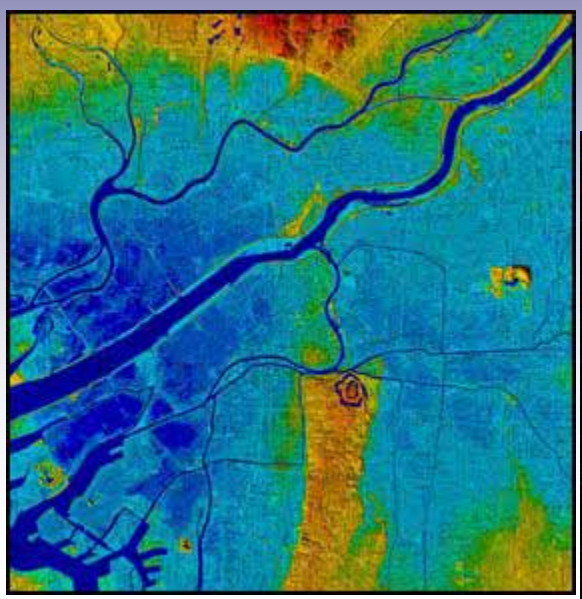
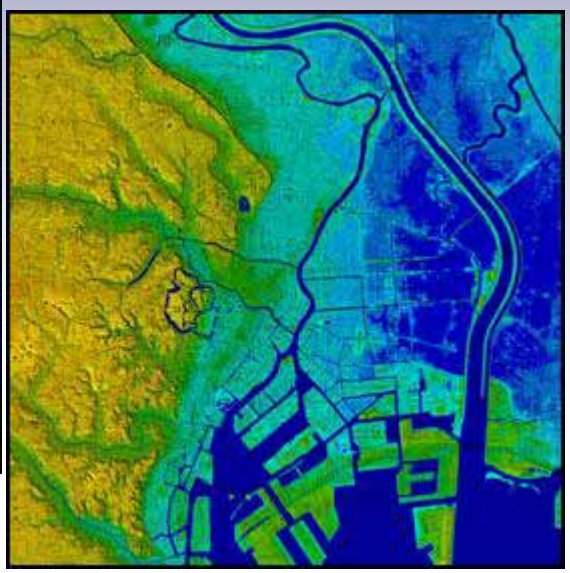
River Administration in Japan

River Bureau, Ministry of Land, Infrastructure, Transport and Tourism





Topography of land spreading on low plains
Right: Kanto region, Top: Kinki region

Top: Maruyama River Typhoon No. 23 in 2004
Right: Tamagawa Dam, Omono River in Akita Prefecture

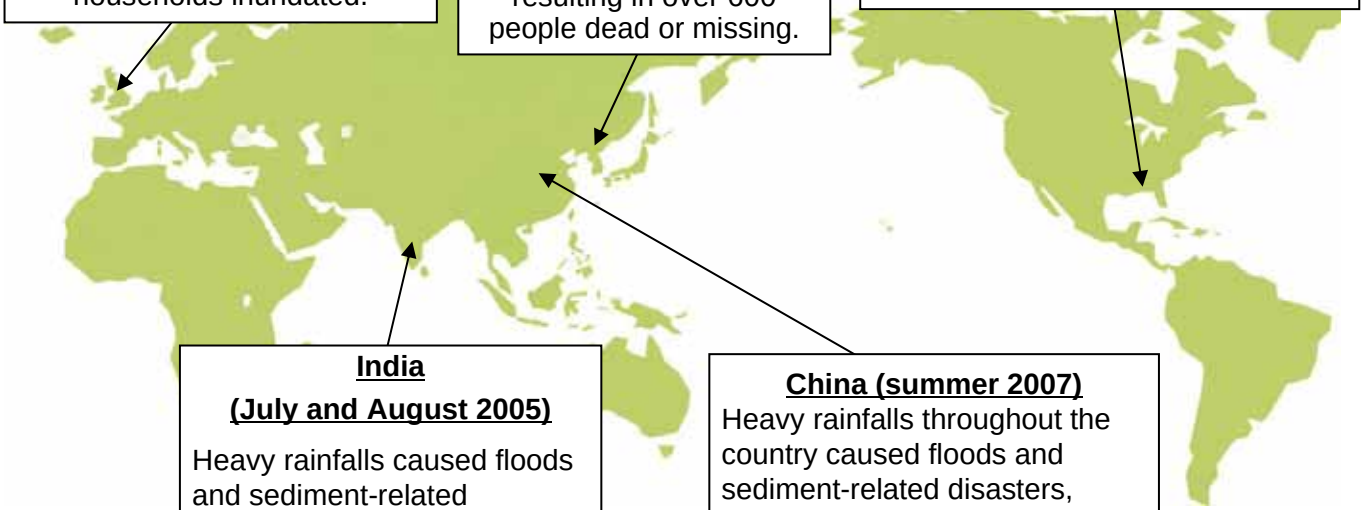
Flood management is a high priority issue in Japan, as recognized in many other countries.

Flood is a major disaster that have been happening on a global scale

United Kingdom (July 2007)
Record-breaking heavy rainfalls mainly in the central and western regions caused floods leaving 350 thousand households inundated.

Democratic Peoples' Republic of Korea (August 2007)
Heavy rainfalls that lasted for a week caused floods resulting in over 600 people dead or missing.

New Orleans, the United States of America (August 2005)
The landfall of hurricane "Katrina", on the southern sea coast resulted in over 1,200 people dead.



India (July and August 2005)
Heavy rainfalls caused floods and sediment-related disasters. Over 1,000 people were reported dead or missing.

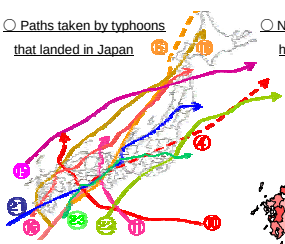
China (summer 2007)
Heavy rainfalls throughout the country caused floods and sediment-related disasters, resulting in 1,300 dead or missing.

In Japan, severe water-related disasters have been causing human losses every year.

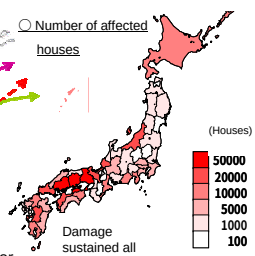
Fiscal 2004

• Concentrated rainfalls and landings by ten typhoons during the rainy season that exceeded past records, resulted in extensive floods and sediment-related disasters throughout Japan.
• Dead or missing persons numbered 240, whereas 199,371 houses were inundated.

○ Paths taken by typhoons that landed in Japan

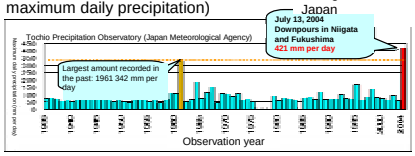


○ Number of affected houses



Damage sustained all throughout Japan

Rainfalls in Niigata (new record for maximum daily precipitation)

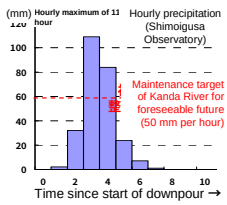



Typhoon No. 16: High tide disaster (Takamatsu City in Kagawa Prefecture)


Typhoon No. 23 (Toyooka City in Hyogo Prefecture: Maruyama River)

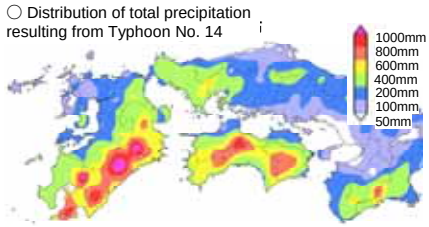
Fiscal 2005

• Precipitation of over 100 mm per hour fell in the Tokyo Metropolitan Area.
A major rainfall resulted in a total precipitation of 1,000 mm in the southern Kyushu region.
• Dead or missing persons numbered 41 and inundated houses numbered 32,581.



Suginami Ward of Tokyo (September 2005)

○ Distribution of total precipitation resulting from Typhoon No. 14

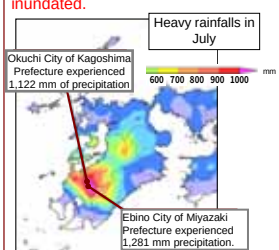



Boulder and mud slide disaster due to heavy downpours from Typhoon No. 14
Tarumizu City in Kagoshima Prefecture (September 2005)


Waterlogged damage arising from overflow from Otani River, a tributary of Oyodo River
Shimokomatsu District of Miyazaki City (September 2005)

Fiscal 2006

• Continued from the previous year, the southern area of Kyushu suffered from heavy rainfall with a total precipitation of over 1,000 mm.
• Dead or missing persons numbered 42 and 25,804 houses were inundated.



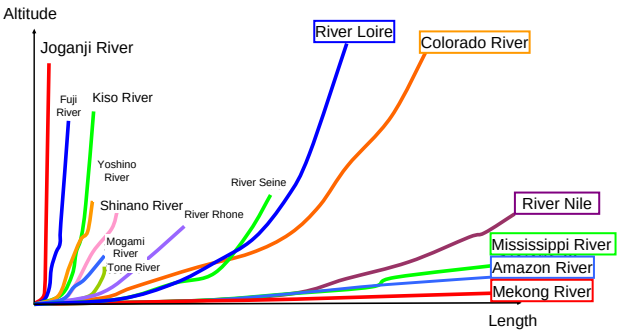
Yusui Town of Kagoshima Prefecture (July 2006)


Damage caused by mud and boulder slide due heavy downpour in July
Okaya City of Nagano Prefecture (July 2006)

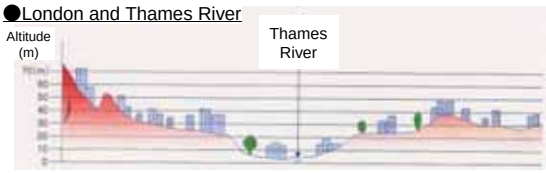
Japan is very vulnerable to the water-related disasters, which calls for extensive flood management measures.

Severe terrain conditions of Japan

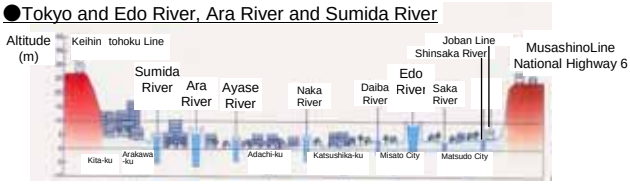
Many rivers are very steep with a short distance from the source to the sea, resulting in rapid flow. Furthermore, most of urban areas are located in low-lying areas that are lower than the water level during floods.



●London and Thames River



●Tokyo and Edo River, Ara River and Sumida River

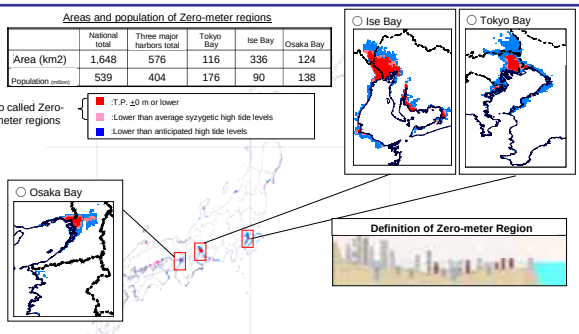


Population and city functions are concentrated in areas below zero-meters level in coastal areas of three major bays
Catastrophic disasters are anticipated once the embankments are failed.

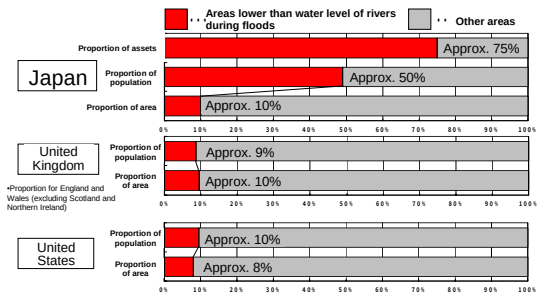
Areas and population of Zero-meter regions

	National total	Three major harbors total	Tokyo Bay	Ise Bay	Osaka Bay
Area (km2)	1,648	576	116	336	124
Population (million)	539	404	176	90	138

So called Zero-meter regions
:T.P. ±0 m or lower
:Lower than average syzygetic high tide levels
:Lower than anticipated high tide levels



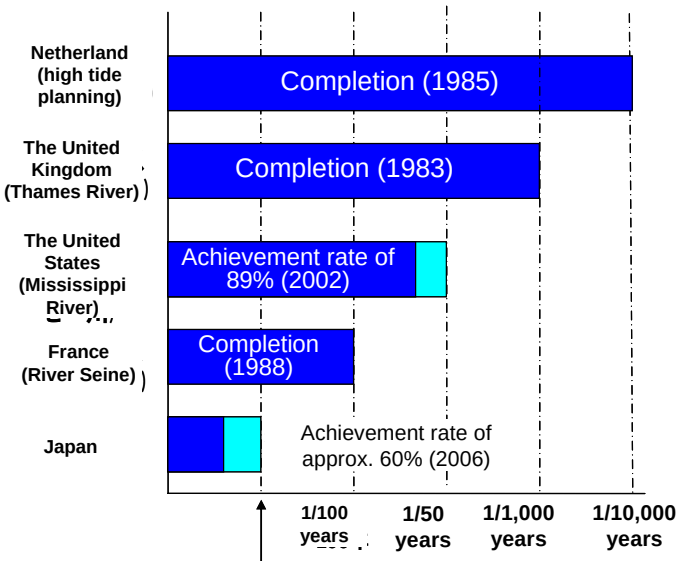
Approximately half of the population and three-quarters of total assets are concentrated in low-lying areas.
Major damage is anticipated when flooding occurs.



Level of structural improvement is lower compared with other countries.

A number of local governments have experienced water-related damages

Compared with other industrialized nations, the level of safety secured by flood control measures is lower in Japan.



1/30 to 1/40 years (major rivers)
1/5 to 1/10 years (medium to minor rivers)

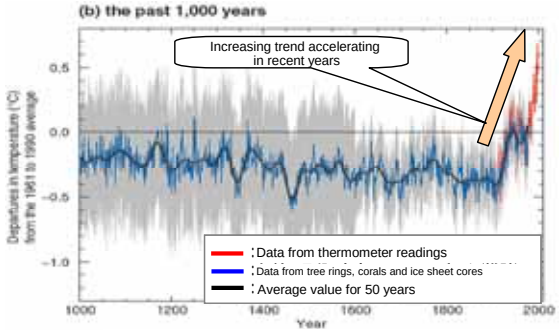
Floods and sediment-related disasters have occurred in more than 90% of municipalities throughout Japan during the past ten years.

Occurrence of Flood and Sediment-related Disasters from 1994 to 2003

The risk of disaster is becoming even greater due to climate change and changing socio-economic conditions.

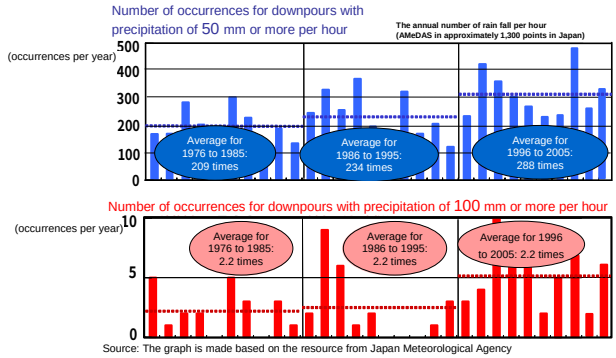
The risk of disaster is becoming greater due to global warming.

Changes in temperature in the northern hemisphere during the past one thousand years.



Excerpts from "Climactic Change 2001", a Report of the First Working Group in the Third Evaluation Report of the IPCC

Heavily concentrated rainfalls exceeding 50 mm or even 100 mm per hour are on the increasing trend



Source: The graph is made based on the resource from Japan Meteorological Agency

Inter-governmental Panel on Climate Change (IPCC)

•Approved by the Tenth Meeting of the First Working Group for the Fourth Evaluation Report of the IPCC (January 29 to February 1, 2007)

- **Global warming is considered to be almost certain due to increasing greenhouse gases originating from human activities.**
- **The last 12 years have been the warmest 12 years since 1850.**

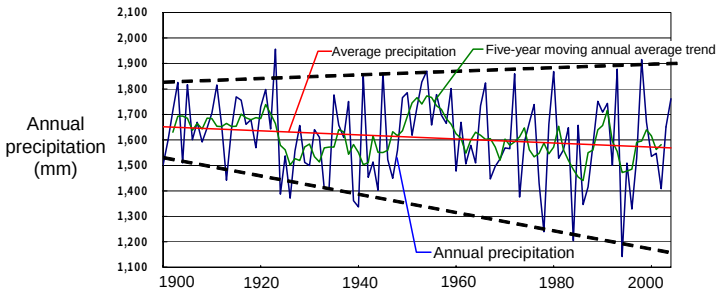
Rise in the average temperature and level of the sea water at the end of 21st century

	A society wherein a balance of both the environmental conservation and economic development is on a global scale	A society focused on fossil fuel, undergoing high economic growth
Rising temperatures	Approx. 1.8 degrees Celsius (1.1 to 2.9 degrees Celsius)	Approx. 4.0 degrees Celsius (2.4 to 6.4 degrees Celsius)
Rising sea levels	18 to 38 cm	26 to 59 cm

Increased strength of tropical low pressure systems

Some experts forecast the elimination of almost all sea ice in the Arctic Sea, during late summer seasons, by the latter half of the 21st Century.

Although the amount of annual rainfall is on decreasing trend, fluctuation of its amount is becoming greater.



Disaster risks are increasing from changes in socio-economic conditions

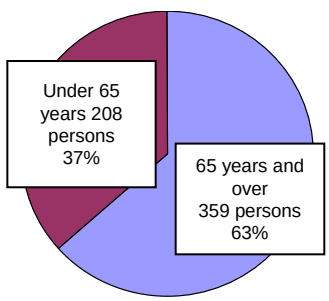
Occurrence of widespread submergence at the underground facilities in urban areas

Azabu-juban Subway Station in Tokyo (October 2004)

Fukuoka City Subway System (July 2003)

Due to the aging population, a significant number of victims were among those who required assistance in the event of disasters, such as the elderly or children in day care facilities.

Proportion of elderly among disaster victims



Asahi Shimbun on July 14, 2004

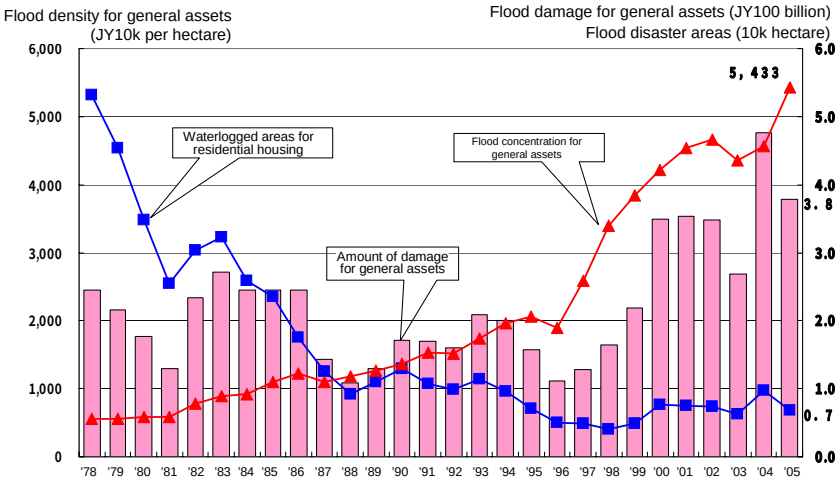
Sashiki Town in Okinawa Prefecture, 2005

The slope behind a nursing facility collapsed in Sashiki Town, Okinawa Prefecture, in June 2005 due to the heavy rainfall, resulting in the evacuation of all 70 people in the facility.

Floods cause catastrophic damage, therefore preventative measures are essential.

Floods cause catastrophic damage

Although the flooded areas are definitely decreasing due to flood control projects that have been carried out over many years, the amount of economic loss in flooded areas has sharply increased due to increasing number of assets which are unable to withstand flooding.



(1) Amount of damage (JY10k)/waterlogged areas (hectare) (costs as of 2000)
(2) Figures represent average for past five years.
(3) Non-operation losses for businesses are included in the amount of damage for general assets, as well as the concentration of waterlogged areas.
(4) Figures were derived from "Flood Statistics" issued by the River Bureau of the Ministry of Land, Infrastructure and Transport.

Electronic equipments, once submerged in water, are no longer usable.

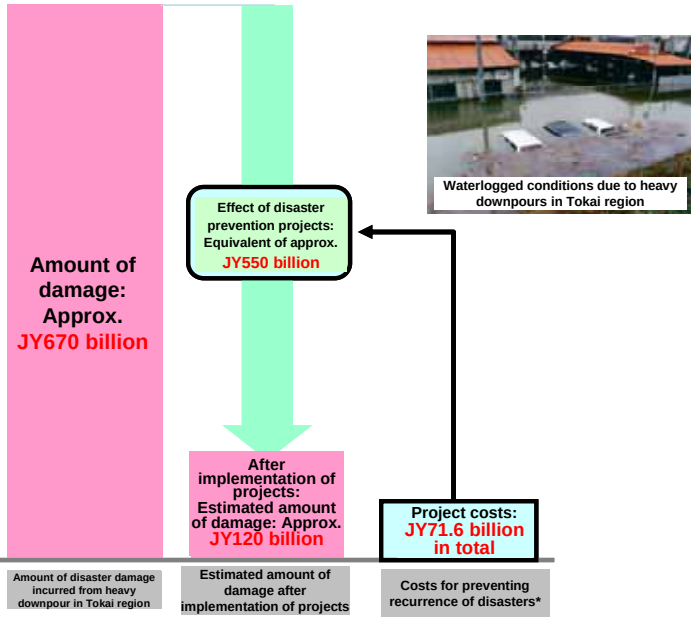
Heavy downpour in Tokai region, September 2000

Preventative strategies are essential for flood management.

The amount of investments for preventative measures intended to circumvent disasters from occurring are more efficient means than the amount required for relief and response after flooding.

(1) Heavy rainfall in Tokai region
(September 2000) [Shonai River and Shin River in Aichi Prefecture]

Prior investments of JY71.6 billion made it possible to reduce disaster damage by about JY550 billion.

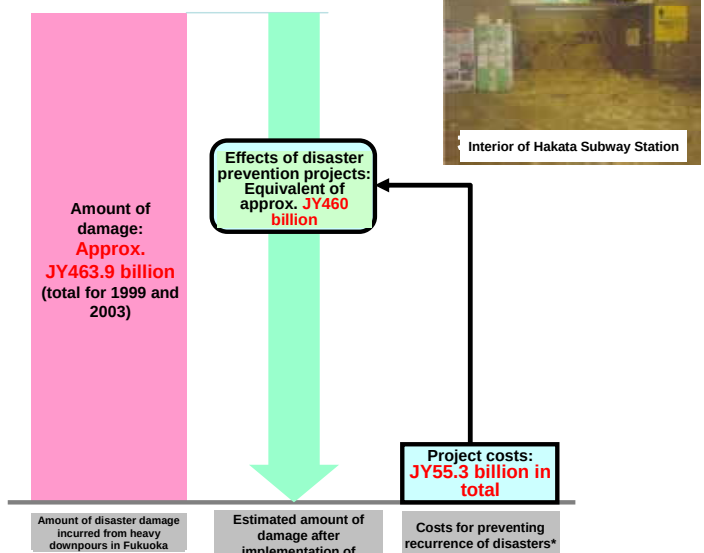


Waterlogged conditions due to heavy downpours in Tokai region

* Special Emergency Project for Shonai River and Shin River Disaster Prevention Strategies (2000 to 2004).

(2) Heavy rainfall in Fukuoka Prefecture
(July 2003) [Mikasa River, Fukuoka Prefecture].

Prior investments of JY55.3 billion made it possible to reduce disaster damage by about JY460 billion.



Interior of Hakata Subway Station

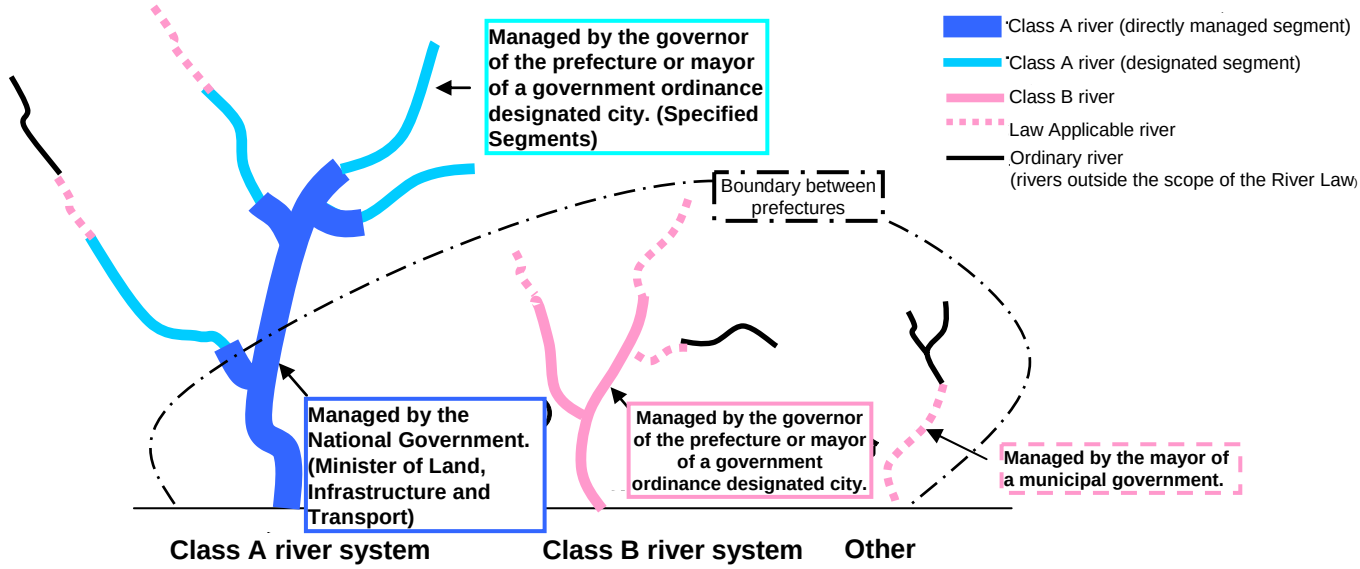
* Special Emergency Project for Mikasa River Disaster Prevention Strategies (2003 to present)

Administrative role of the Ministry of Land, Infrastructure and Transport for rivers in Japan

Framework of river management in Japan

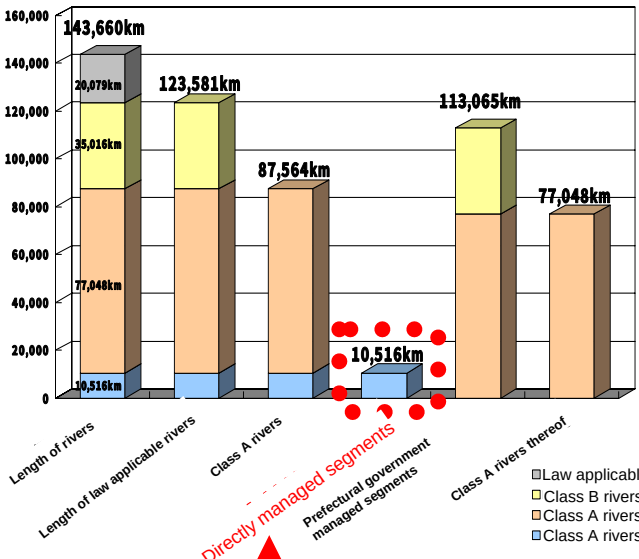
○ **Rivers subject to the River Law are classified into Class A and Class B rivers, depending on the importance of their roles. The roles for managing rivers are tasked to the Minister of Land, Infrastructure and Transport (Regional Directors of Maintenance Agencies), as well as the governors of prefectures.**

○ **Management of small-scale rivers that do not fall into the categories of Class A or Class B is delegated to municipal government mayors in accordance with the rules and regulations for Class B rivers. (Law Applicable Rivers)**



○ **The Ministry of Land, Infrastructure and Transport manages rivers with a particularly high level of importance comprising 7% of the total length of all rivers within the nation.**

○ **Responsibility for managing the rivers rests primarily on the National Government, however, management is delegated to local governments (excluding Law Applicable Rivers).**



●Class A rivers
Rivers that are part of river systems considered to be particularly important for the maintenance of the land or national economy. These rivers are designated by the Minster of Land, Infrastructure and Transport.

●Direct management segment
Segments of Class A rivers with a particularly high level of importance managed by the Minister of Land, Infrastructure and Transport.

●Designated segments (statutory consignment administration)
To be managed by the governors of prefectures designated by the Minister of Land, Infrastructure and Transport.

●Class B rivers (statutory consignment administration)
Rivers that are part of river systems, not part of Class A rivers, but considered to be particularly important for the interests of the public. These rivers are designated by the governors of prefectures. Management of these rivers is conducted by the governors of prefectures.

●Law Applicable Rivers (local government administration)
Rivers designated by the mayors of municipal governments that are not Class A or Class B rivers.
Management of these rivers is conducted by the mayors of municipal governments.

The Ministry of Land, Infrastructure and Transport is managing rivers with particularly high level of importance comprising 7% of the total length of all rivers within the nation.
Management of other rivers is delegated to local governments (excluding Law Applicable

Flood management strategies in Japan - efficient flood management strategies incorporating a diverse range of measures

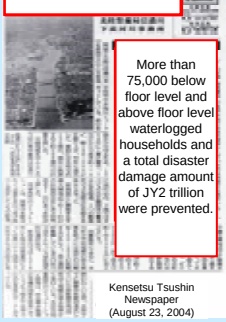
Basic framework of flood management strategies in Japan

		Measures	Details of measures	Administrative organization
Prevention of inundation (prevention)		Control of flooding (maintenance of facilities for flood control)	• Widening of rivers and adjustment of river flows using dams and retarding basins.	• River management (national and prefectural governments).
		Safe ways of living	• Restrictions and guidance on land usage (urbanization control areas, hazard maps).	• River management. • City planning bureaus.
		Inhibiting increases in flooding water	• Development permits. • Permits for rain water infiltration prevention activities.	• Prefectural governments.
Disaster limiting activities in cases of flooding (emergency responses)	Responsive action for emergencies	Flood prevention activities	• Repairs of emergency facilities and provision of precise information. • Responsive action to deal with scouring damage and leaking levees.	• River management. • Flood prevention groups.
		Evacuation and rescue	• Evacuation, rescue and provision of relief for residents.	• Municipal governments. • In case of major disaster: Organizations of national government, Japan Self Defense Forces, etc.
	Responses implemented during normal periods	Guidance and instructions to residents	• Dissemination of information regarding evacuation assembly points and evacuation routes. • Dissemination of information regarding flood danger.	• Municipal governments. • River management.
		Formulation of disaster prevention plans	• Systemization of various implementations with assumption of flooding. • Allocation of roles and clarification of responsibilities.	• National and regional public organizations. • Designated organizations, etc.
		Sustaining appropriate functions of facilities	• Management with consideration for changes in river beds. • Maintenance of evacuation assembly points.	• River management. • Prefectural and municipal governments.

Steady implementation of hardware measures is essential as flood management strategies

Flood damage resulting from heavy rainfall in Niigata and Fukushima in 2004, the largest one after World War II, was prevented after completion of flood control measures.

Sekiya Water Floodway saved Niigata City



More than 75,000 below floor level and above floor level waterlogged households and a total disaster damage amount of JY2 trillion were prevented.

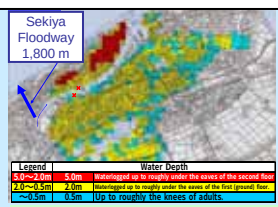
Kensetsu Tsushin Newspaper (August 23, 2004)

The Sekiya Floodwa excavated from 1964 to 1972 (Niigata City)

Prevented waterlog damage

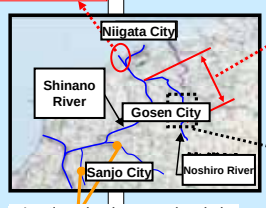
Waterlogged area (hectare)		Waterlogged above floor level	Waterlogged below floor level	Damage reduction amount
Residential property	Agricultural property			
Approx. 2,300	Approx. 800	Approx. 60,400 households	Approx. 15,300 households	Approx. JY2 trillion

Estimated waterlogged areas if Sekiya Floodway did not exist



* Maximum waterlogged range and depth for levees breached at one location on both sides of the river's banks downstream of the river, based on calculations from the simulation of flooding with water levels exceeding HWL.

Sekiya Floodway



Locations where levees were breached during heavy downpours in Niigata and Fukushima (July 2004)

Flood control strategies for Nodai River (Gosegawa City of Niigata Prefecture) of the Shinano River system prompted by the flood of 2000.

Flood control strategy for Nodai River prompted by the flood of 2000.

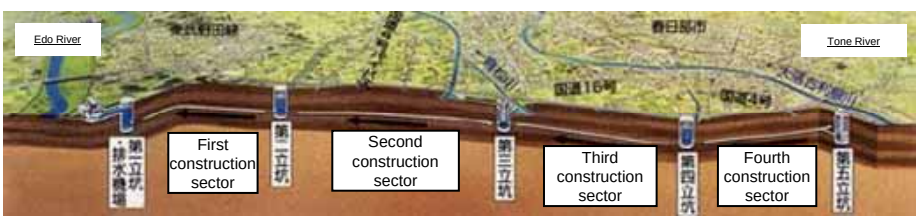
Increased downstream capacity by 2.3 times

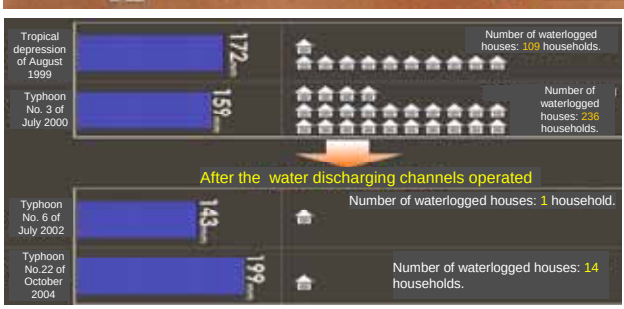
Disaster status for July 2000 (Gosen City)

Flood of 2000: 707 waterlogged houses

Flood of 2004: No waterlogged houses

Completion of Metropolitan District Water Discharging Channels resulted in significant reduction in flooded areas.





Interior of underground discharging channel

Shield machine used for excavation work

Speedy implementation of flood management strategies in good mixture of hardware and software.

It is also important to promote software measures in parallel with the implementation of hardware measures.

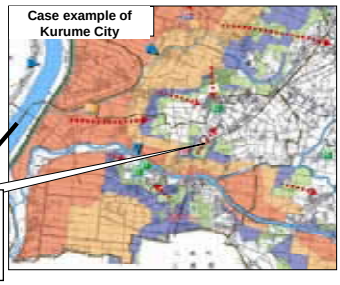
"Disaster Reduction" strategies by software measures for minimizing disaster damage mixed with hardware measures

Publication of nationwide flood hazard maps

Time it takes from breaching of levee to being waterlogged

- Waterlogged above floor level within 30 minutes
- Waterlogged above floor level within 60 minutes
- Waterlogged above floor level in 60 minutes or more
- Waterlogged eventually

Case example of Kurume City



Evacuation assembly points available during waterlog disasters are obvious at a glance.

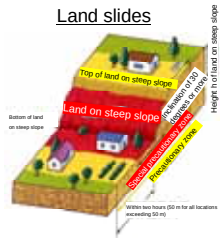
Designation of hazardous areas for sediment-related disasters

Dangerous locations clarified through zone designations

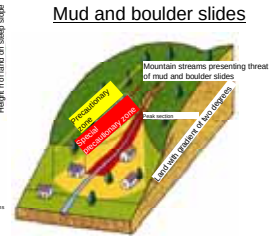
→ Maintenance of precautionary and evacuation organizations;

- Restrictions on land use;
- Restrictions on structure of buildings;
- Recommendations for the relocation of existing residential buildings.

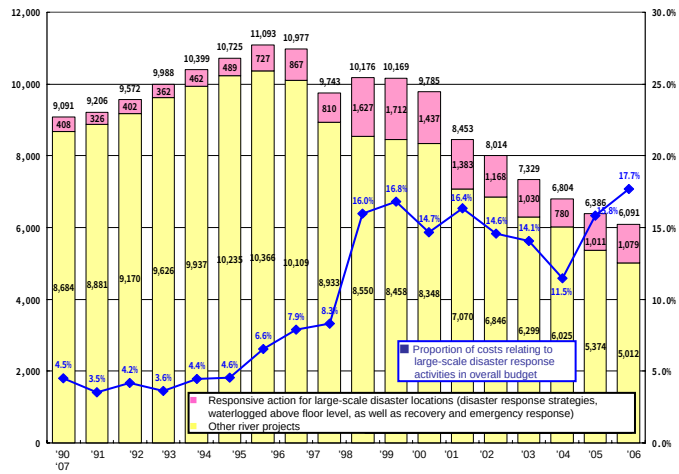
Land slides



Mud and boulder slides

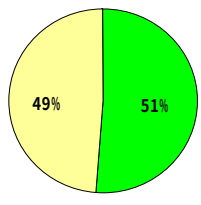


However, due to limited budget, the investments for preventative strategies were reduced.

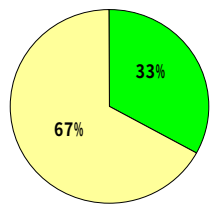


Proportion in total budget increased for post incidental measures for locations afflicted by large-scale disasters, due to increased occurrence of floods in recent years.
It is not possible to invest necessary amount to preventative strategies due to reduction in budget for flood management and increase in post incidental measures, such as recovery works.

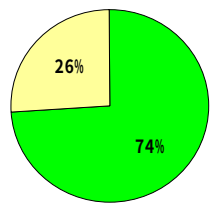
- Disaster response activities in recent years
- Preventative strategies



■ River projects budget (FY2006)



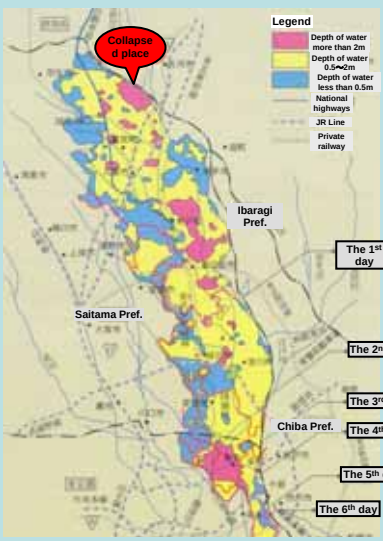
■ Directly managed river projects (FY2006)



■ Auxiliary river projects (FY2006)

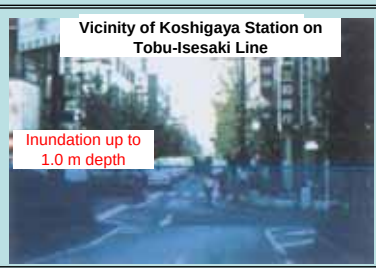
If the Tone River levees were breached...

If Typhoon Kathleen were to land under the current conditions and the levee of the Tone River was breached, 2.32 million people would be affected with economic damages amounting to JY34 trillion.



Assumed flooding and waterlogged area of Kan-nana ringed artery No. 7 (Katsushika-ku)

Vicinity of Koshigaya Station on Tobu-Isesaki Line

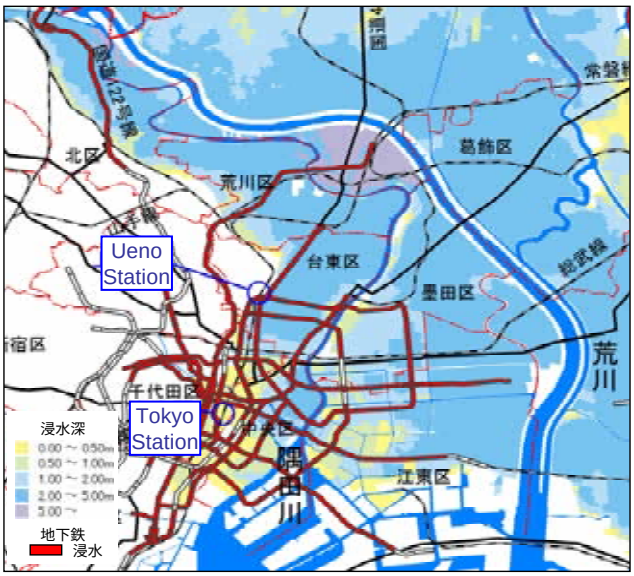


Vicinity of Matsubara-danchi Station on Tobu-Isesaki Line

Flood management is an important responsibility that needs to be borne by the national government.

It is essential for the national government to bear the responsibility of implementing emergency response action and preventative strategies for disasters when they occurred at major rivers, which are projected to cause disaster damage on a major scale.

Expected Inundation areas when levees on Ara River are breached

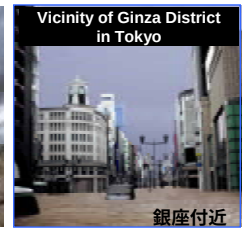


Estimated disaster damage when levees on Tone River and Ara River are breached

	Tone River	Ara River
Estimated amount of damage	JY34 trillion	JY33 trillion
Number of affected persons	2.32 million persons	1.16 million persons
Waterlogged above floor	694,000 households	470,000 households
Waterlogged area	530km²	78km²
Past disasters	Typhoon Kathleen in 1947	1910

Suspended capital functions


Levee breach conditions


Vicinity of Ginza District in Tokyo
銀座付近


4 units
Tokyo Station


Flooding of subway stations

○ **Typhoon No. 23 caused extensive damage, mainly in Hyogo Prefecture and northern Kyoto Prefecture on October 20, 2006. Levees were breached at several locations. Maruyama River, which suffered particularly large amount of damages, was provided with emergency recovery action in preparation for the next flood by the Kinki Regional Development Bureau, with the assistance of neighboring Regional Development Bureaus. Recovery action was completed at two locations in five days.**

Breach of levees along Maruyama River (two locations)


Torii Bridge


Tateno Bridge

<Levee breaching damage>
Levee breaching location: Approximately 5.4 km along the left bank of the Izushi River

<Levee breaching damage>
Levee breaching location: Approximately 13.2 km along the right bank of the Maruyama River


Specialists were dispatched to Toyooka City and other locations


Waterlogged area in Toyooka City


Inspection of disaster location by Minister Kita


28 drainage pump trucks brought in from all over Japan

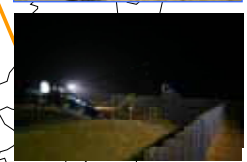

Investigation by helicopter


Disaster strategy task force vehicles

Operations of the ministry

Drainage pump truck


Levee recovery operation was continuous, day and night



Maruyama Riv.

Yura Riv.

4 units

7 units

13 units

4 units

The Ministry

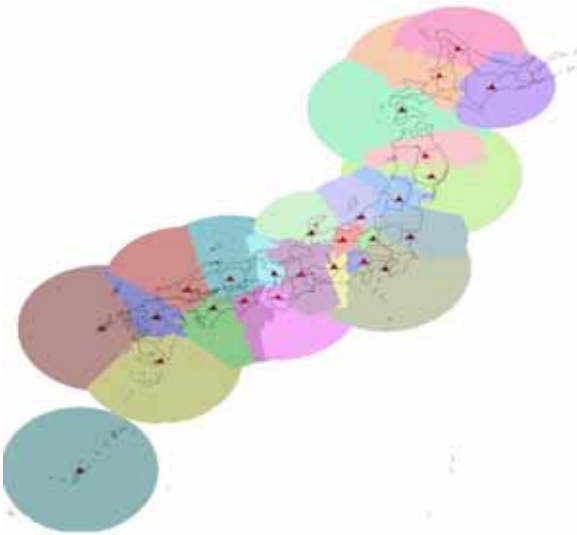
Drainage operation implemented using 28 drainage pump trucks.
- Kinki Regional Development Bureau: 13
- Chubu Regional Development Bureau: 4
- Hokuriku Regional Development Bureau: 4
- Chugoku Regional Development Bureau: 7

Yura River in Kyoto Prefecture was also flooded. A tour bus was waterlogged on National Highway 175 near Maizuru City, leaving 37 passengers and crew stranded on the roof of the bus. Victims were rescued by the Japan Maritime Safety Agency about 11 hours later.

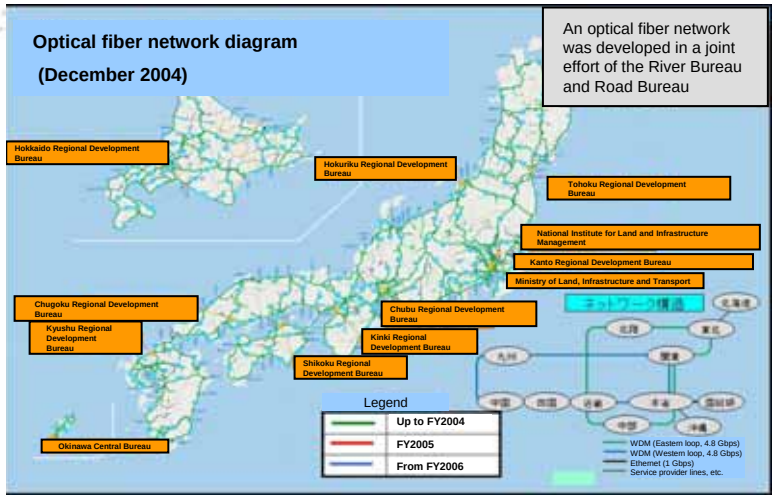
Recovery work on the directly managed sector (levees breached at two locations) was completed in five days, with assistance from neighboring Development Bureaus.
Although the sector managed by the Hyogo Prefecture was smaller in scale than the directly managed sector (levees breached at four locations) it required 17 days for the completion of recovery work.

Speedy and Advanced Disaster-related Information Reduces a Number of Casualties

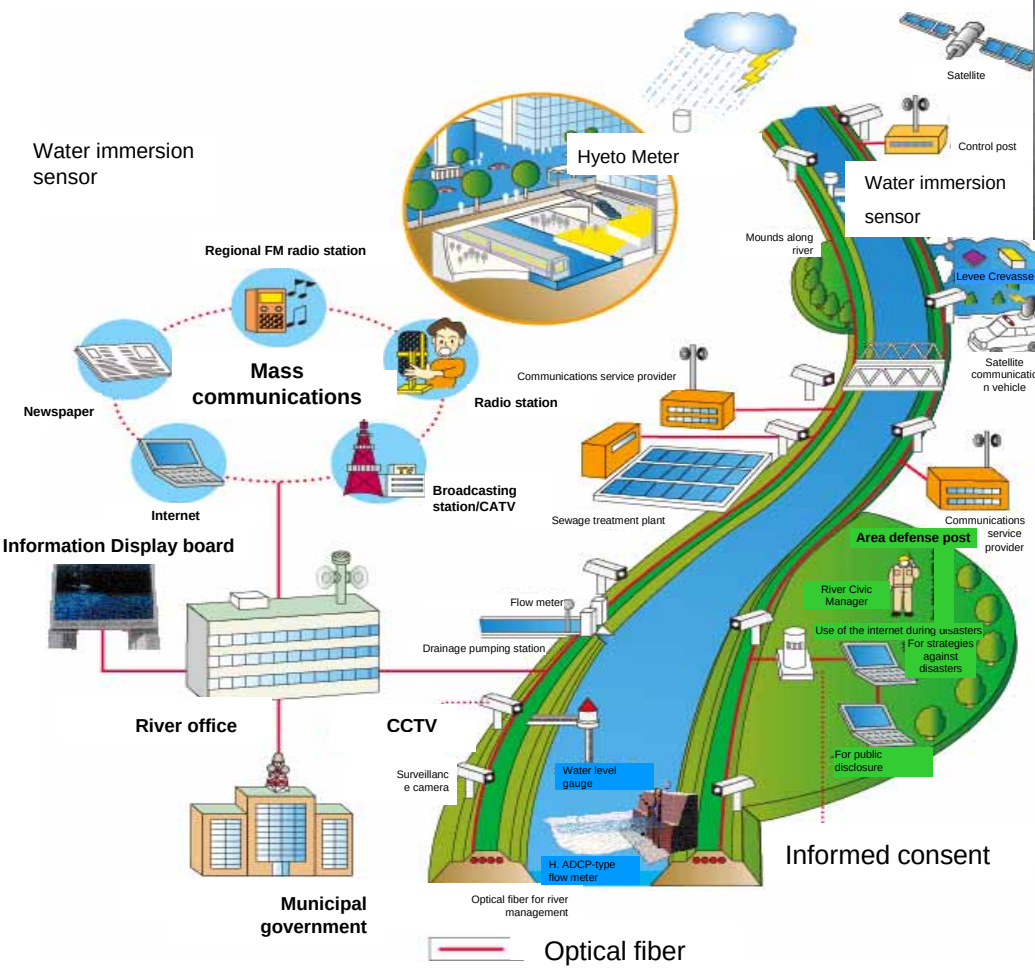
Provision of River information by utilizing ICT



Radar rain gauges installed in network of 26 locations throughout Japan



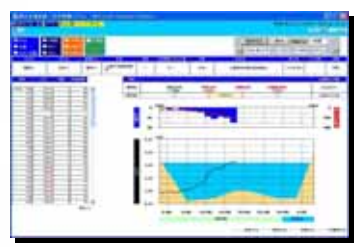
The total span of optical fiber maintained by the Ministry of Land, Infrastructure and Transport extends approximately 35,000 km, with about 14,000 km maintained for the purpose of river management (as of 2007)



Provision of river information using optical fiber

Monitoring with CCTV

Information provided to mobile phones



Information provided on the internet

Conversion to environment-focused river management (1)

Implementation of measures for river environment conservation

Improvement of water quality

An example of water purification at Matsuehori

Channeling of water from Lake Shinji and dredging work to revitalize clean water of Matsuehori River
Tourism vitalization effects by pleasure boats

Conservation of favorable natural environment

An example of multifaceted natural river creation at Nuke River (Fukuoka Prefecture)

<Before construction>
Levees on both sides were sealed with cement seawalls, with almost no habitat for aquatic lives.

<After construction (approx. two years)> Rapids and deep waters were formed to provide stagnation and shaded areas by plants that provide habitats for fish.

Creation of a cheerful atmosphere along the rivers

An example of "River Town Creation" at Dotonbori River and other locations

Development of the plazas harmonizing with waterside space. Open cafes were established after river banks were opened for private services as a social experiment.

Boardwalk along Dotonbori River (Osaka City)

Open cafe at Hori River (Nagoya City)

Environmental conservation measures implemented at dams

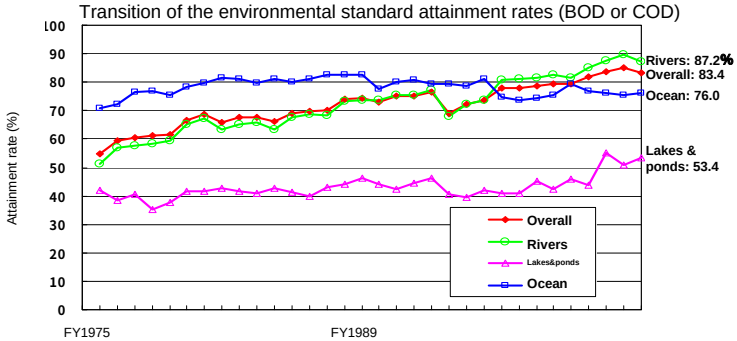
Necessary environmental conservation measures were implemented by dam projects, after environmental impact assessment.

Water purification utilizing aeration system

Improvement of water quality

- Aeration of sludge, maintenance of purification facilities and inducing water for purification to improve water quality.
- In terms of the environmental standard achievement for public waters, improvement has been observed generally with regards to rivers, whereas water quality at lakes and ponds has not improved that requires continued water quality improvement measures.

Transition of the environmental standard attainment rates (BOD or COD)



Source: FY2005 Water Quality Survey Results for Public Waters (Ministry of the Environment)

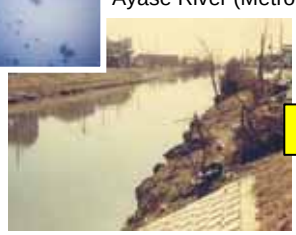
An example of a water purification project

Dredging (Ayase River in Saitama Prefecture)

Plant purification facility (Hitachi-Tone River in Ibaragi Prefecture)

Scum

Ayase River (Metropolis of Tokyo and Saitama Prefecture)



Condition of Ayase River around 1975 when trash and scum were floating on the river

Present day Ayase River with improved water quality

Slime dredging at Ayase River. The water quality is improving in recent years, due to the installation of a river purification facility, the maintenance of sewers as well as activities by local governments and residents.

Kasumigaura (Ibaragi Prefecture)

Image depicting an outbreak of water-bloom

Water-bloom collection boat and collection float

An outbreak of a large amount of water-bloom takes place during the summer season and causes a foul odor when it rots, significantly deteriorating the surrounding environment and appearance. For this reason, water-blooms floating on the surface of the water are collected by surface skimming boats (water-bloom collecting boats).

Conversion to environment-focused river management (2)

Conservation of favorable natural environment

Creation of multifaceted nature in rivers

○ The “Creation of a multifaceted nature in rivers” entails the management of rivers in order to create and maintain a livable, nurturing and breeding environment for living organisms in which rivers inherently have and diverse river scenery with consideration for the lifestyles of people in the region, as well as a harmonious relationship with their history and culture, from the perspective of natural workings of the whole rivers.
○ The “Creation of a multifaceted nature in rivers” is fundamental to all river maintenance with all Class A and Class B, as well as law applicable rivers, subject to river management activities, such as surveying, planning, design, engineering and construction, including their operation and maintenance.

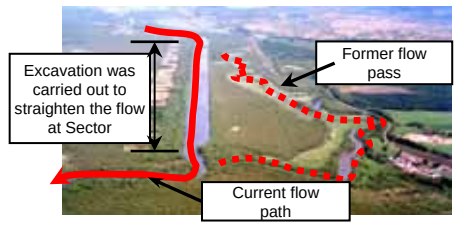
Moizari River (Eniwa City, Hokkaido Prefecture)

(Before maintenance)　(After maintenance)

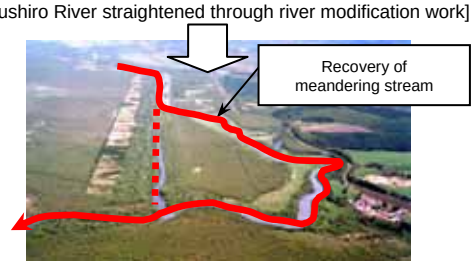
Recovery of nature

A project intended for the maintenance of river environment is conducted by recovering the nature of the “river system” from the basin-wide perspective. The nature’s resilience to recover is vitalized, with as little human intervention as possible.

Recovering meandering stream of Kushiro River (Hokkaido Prefecture)



[Kushiro River straightened through river modification work]



[Recovery of meandering stream by using former river location (an image)]

Creation of a cheerful atmosphere along the rivers

Special permission for occupying river areas as social experiments

Ota River (Hiroshima City, Hiroshima Prefecture)

A “Riverside Open Cafe” was started in October 2005 in order to promote the integration of waterside and urban areas.

Hori River (Nagoya City, Aichi Prefecture)

The Hori River flows through the center of Nagoya City was restored as well as its water quality through the maintenance of sewers and channeling of water. The river provides a cheerful atmosphere and a place for recreation and relaxation, through the establishment of riverside paths and open cafes.

Creation of river in harmony with historical townscape

Ono River (Katori City, Chiba Prefecture)

The Ono River used to be a prosperous traffic hub of the Tone River boat transport system and numerous historical buildings still remain along the river. A river in harmony with such a historical townscape was restored.

The creation of a cheerful atmosphere utilizing the river

Shinmachi River (Tokushima City, Tokushima Prefecture)

Shopping district facing the river

Various events are held on the water-friendly facilities along the banks of the Shinmachi River that flows through the center of Tokushima City, promoting vitalization of the shopping district along the river.

Conversion to environment-focused river maintenance (3)

Environment-focused activities at dams

Securing the capacity to ensure the environmental flow from the dam

An unspecified capacity is secured for dams in order to ensure environmental flow, such as the securing of habitats and nurturing locations for animals and plants, while maintaining clean waterflows.

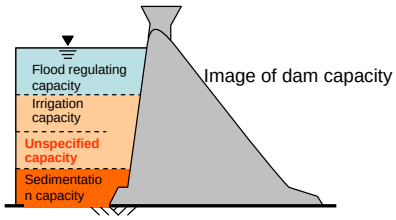


Image of dam capacity


Average droughty water discharge (before start of operations): 2.86m3/s (1996 to 2000)


Average droughty water discharge (after start of operations): 8.1m3/s (2001 to 2004)

Full-scale operation starts at Miyagase Dam (2001)

Flow capacity is improved by securing environmental flow capacity through water supply from the dam (Samukawa Diversion Weir of Sagami River)

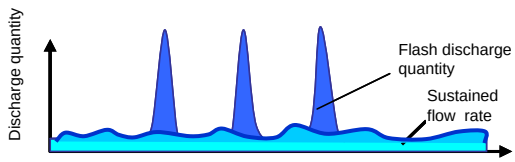
Flexible operation of dams

- The river environment downstream from the dam is maintained and conserved by storing a portion of the flowing water in the flood regulation capacity of the dam, within a range that does not obstruct flood control function, for discharging appropriate amount of water as needed.
- Flexible dam operation tests were implemented at 24 dams in FY2006.

[Discharging patterns for flexible operation and an example of the effects]

○ Flash discharge

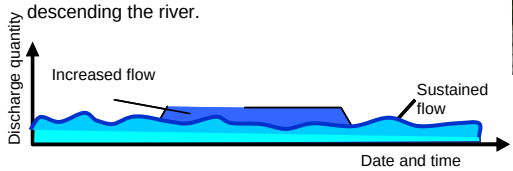
Short discharging bursts raise the conveying force. Such discharges are made to flush stagnant water, remove adherent algae and support its regeneration.

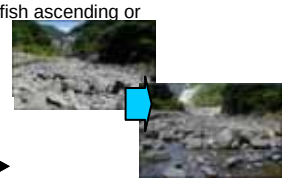



This is effective for flushing the silt on the bottom and peeling off the adherent algae. New algae grows following cleaning.

○ Amount of discharge increased for environmental flow

Continuous discharging on top of the amount of water flow maintains a certain level of flow volume. This is conducted in order to improve the scenic appearance of the river, as well as to provide support for fish ascending or descending the river.



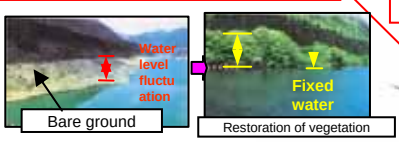

Dried segments in the river are eliminated downstream from the dam

Implementation of environmental impact assessment and conservation activities at the dam

Based on the environmental impact assessment , necessary environmental conservation activities are implemented through dam projects.

Recovery of indigenous waterside plant life

Elimination of bare ground through reorganization of existing dams



Restoration of vegetation with indigenous species

Relocation of plants (conservation of critical species)


Relocation status

Status following relocations

Prevention of eutrophication byaeration


Purification of water with aeration circulation system


Traffic roads are built and relocated through tunnels

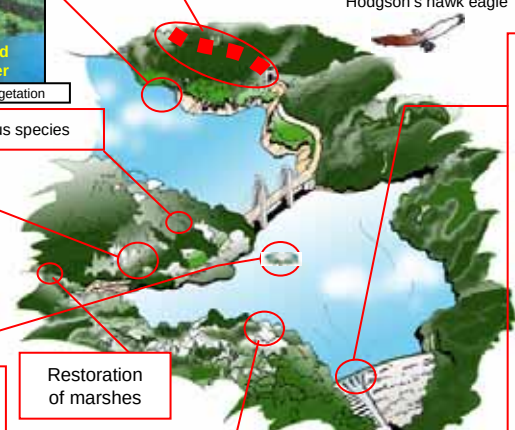
Conservation for ecosystem (epistatic) (monitoring of breeding status for species of interest [birds of prey] is provided using CCD cameras and by collecting information on ecological environment)

Images of breeding taken by CCD camera


Immediately after the laying of eggs


Parent bird and animal food (small birds) (juvenile bird on top)

Hodgson's hawk eagle



Restoration of marshes

Conservation (such as securing relocation routes for small animals) implemented for the ecosystem (typical and transient conditions)

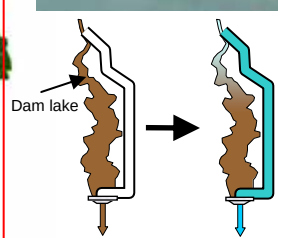


Building of crossing pipes (for mammals)

Strategies for cold water and turbid water

Countermeasure for turbid water using fresh

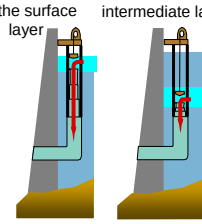
Countermeasure for cold and turbid water by selective water intake



As a long-term discharging strategy for turbid water after flooding, water with a low degree of turbidity is diverted from the reservoir and discharged following a flood.

Intake of water on the surface layer

Intake of water in the intermediate layer



A selective water intake facility is operated to enable the intake of water from arbitrary layers inside the reservoir as a long-term strategy for managing the cold water temperature and turbid water.

Conversion to environment-focused river management (4)

Education on river environment

- Local civic groups, educators and river managers get together to establish a river conference.
- **"Kids Riverside Support Center"** provides support for activities (such as the lending of materials and coordinating activities)
- Project has been in operation since 1999, with 248 locations nationwide registered to promote relevant activities (as of end-March 2007)
- River managers implement the facility maintenance work as required, such as the establishment of trails so that children can easily walk along the river, as a part of the **"Waterside Fun School Project"**.

"Kids' waterside re-discovery" project

Tama River flow experience
(Todoriki Waterside Fun School Conference)

A scene from "Kids Waterside" activity
(Kogu River, Osaka Prefecture)

"River Activities Council (RAC)", a non-profit organization

- A conference comprised of non-profit organizations and civic groups involved in river activities throughout Japan. The purpose of the organization is to spread awareness on the recovery of humanism and the conservation of the water environment through river-related activities.
- Basic seminars (one-day extension seminars) are held in order to familiarize people with rivers in conjunction with civic groups throughout Japan, while training for activity leaders for fun and safe river activities, are provided for the purpose of supporting and promoting experiential activities in rivers.

River activities leader training workshop

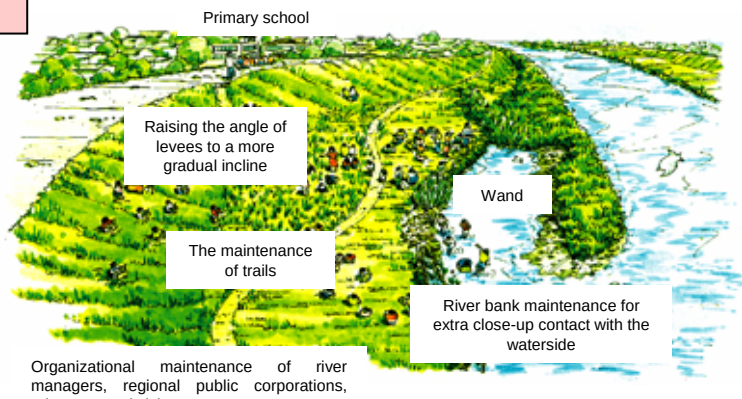
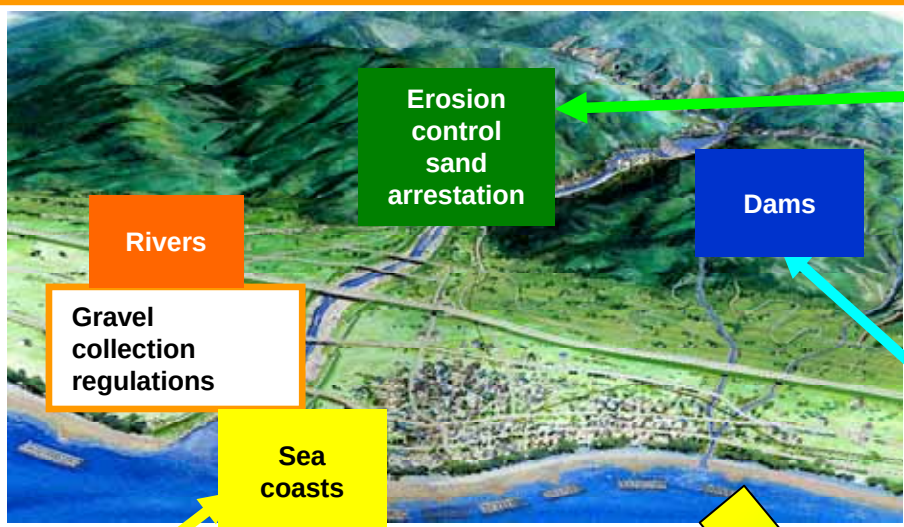


Image diagram of a waterside fun school

Promotion of comprehensive sedimentation management



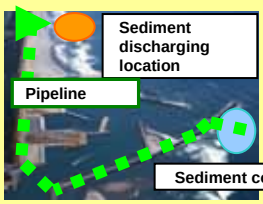
Permeating erosion control dike

The outflow of sediment from denuded land is controlled to promote the appropriate streaming of sediment (Hino River, etc.).

Scouring sluice

A capacity of stored water was secured by adding functions to dams for releasing sediment downstream in order to promote the appropriate streaming of sand (Tenryu River, etc.).

Sand bypass



A sand bypass was implemented in order to integrate and efficiently execute measures to counter sea coast erosion and the immersion of the harbor channel (Fukuda Fishing Port on Asaba Sea Coast, etc.).

Consideration and evaluations on more effective technologies is done, whereas projects implemented in the past individually are coordinated to promote activities contributing to consistent and integrated sediment control from mountain areas to the sea coasts.

Japan is engaged in proactive promotions to make international contributions in the areas of rivers and water resources.

International Trend of Water

- **The 1st World Water Forum** — 1997, Marrakech, Morocco, 500 ppl., 63 countries
- **The 2nd World Water Forum** — 2000, The Hague, the Netherlands, 5,700 ppl., 156 countries
- **The 3rd World Water Forum** — 2003, Kyoto,Osaka, Shiga (Yodo River basin), Japan, 24,000 ppl., 182 countries
- **The 4th World Water Forum** — 2006, Mexico City, Mexico, 19,000 ppl., 149 countries
- **The 5th World Water Forum** — 2009, Istanbul, Turkey

The 3rd World Water Forum
Honorary President
His Imperial Highness the Crown Prince of Japan
Chairman of the National Steering Committee
Mr. Ryutaro Hashimoto
Former Prime Minister of Japan

The birth of Japan Water Forum
Chairman
Mr. Ryutaro Hashimoto,
Former Prime Minister of Japan
Vice President
Mr. Okuda
Chairman, Nippon Keidanren
Vice President
Dr. Tambo
Professor Emeritus of Hokkaido University and the Open University of Japan
Vice President
Ms. Kada,
Chairperson, the Forum for Children, Rivers, and Neighboring Environment

March 21, 2006 Declaration of the formal establishment of APWF by Mr. Ryutaro Hashimoto, Former Prime Minister of Japan

September 27 APWF Inauguration Ceremony (Manila, the Philippines) Mr. Yoshiro Mori, Former Prime Minister of Japan appointed to the post of Chairman

December 2007 1st Asia-Pacific Water Summit

International Center for Water HAzard & Risk Management

A resolution to approve the establishment and operation of ICHARM as proposed by the Japanese government was passed at the General Assembly of UNESCO held by 191 member nations in October, 2005. The issue was determined by the Cabinet in Japan on March 3, 2006, resulting in the subsequent signing of an agreement between UNESCO and the Japanese government. The International Center for Water Hazard and Risk Management (ICHARM) was established within the Public Works Research Institute at Tsukuba City on March 6 of the same year.

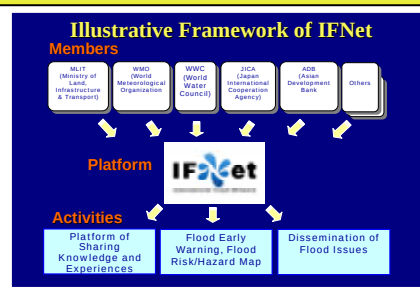
- Development and popularization of a flood advance warning system using satellite information.
- Research on the evaluation of flood disaster risks due to global warming and adaptation strategies.
- Personnel training activities relating to the “Master’s Degree Program on Disaster Management Policy Program” launched in collaboration with the National Graduate Institute for Policy Studies in FY2007.

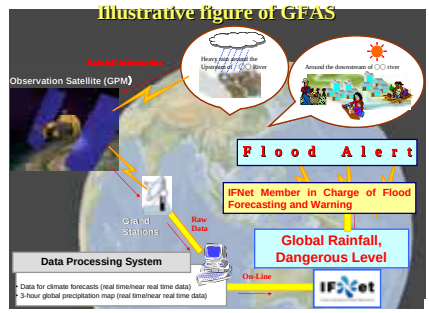
A view of the opening ceremony of the “Master’s Degree Program on Disaster Management Policy Program”

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

International Flood Network

- **Established in 2003 for the purpose of building a society that is safe and sustainable against flood issues, considering solutions for relevant issues, by sharing information and experiences relating to such issues among international organizations, national governments and academic institutions.**
- **Flood early warning system (GFAS) provided that utilize satellites, as well as an outflow analysis system (IFAS).**





http://www.internationalfloodnetwork.org/

River Bureau,
Ministry of Land, Infrastructure, Transport and Tourism

2-1-3, Kasumigaseki, Chiyoda-ku, Tokyo, Japan
Tel. +81-3-5253-8444
HP. http://www.mlit.go.jp/river/

November,2007