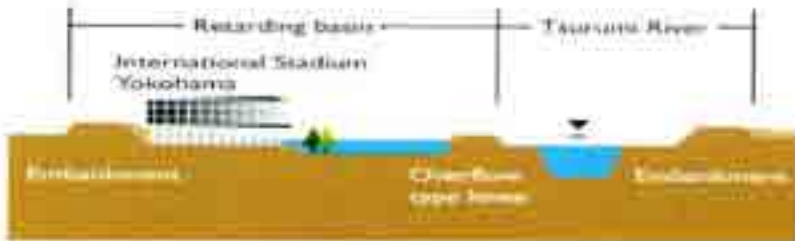
Construction of Retarding Basin and Diversion Tunnel

Multipurpose Retarding Basin for Tsurumi River

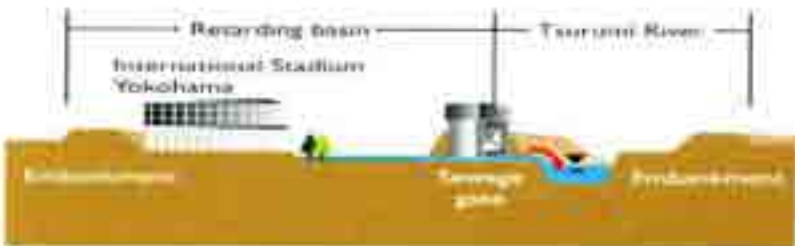




1 When it looks like a flood is going to cause the river to overflow, water from the river can flow over the overflow type levee into the retarding basin.



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

School ground storage



Shinkashi River

Example of Basin Measures

Construction of Permeable Pavements and Infiltration Inlets

Permeable pavement



Permeable tile pavement

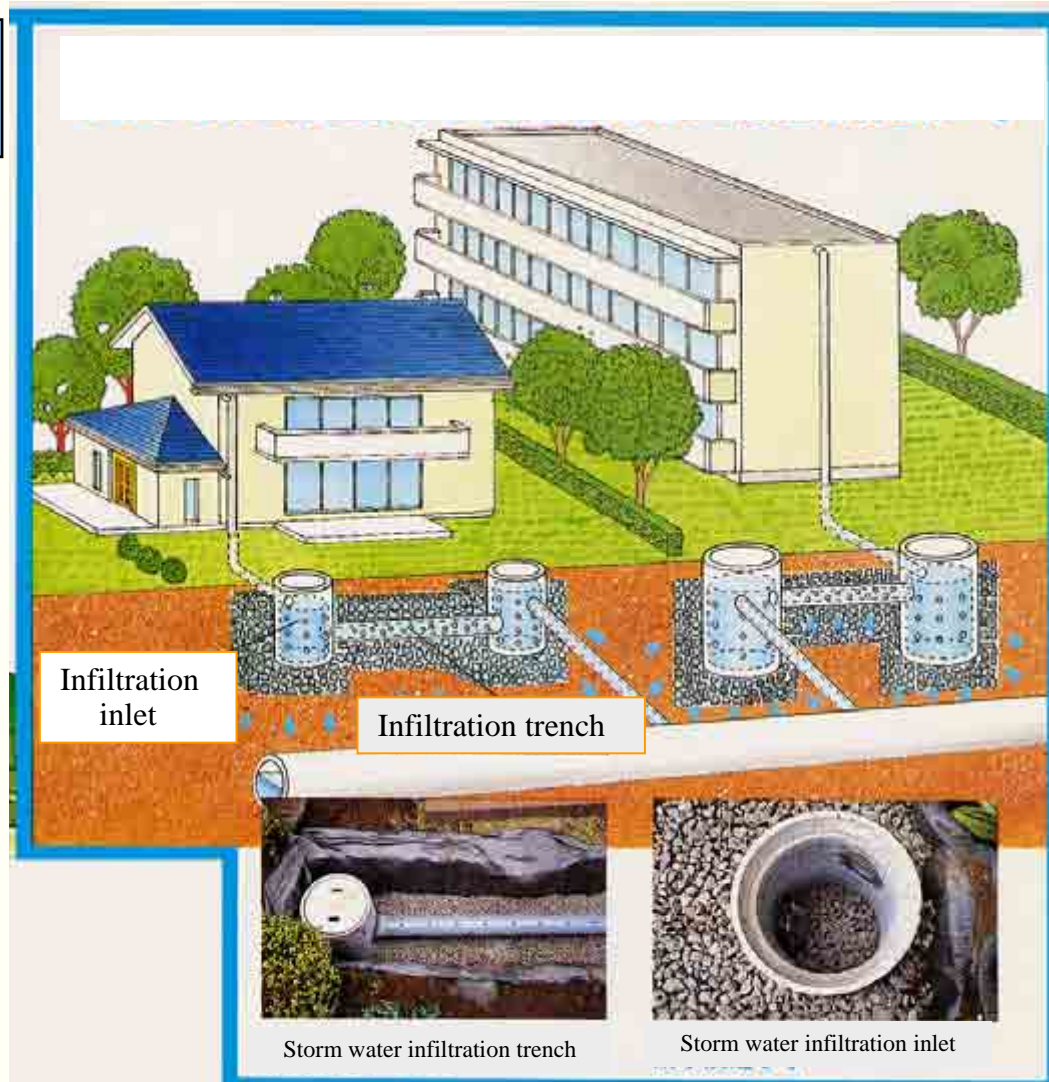


Tokyo Metropolis

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

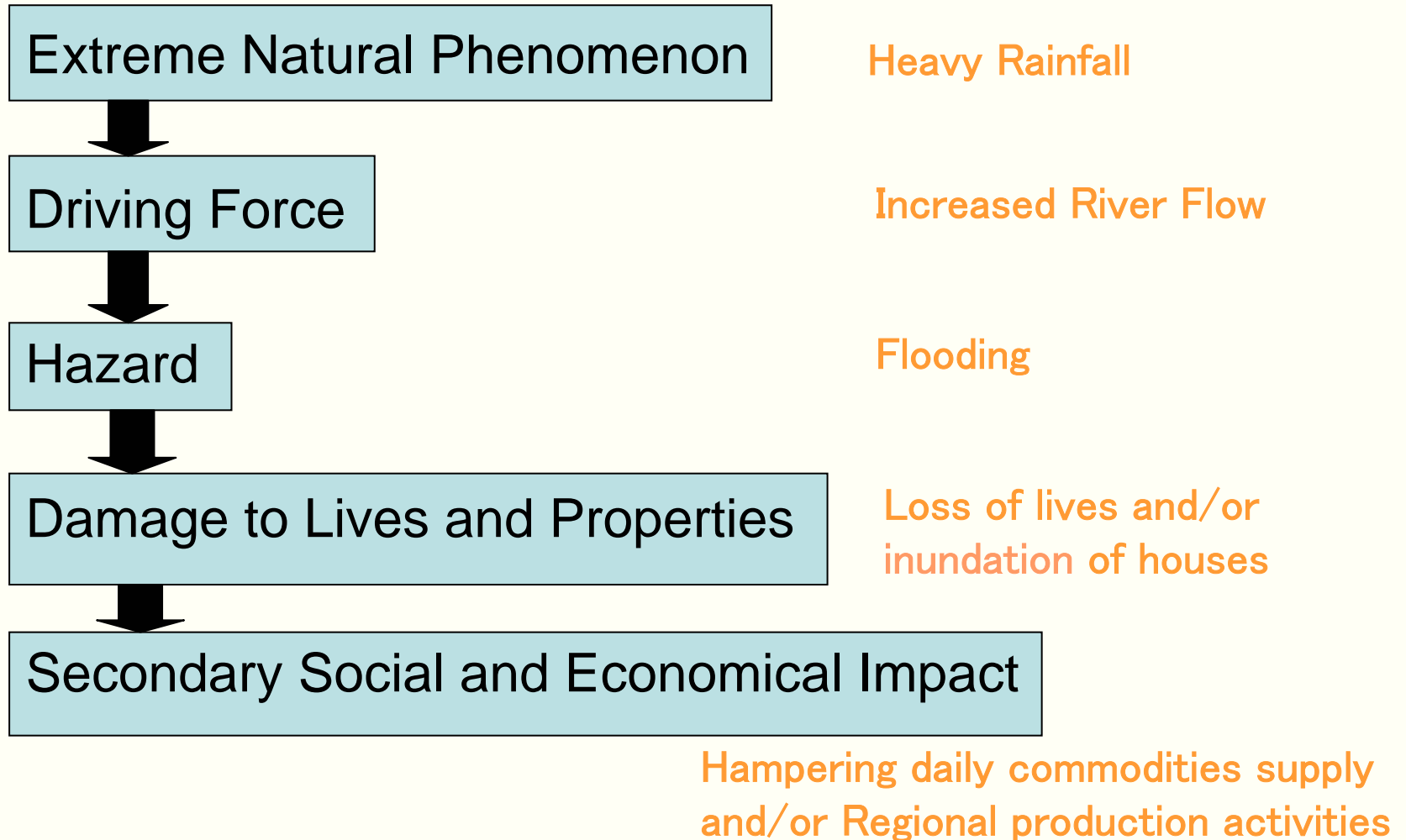


- ▲ Constructed in a multipurpose retarding basin for the Tsurumi River, this building has adopted a piloti type structure to permit the use of the retarding basin during floods.

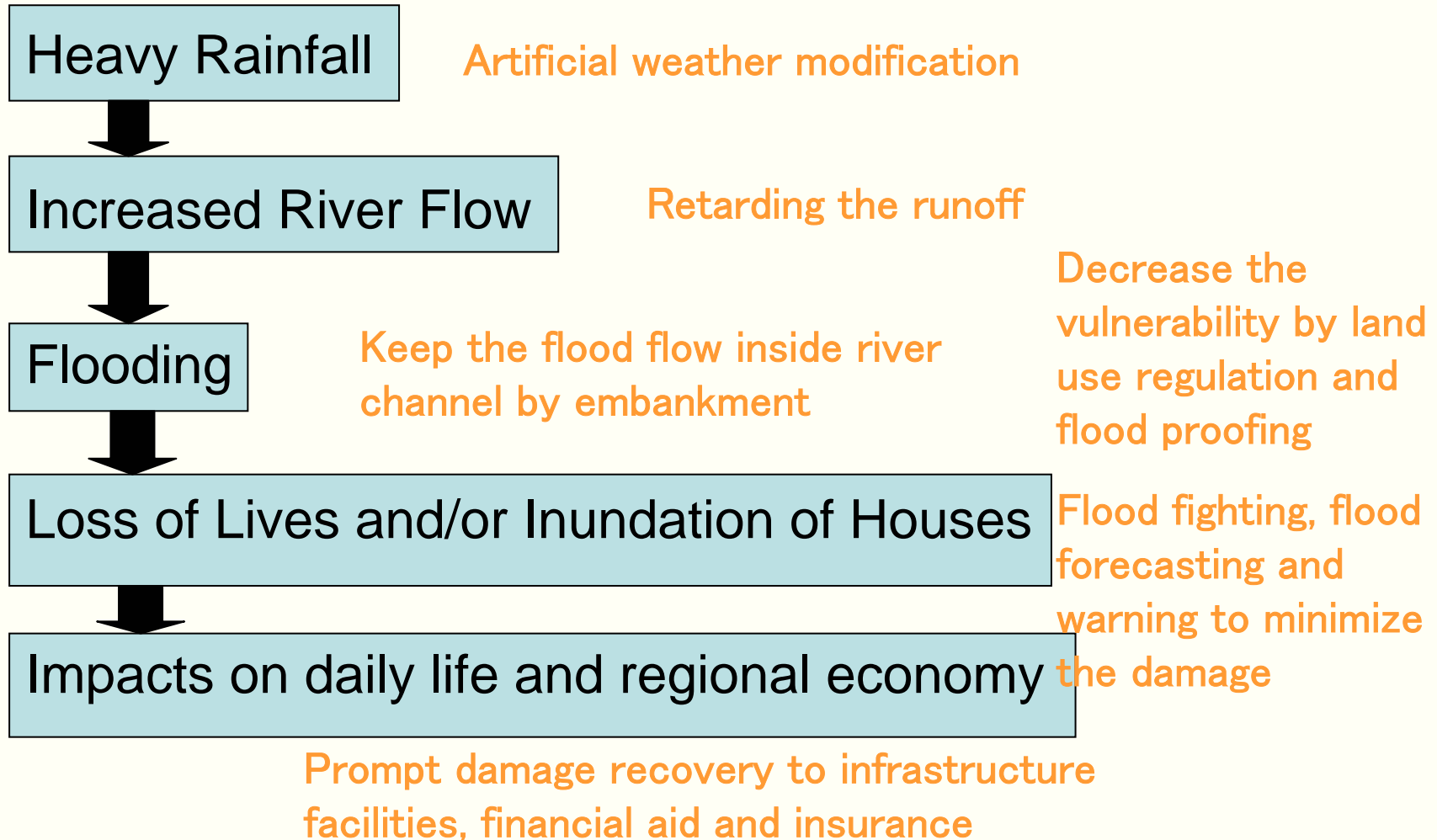


- ▲ Located near the Tsurumi River, the building, learning from past experience, adopts a piloti type structure to protect it from flood damage.

Process Chain of Natural Disasters



Flood Risk Management to cut Process Chain of Flood Disasters





END

Thank you for your attention

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