Water Resources in Japan

Water Resources Department
Land and Water Resources Bureau
Ministry of Land, Infrastructure and Transport
Government of Japan

List of Contents

Organization and Legislation Related to Water Resources Policy

In Japan, measures concerning water resources are implemented by a number of government ministries and agencies in cooperation, based on numerous laws. The Water Resources Department of the Ministry of Land, Infrastructure and Transport(MLIT) acts as the overall coordinator in adjusting measures for water supply and demand and reservoir area development by related ministries and agencies as well as bureaus and departments.

Water Supply for Domestic Use — **Ministry of Health, Labour and Welfare**
- Water-Supply Law
- Law to Promote the Implementation of Programs to Preserve the Quality of Source Water for Public Water-Supply, etc.

Water Supply for Agricultural Use, Development of Forest for Water Headwaters Conservation — **Ministry of Agriculture, Forestry and Fisheries**
- Land Improvement Law
- Forest Law, etc.

Water Supply for Industrial Use ; Hydroelectric power generation — **Ministry of Economy, Trade and Industry**
- Industrial Water Law
- Industrial Water Supply Business Law, etc.

Water quality, Environmental Preservation — **Ministry of the Environment**
- Water Pollution Control Law
- Law to take Special Measures for Preservation of Water Quality in Head Waters Areas for the Purpose of Preventing Specific Trouble in the Drinking Water Supply, etc

Ministry of Land, Infrastructure and Transport (MLIT)

Sewerage — **Sewerage and Water Waste Management Department**
- Sewerage Law, etc.

Flood Control, River Water Utilization, and Improvement in and Conservation of River Environment — **River Bureau**
- River Law
- Specified Multipurpose Dam Law, etc.

Overall Coordination, Water Supply and Demand Planning, Reservoir Area Development — **Water Resources Department**
- Water Resources Development Promotion Law
- Water Resources Development Public Corporation Law
- Law Concerning Special Measures for Reservoir Areas

Organization of the Water Resources Department
- Water Resources Policy Division : basic policy, Japan Water Agency, groundwater, miscellaneous water use, etc.
- Water Resources Planning Division : long-term planning, establishment of sound hydrological cycle, etc.
- Reservoir Area Development Division : reservoir area development, 100 Selected Water Spots

Water Balance in Japan

- Available Amount of Water

Annual precipitation in Japan is approximately 650 billion m³ (average figure over the 30-year period from 1971 to 2000), of which approximately 230 billion m³ (35%) is lost through evaporation. The remaining 420 billion m³ is theoretically the maximum amount that can be used by humans and is referred to as the "inventory of water resources". The inventory of water resources decreases in years of low precipitation, reduced to 280 billion m³ in the year of water shortage occurring about once in 10 years.

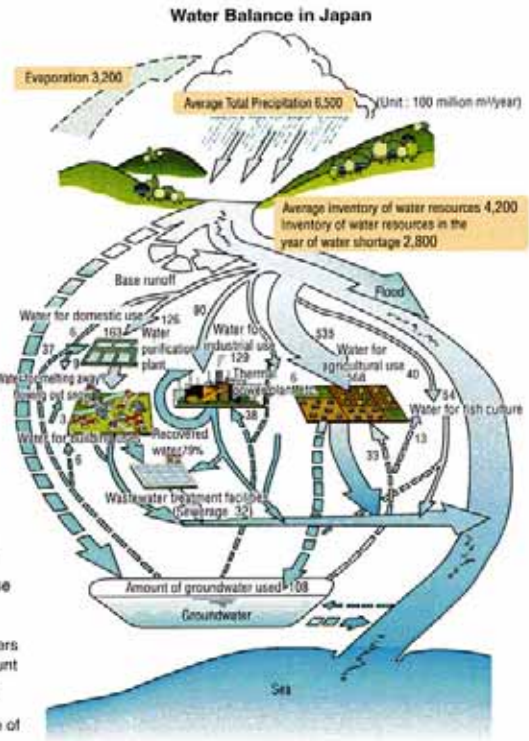
The amount of water actually used (intake amount in 2001) is approximately 85.9 billion m³, which is equivalent to roughly 20% of the mean inventory of water resources. This ratio is referred to as the "water resources utilization rate". The water not used, amounting to 300 billion m³ or more turns into flood and so forth, running off into the sea or stored as groundwater.

- Amount of Water Use by Purpose

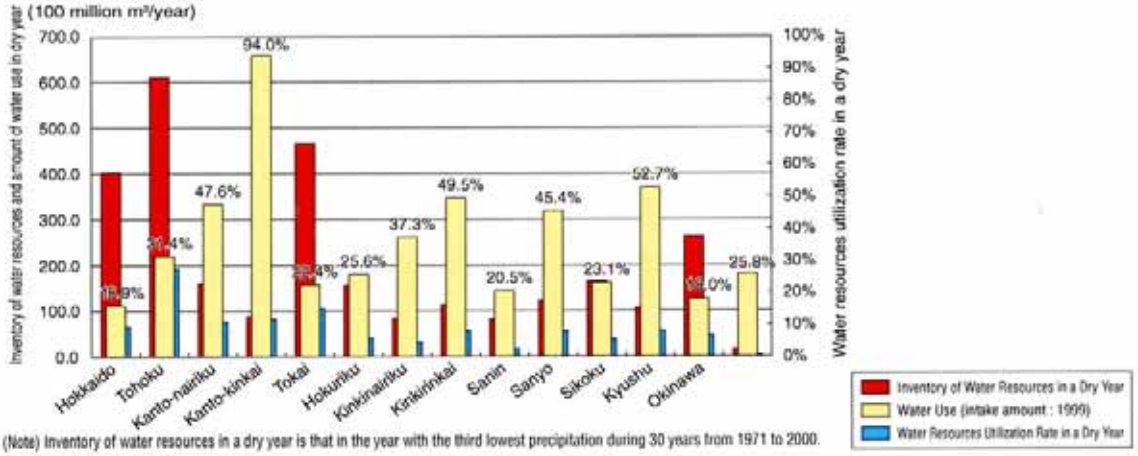
The situation regarding water use (2001) breaks down as approximately 56.8 billion m³ (around 66% of total usage) for agriculture, approximately 12.9 billion m³ (approximately 15%) for industry, and approximately 16.3 billion m³ (around 19%) for domestic purposes. In terms of regional distribution, the water resources utilization rate is high in the regions of Kanto and Kinki where population and industry is concentrated.

- Use of River Water and Groundwater

Of the approximately 85.9 billion m³ that is used, around 75.2 billion m³ (approximately 87%) is obtained from rivers, lakes and marshes, and around 10.8 billion m³ (approximately 13%) is obtained from groundwater.



(Note) 1. Figures of "average total precipitation", "evaporation" and "inventory of water resources (average, year of water shortage) were calculated by Water Resources Department, MLIT, based on the data of 1971 – 2000.
2. Figures for "water for domestic use" and "water for industrial use" are those of 001, and those for "thermal power plants etc. "are of 1997, all of them as surveyed by Water Resources Department, MLIT.
3. In respect of "water for agricultureal use", the figures for the amount of water intake from rivers are those of 2001, as surveyed by Water Resources Department, MLIT. Figures of the amount of intake from groundwater were taken from "4th Survey of Groundwater use for Agriculture (October, 1995 – 1996)" by the Ministry of Agriculture, Forestry and Fisheries.
4. Figures for "water for fish culture" and "water for melting away / flushing out snow" are those of 2000, as surveyed by Water Resources Department, MLIT.
5. Figures for "water for building uses" are those of 2002, taken from "General Condition of Areas with Ground Subsidence all over the Country" by the Ministry of Environment.
6. Figures for "wastewater treatment facilities" are those for the amount of sewerage treatment, as surveyed by Water Resources Department, MLIT.



(Note) Inventory of water resources in a dry year is that in the year with the third lowest precipitation during 30 years from 1971 to 2000.

History of Water Use

- Ancient times to the Edo Era:Development of water use in agriculture

Water use in Japan developed in close association with the production of paddy rice since ancient times. After paddy rice cultivation was introduced, water use developed firstly by the construction of small irrigation ponds and then through the use of water from small and medium rivers, as the manorial system expanded, warring feudal lords made efforts to maintain or increase rice production, and so on. In the Edo Era flood control works on major rivers such as the Tone River was enhanced and paddy fields were newly developed, which resulted in the rapid development of paddy fields in alluvial plains. Meanwhile, the first construction of water supply systems such as the Kanda and Tama Rivers for Water Supply were started in Edo(old Tokyo) and other major cities.

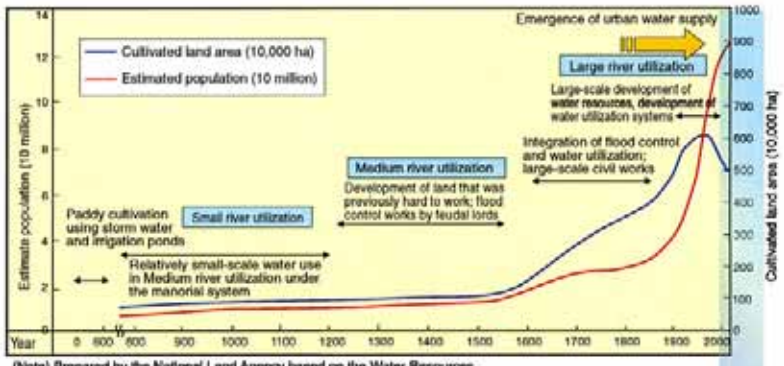
- Meiji Era through to the Pre-World War II Period: Modernization of Japan and formation of the base for socioeconomic development

The demand for industrial water increased in line with the drastic growth of heavy and chemical industries, following the implementation of the policy for encouragement of new industry. Modern water supply systems had been enhanced in urban areas including Yokohama in response to the increase in population and the need for prevention of infectious diseases. On the other hand, in line with increased demand for electricity, following the progress of urbanization / industrialization, major advances were made in the hydroelectric power generation sector.

- Post-World War II Period to the Present : A vital role in socioeconomic development

Since the demand for domestic, industrial and agricultural water use grew sharply due to rapid economic growth and population increase, comprehensive development of water resources based on construction of multipurpose dams, etc. was implemented in order to secure stable water use.

Moreover, concerning legislative systems, legislations concerning water resources development such as dam construction, each purpose of water use, prevention of ground subsidence and so forth were established by the 1960s, while legislation concerning development of reservoir areas water quality and environmental preservation, etc. have been put into place since 1970.



(Note) Prepared by the National Land Agency based on the Water Resources Development Plan by Shunishi Kurosawa

Establishment of Various Systems to Support Water Utilization

~1945

- River Law (1996)

1945~1969

Comprehensive Development of Water Resources by Dams, etc.

- Comprehensive National Land Development Law (1950)
- Aichi Irrigation Public Corporation Law (1955)
- Specified Multipurpose Dam Law (1957)
- Water Resources Development Promotion Law (1961)
- Water Resources Development Public Corporation Law (1961)

Water Use and Ground Subsidence Prevention

- Land Improvement Act(1949)
- Power Source Development Promotion Law (1952)
- Industrial Water Law (1956)
- Water Supply Law (1957)
- Industrial Water Supply Business Law (1958)
- Amendment to the River Law (1964)

1970~1989

Development of Reservoir Areas

- Act on Special Measures for the Lake Biwa Comprehensive Development (1972)
- Law Concerning Special Measures for Reservoir Areas (1973)

Water Quality Preservation

- Amendment to the Sewerage Law (1970)
- Water Pollution Control Law (1970)
- Law for Conservation of Lake Water Quality(1973)

1990~2000

Environment Preservation

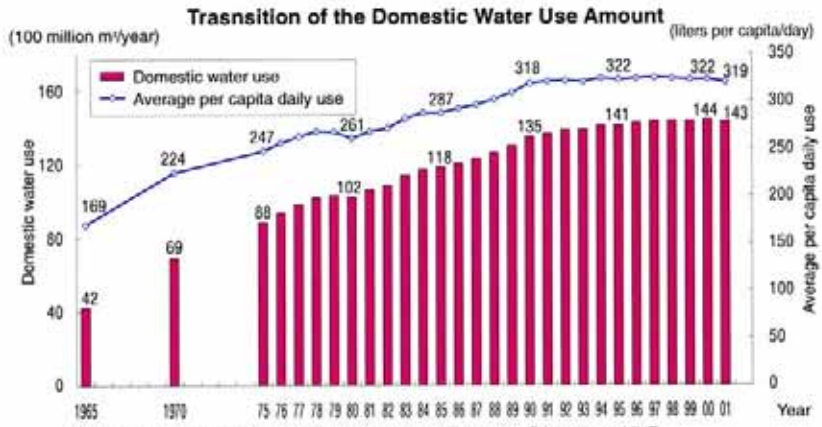
- Basic Environment Law (1993)
- Law to take Special Measures for Preservation ofWater Quality in Head-waters Areas for the Purpose of Preventing Specific Trouble in the Drinking Water Supply (1994)
- Law to Promote the Implementation of Programs to Preserve the Quality of Source Water for the Public Water-Supply (1994)
- Amendment to River Law (1997)
- Environmental Impact Assessment Law (1997)

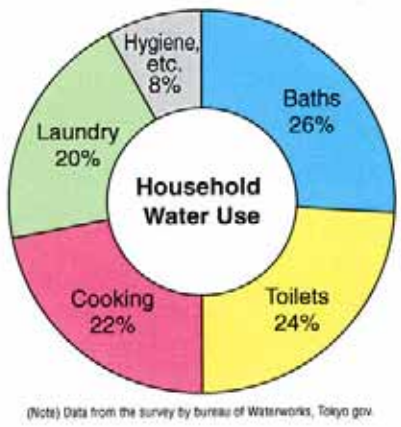
(Note) Water Resources Development Public Corporation was abolished in 2002, and an independent administrative corporation, JapanWater Agency was established.

State of Water Use

- Water for Domestic Use

The water used in households and in offices, hotels, restaurants and so forth is called, "household water" and "water for use in urban activities" respectively, which are collectively called, "water for domestic use".The daily per capita amount of domestic water use roughly doubled in the period between 1965 and 2001 due to changes in lifestyle (e.g. spread of flush toilets). Combined with population increase and expansion of economic activities over the same period, domestic water use increased by roughly three times, although it has followed a slightly increasing trend or remained static in recent years.A large proportion of households water is consumed for the purpose of cleaning, as in baths (approximately 26% of all household water), toilets (approximately 24%), cooking (approximately 22%) and laundry (approximately 20%).



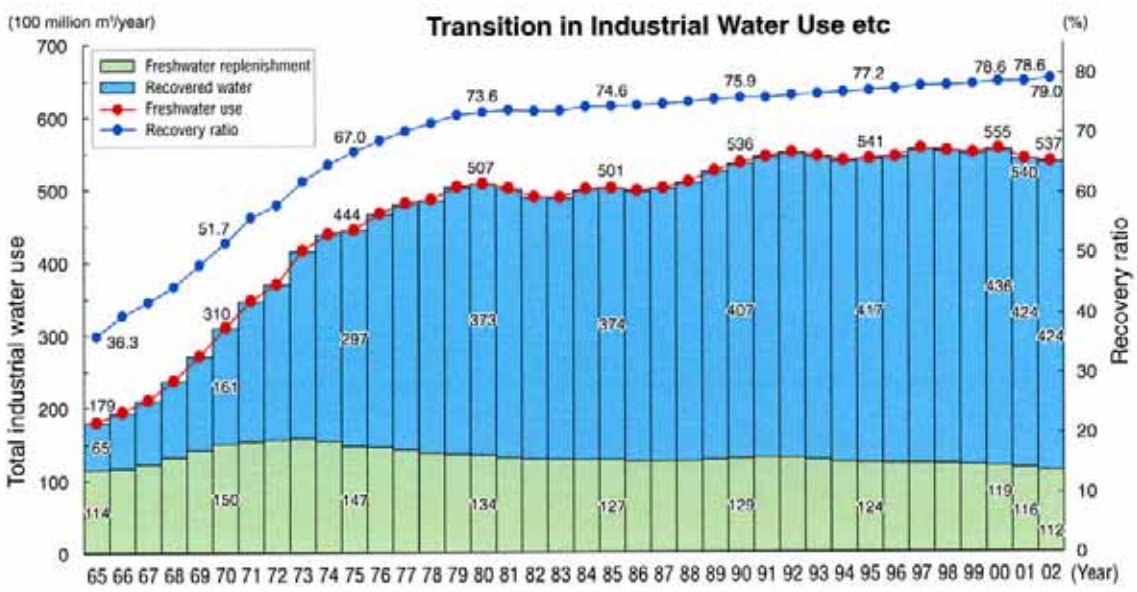


(Note) Data from the survey by bureau of Waterworks, Tokyo gov.

(Note) 1. Figures after 1975 were surveyed by Water Resources Department, MLIT.
2. Figures for 1965 and 1970 were taken from "Water Supply Statistics" (Ministry of Labor, Health and Welfare).
3. Based on effective water volume

- Water for Industrial Use

"Industrial water" is the one supplied for the industrial activities of manufacturing industry and so on, and is used for raw materials, product processing / cleaning, boilers, cooling and so forth.
The amount of use includes that of water reused after it is once used and recovered. The percentage of the amount of water recovered and reused in the total amount of use is called "recycling ratio".
Industrial water use increased roughly three times between 1965 and 2002. On the other hand, due to advances in water recycling, the amount of water, required to be newly taken in from rivers, etc. (called, "freshwater replenishment") has been decreasing or remained static in trend since 1973.



(Note)1. Figures are for businesses with 30 or more employees based on the data from "Census of Manufactures" by the Ministry of Economy, Trade and Industry
2.Water used in thermal power plants, etc. is not included..
3. Since figures are given as daily amounts in "Census of Manufactures", annual amounts were obtained by multiplying these by 365.

Water Resources Development

- Needs of Water Resources Development

Japan has relatively high precipitation on the global standard with plenty of water per square meter of the national land. However, the river flow greatly fluctuates throughout the year; high in the spring thaw, the rainy season from June to July, and the typhoon season, but low in other periods. On the other hand, the amount of water for domestic and industrial use does not fluctuate so greatly as the river flow, though it fluctuates in different seasons and days of the week.

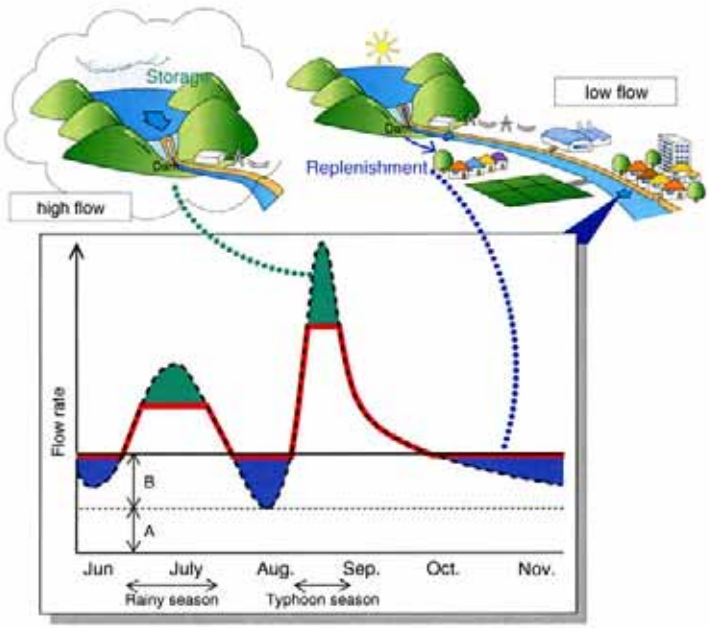
In order to achieve stable water use, it is necessary to obtain stable intake of river water all year round irrespective of fluctuations in river flow. For this reason, water resources development facilities such as dams and weirs, etc. are constructed in order to take in a uniform amount of water in a stable manner.

- Mechanism of Water Resources Development

Let us assume the river flow at the point of water intake as seen in the conceptual diagram below on the right. River flow in the natural state without dams, and so on is shown in the undulating line. Generally, the amount of water flow is large in the rainy and typhoon seasons, though it may be small sometimes. If it is considered to take in a uniform amount of water intake throughout the year, only the levels indicated by line A in the diagram would be secured.

When a dam is constructed, water can be stored at times of high flow such as those of the rainy and typhoon seasons (storage : green areas in the diagram) and partly discharged from the dam at times of low flow (supplement : blue areas in the diagram); the modified river flow is indicated by the red line, making a higher intake of water (A+B) possible throughout the year.

The amount of stored water by dam construction is referred to as "dam development water" (B in the diagram).



- Water Resources Development Facilities

Water resources development facilities include the following ones. Apart from them, water channels are necessary for introducing water to the place of use (agricultural land or water purification plant) to use the water from rivers.

- Dams and barrages ...Sameura Dam, Chikugo Large Barrage and so forth

Along with the dams and barrages constructed for the purpose of securing each of the agricultural water, tap water and industrial water, there are those constructed as multipurpose facilities with concurrent objectives of flood control, maintenance of normal functions of water flow, hydroelectric power generation and so on. The amount of downstream river flow and so forth are stabilized by the water storage in dams and water replenishment to rivers, to make a new amount of water available for use.

- Lake and marsh development facilities ...The Lake Biwa Development Facilities, The Lake Inbanuma Development Facilities and so on.

Facilities to artificially control water level of lakes and marshes like dams for stabilizing downstream river flow and so forth, as well as developing new amount of water to make it available for use.

- Water transfer canal to regulate flow state ...Kitachiba Water-Introductory Canal, Kasumigaura Water Introduction and so forth

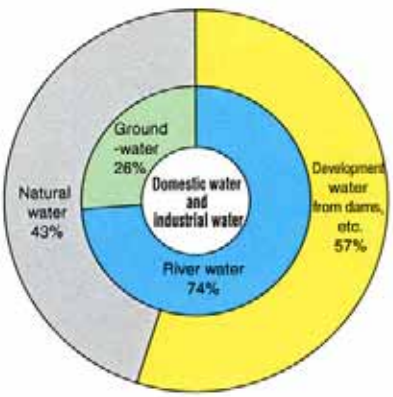
Connection facilities with two or more rivers of different fluctuation of annual flow, for introducing additional flow from the other river to a certain river when the river flow is insufficient in the latter, for stabilizing the river flow and developing new amount of water to make it available for use.

- Importance of Water Resources Development Facilities

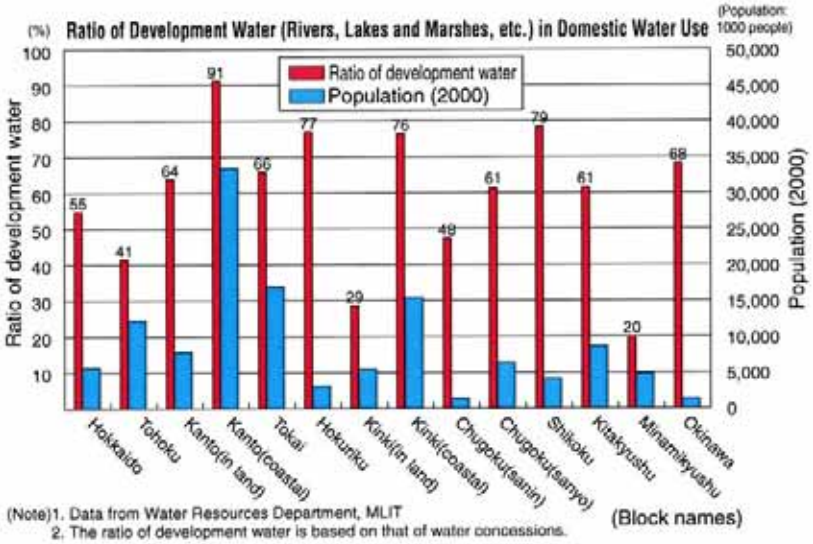
So far in Japan, approximately 860 multipurpose dams and 1,700 single-purpose dams for agricultural, domestic and industrial water supply have been constructed, and a steady supply (approximately 16.7 billion m^3 per year) of "urban water" has been secured.

Currently, approximately 29.1 billion m3 of the urban water is used in Japan, and 74% of it is taken from rivers, 77% of which (57% of overall amount of urban water use) is developed in such improved water resources development facilities.

In particular, in the Kanto coastal region, where population and economic activity is highly concentrated, about 90% of the water for domestic use from rivers is newly secured through the improvement of water resource development facilities.



(Note) 1. According to survey by Water Resources Department, MLIT
2. "Urban water" is the sum of "water for domestic use" and "water for industrial use".



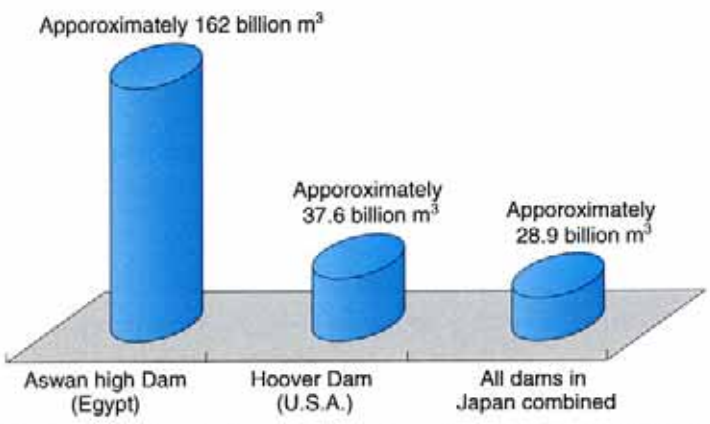
(Note)1. Data from Water Resources Department, MLIT
2. The ratio of development water is based on that of water concessions.

- Scale of Water Resources Development Facilities in Japan

The storage capacity (active strage capacity) of dams constructed up to this date in Japan, including all capacity used for the purposes of power generation, flood control, water utilization and so on, amounts to approximately 23.7 billion m^3.

Owing to relatively small national land area compared to foreign countries and short rivers with steep gradients, construction of giant reservoirs is difficult in Japan. Accordingly, the storage capacity of all dams in Japan, constructed up to this date, though many in number, is less than that of the Hoover Dam in the United States and less than 20% of that of the Aswan High Dam in Egypt.

Total Storage Capacity



(Note)Data from the Japan Dam Association, Hoover Dam and Egyptian Government homepages

Yagisawa Dam (Tone River System)

National Comprehensive Water Resources Plan (Water Plan)

- National Comprehensive Water Resources Plan

It is essential that policies concerning water resources is implemented in a planned manner based on a long-term and comprehensive viewpoint. Therefore, in order to demonstrate long-term prospects of water supply and demand and clarify the basic direction of water resources development, preservation and utilization, the Water Resources Department of MLIT has compiled the National Comprehensive Water Resources Plan. In the past, Long-Term Water Supply and Demand Plan was compiled in 1978 and National Comprehensive Water Resources Plan (Water Plan 2000) which adopted 2000 as the target year, was formulated in 1987, while the New National Comprehensive Water Resources Plan (Water Plan 21), which has adopted 2010 and 2015 as rough target years, was compiled in June 1999.

- Features of Water Plan 21<Basic Targets>

In Water Plan 21, the following three basic targets have been raised for the "Construction of a Healthy Hydrological Cycle" (See Page 15):

1. Establishment of a sustainable water use system. 2. Conservation of and improvement in the water environment. 3. Water-related culture restoration and nurturing of water culture.

<Aiming for the Establishment of a Sustainable Water Utilization System>

In order to allow the stable use of safe water in each area and basin, the target level and so forth for the stability of water utilization are to be established to integrally promote measures to be implemented for the purpose of increasing the amount of water that can be steadily supplied under the regional consensus.

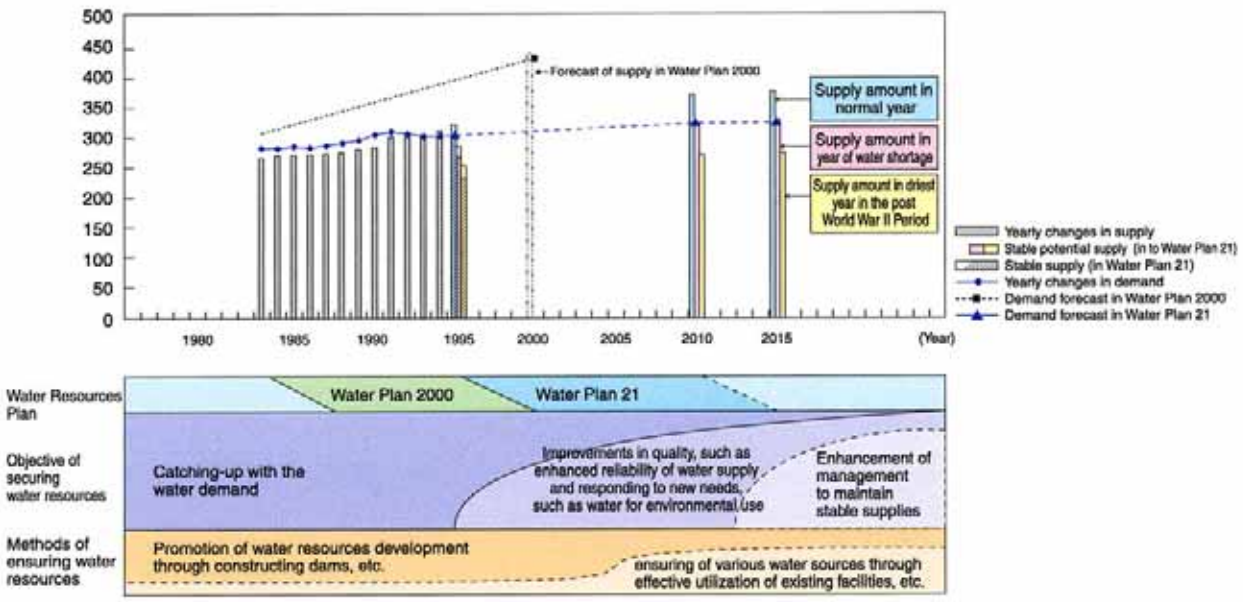
<Aiming for the Conservation of and Improvement in the Water Environment>

In order to have the multilateral functions inherent to water demonstrated, efforts will be promoted to preserve and develop the waterside space by securing water for environmental use and otherwise, as well as to secure the amount and quality of water by means of preserving and developing water sources as well as groundwater and so on.

<Aiming for the Water-related Culture Restoration and Nurturing of Water Culture>

Along with these targets, voluntary participation of citizens and so forth will be promoted, which will lead to the renewed recognition of the relation between humans and water, nurturing of the conciousness to value water, and, at the same time acquisition of understanding and cooperation related to the conservation of and improvement in water environment.

Demand and Supply of Water for Urban Use (National Total)



- Prospects for the Supply and Demand of Water

Conditions of rainfall are divided into three assumed scenarios, i.e. "normal year", "year of water shortage", and "driest year in the post-World War II period", and the prospects for water supply and demand from 2010 to 2015 are assessed.

Since no more sudden increases in water demand are now expected, providing that construction of all facilities, projected to be completed by 2015, will advance according to schedule, it is expected that stable water supply will still be possible in the normal year and year of water shortage.

Water Resources Development Basic Plan

- Water Resources Development Promotion Law and River Systems of Water Resources Development

Based on the Water Resources Development Promotion Law, the seven river systems (Tone River, Arakawa River, Toyokawa River, Kiso River, Yodogawa River, Yoshino River, Chikugo River), where wide area water supply measures have become necessary in response to the development of industry, increase in urban population and so on, have been designated as water resources development river systems. Concurrently, this law has the objectives that, at each designated river systems, water resources development basic plan is created and comprehensive development and rational use of water resources are advanced to contribute to the improvement in the life of citizens and so forth.

Districts receiving water from the designated river systems only account for about 16% of the national land area, although about 50% of population and industrial activity in Japan are concentrated in these areas.

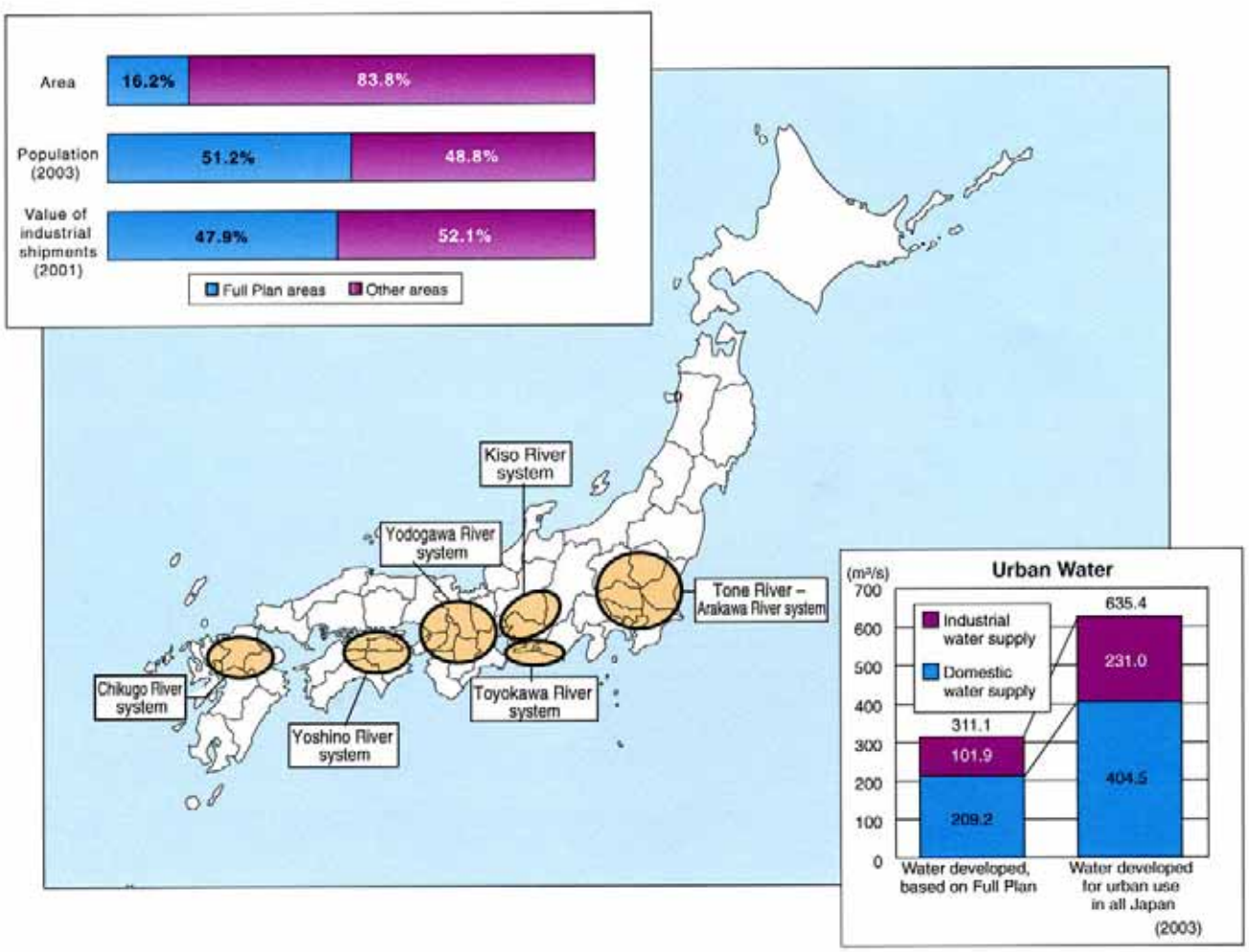
- Water Resources Development Basic Plan

The following contents are incorporated into the Full Plan.

1. Water demand forecasts and supply targets according to purpose of use
2. Basic items relating to construction of facilities required in order to achieve the supply targets
3. Other important items related to the comprehensive development of water resources and rationalization of water utilization

The contents of the Full Plan are determined or revised by Cabinet decision based on consultation and coordination with related ministries, hearing of opinions of related prefectural governors and studies by the National Land Development Council.

Besides, as a result of construction of water resources development facilities by the government, Japan Water Agency (former Water Resources Development Public Corporation), based on the Full Plan, approximately 379 m³/s of water is newly available for use. In particular, approximately 311m³/s, equivalent to roughly 50% of all developed urban water consisting of combined domestic and industrial water in the country, was developed in the facilities based on the Full Plan. These facilities form a part of important lifeline for major urban areas where population and industry are concentrated.



Japan Water Agency – Independent Administrative Corporation

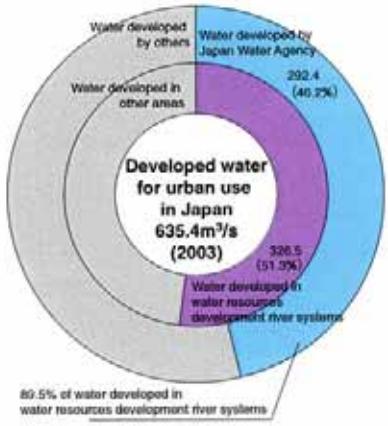
- Objective and Activity

The Water Resources Development Public Corporation, the predecessor of Japan Water Agency – Independent Administrative Corporation (hereinafter abbreviated as the "Agency") was established in 1962 with the goal of contributing the growth of national economy and improvement in the life of citizens through implementing water resources development and use projects based on the Water Resources Development Basic Plan formulated for each of the water resources development river systems designated for the purpose of supplying water to the areas for which wide area water supply measures are required to be taken urgently.

Later on, the Water Resources Development Public Corporation that used to be a Special Public Corporation, was reformed into the Japan Water Agency, an Independent Administrative Corporation in October, 2003, in consideration of the situation surrounding water resources development, as seen in the changes in social structure surrounding supply and demand of water, diversification of the nedds of citizens and so on. The Agency with its management philosophy, we provide stable supply of safe quality water at a reasonable price, aims for flexible organizational operation and efficient service operation with a view to playing efficiently and independently the public role to serve the public interests with a more private company-like management sense.

The Agency is newly constructing (with regard to those which increase the supply amount water, only the projects and so on that had been started at the time of transfer to the Agency) or renovating dams, estuary barrage, lake water level adjusting facilities, water channels, and so forth to help promote water utilization (securing of water supply for domestic, industrial and agricultural use) and flood control (flood regulation as well as maintenance and enhancement of normal function of water flow) on the seven designated river systems for water resources development. In addition the Agency is operating completed facilities including Aichi Toyokawa water supply facilities. Furthermore, in consideration of the expected importance of making efficient use of existing factilities within the river systems in the future, it is allowed to manage on consignment and otherwise the facilities that are recognized to contribute to the rationalization of water resources utilization by the integrated management with the facilities managed by the Agency.

Since the projects of the Agency have diverse objectives and are carried out in many different fields, four competent ministers, i.e. the Minister of Land, Infrastructure and Transport, the Minister of Health, Labor and Welfare, the Minister of Agriculture, Forestry and Fisheries, and the Minister of Economy, Trade and Industry, are responsible for supervising the activity of the Agency.

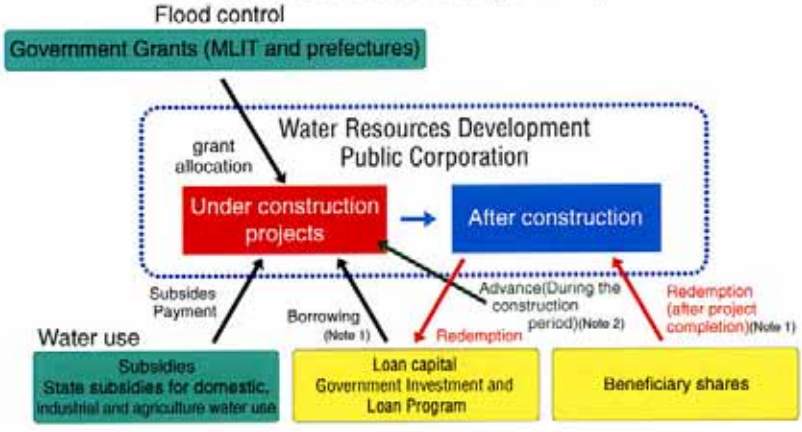


(Note) Water developed in water resources development river systems also includes water that was developed before the Full Pan was compiled.

- Features

1. The Agency implements wide-area, multipurpose and large-scale projects comprehensively and integrally from their construction to the management of the facilities (from water resources development to water conveyance. With the projects implemented up to 2003, the Agency has developed approximately 89% of all developed water for urban use in the said river systems for water resources development (approximately 46% of the national total).
2. The Agency is the only comprehensive organization dealing with water in Japan, implementing projects by coordinating among various parties such as related ministries and agencies, prefectural governments and water users, etc.
3. There is a scheme in which projects of the Agency are financed by loans of the Government Investment and Loan Program, the bonds issued by the Government Investment and Loan Institutions, and so forth, while the loans are repaid in installments by beneficiaries (water users) after the completion of the facilities. This scheme enables the Agency to secure stable funding for and smooth execution of projects. In addition, a water user may also advance its contribution each year at its option.
4. The Agency has accumulated a lot of advanced technologies for constructing and operating dams and water channels.

Flow of Project Cost(Outline)



(Note 1) Method of redemption in installments
(Note 2) Method of advancing beneficiary shares every year

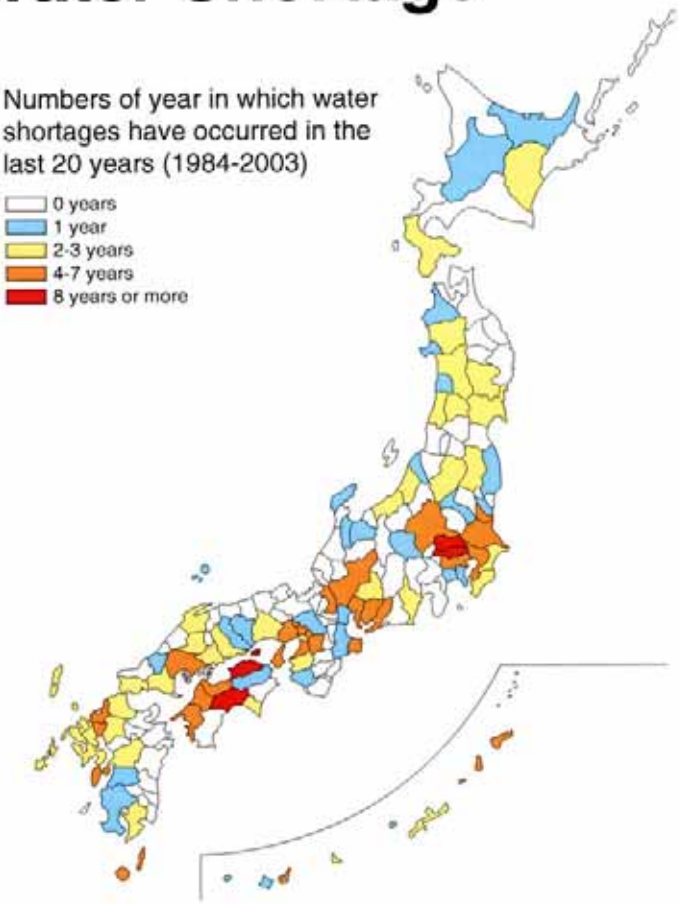
Occurrence of Water Shortage

- Occurrence of Water Shortage

Japan experienced major water shortages in 1939 in the Lake Biwa, 1964 in the year of Tokyo Olympics, 1967 in Nagasaki, 1973 in Takamatsu, 1978 in Fukuoka, and so on.

In the recent years, the water shortage covered almost all Japan in 1994, when each of approximately 16 million people was affected at least once by disrupted or low-pressure water supply, and agriculture suffered losses in products, amounting to some 140 billion yen.

Numbers of year in which water shortages have occurred in the last 20 years (1984-2003)



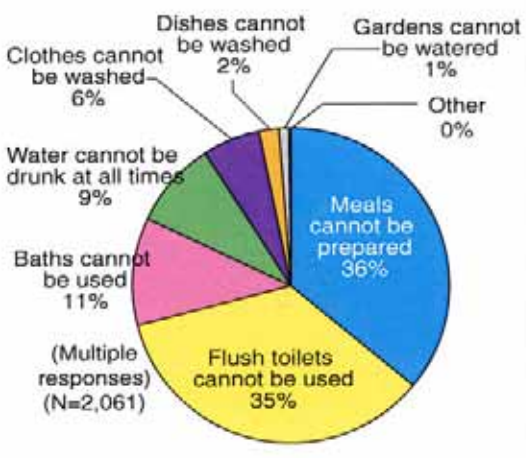
(Note) Shows the number of years in which the water supply was reduced or suspended in the last 20 years (between 1983 and 2002) in each of 172 districts into which the entire country is divided.

- Effects of Water Shortage

Modern society secures comfortable lifestyles and high quality services based on the assumption that there will be stable water supply. Therefore, disrupted or low-pressure water supply adversely affects everyday home life and social activities in a serious manner by making it impossible to prepare meals, use flush toilets and so forth.

Moreover, when shortages of agricultural water occur, farmers save water by means of "water-sharing (method of distributing water in accordance with the designated time and turn)", intensification of repeated use and so on, though this requires a lot of effort and cost. For example, at the time of water shortage in 1994, the cost about three times as much as that in an average year was required. Furthermore, when the absolute amount of water becomes insufficient, crop growth is hindered or completely prevented.

Most Troublesome Effects of Water Restrictions



(Note) Prime Minister's Office, Survey on People and Water (1994)

Water sharing: control of nighttime water distribution using a water-sharing clock (inset)

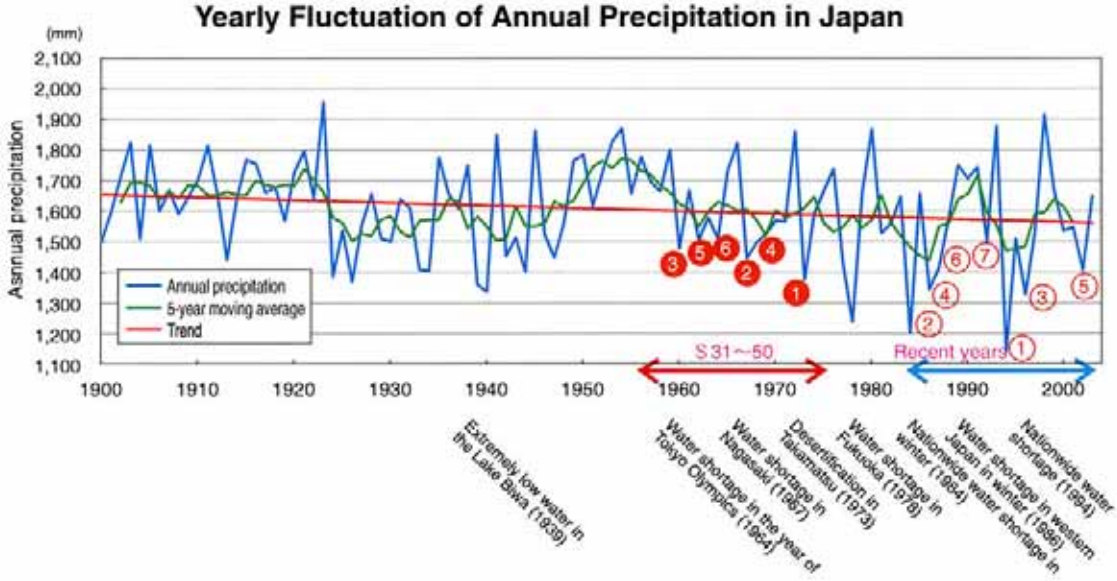
Securing Stable Water Supply

- Fluctuation of Precipitation due to Climate Change

As the long-term trend of temperature change in Japan, the annual average surface air temperature has increased by approximately 1℃ over the past 100 years. Concerning precipitation, there have been numerous low rainfall years since around 1970 and precipitation was well below average in 1973, 1978, 1984, 1994 and 1996, when water shortage brought damage. Recently an increasing trend of fluctuation between extremely low rainfall and extremely high rainfall has been observed.

Moreover, trends of decreasing snowfall, increasingly earlier thaw and so forth in addition to the above-mentioned decrease in precipitation and frequent occurrence of extremely low rainfall years, due to the climate change accompanying global warming.

Yearly Fluctuation of Annual Precipitation in Japan



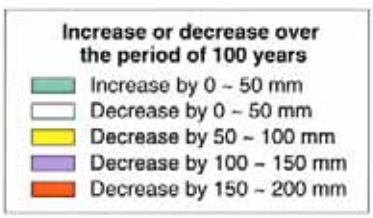
On the Figures in the Graph

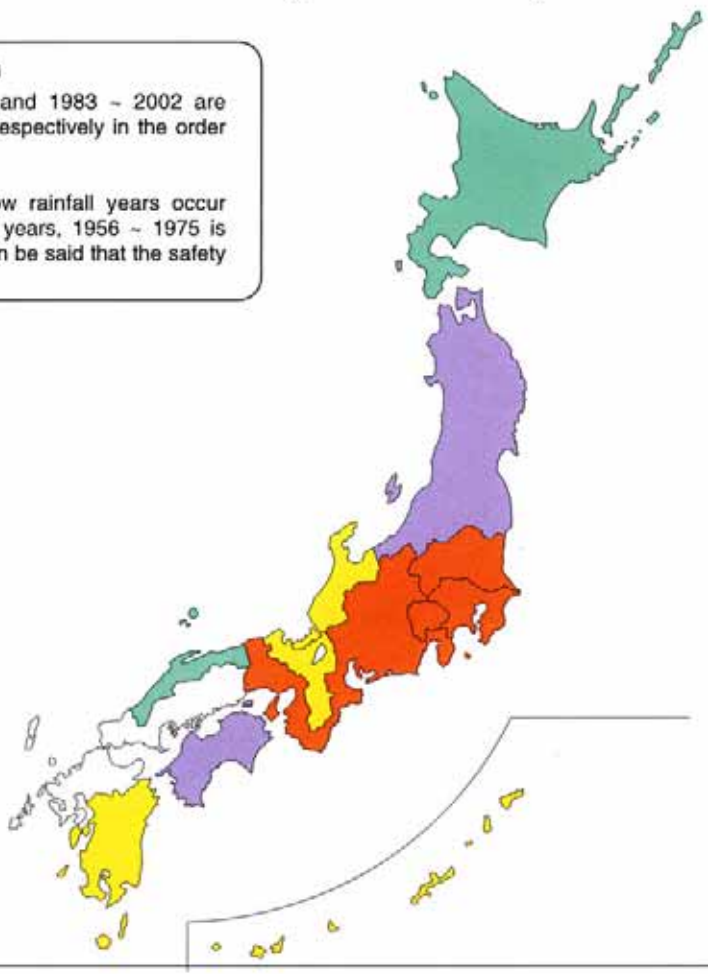
- Low rainfall years in the 20 years, 1956 ~ 1975 and 1983 ~ 2002 are numbered ①、②、③、④ ・・・・ in orange and red respectively in the order starting from the lowest one.
- Comparison of precipitation shows that recently low rainfall years occur frequently, as the 2nd lowest rainfall year in the 20 years, 1956 ~ 1975 is ranked 7th in the recent 20 years. In other words, it can be said that the safety ratio has lowered (2 / 20 → 7 / 20).

- Movements in Precipitation over the Past 100 Years by Area / Season

- Trend of Annual Precipitation by Area

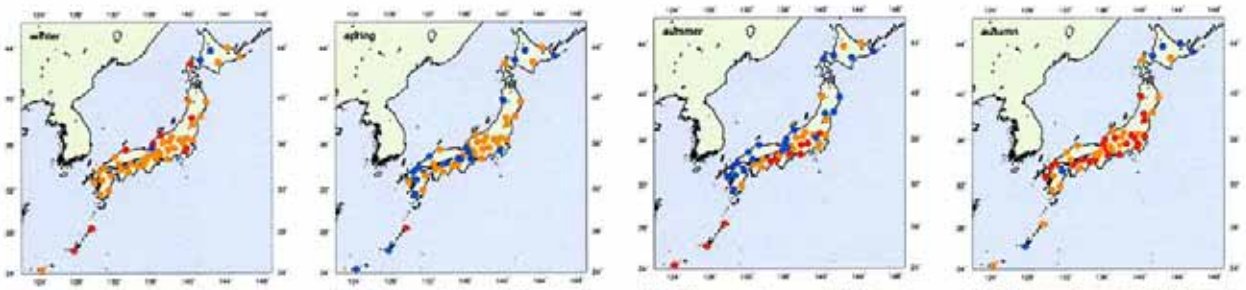
Dividing the entire country into 14 areas, movements in annual precipitation over the past 100 years was analyzed with the result showing that it is on a decreasing trend nationally but is increasing slightly in Hokkaido and San-in.





- Movements in Precipitation by Season

Many spots are noticed, where precipitation in spring and summer seasons is on increasing trend. However, many spots except those in Hokkaido are noticed, where precipitation in autumun and winter seasons is on rapidly decreasing trend.



(1) Change in precipitation in winter season by spot

(2) Change in precipitation in spring season by spot

(3) Change in precipitation in summer season by spot

(4) Change in precipitation in autumn season by spot

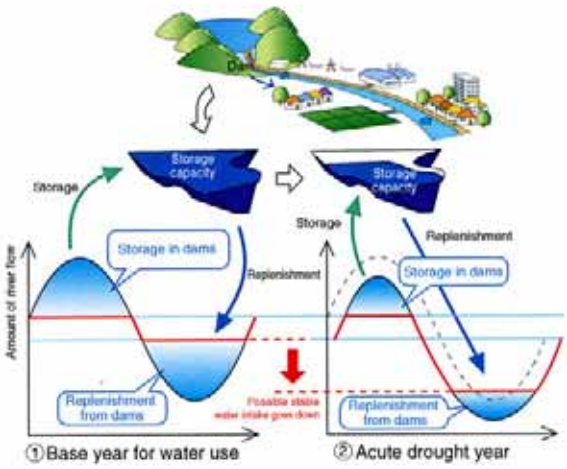
(Note) 1. Provisionally calculated by the Water Resources Department, MLIT, based on the data of Meteorological Agency
2. With respect to the precipitation at 51 spots scattered all over the country for each of four seasons between 1900 and 2001, annual increase or decrease was calculated from the inclination of the trend (by regression line) and stated for each spot.
3. Winter season : December (of the preceding year) – February ; spring season : March – May ; summer season : June – August ; autumn season : September – November
4. ● shows decreasing trend of 0.5 mm or more per year. ● shows decreasing trend of 0-.5 mm or less. ● shows increasing trend.

- Increasingly Unstable Water Supply

In Japan, before construction dams are designed in such a way that even in a year selected as the one with relatively low rainfall (base year for water use) it would be possible to supply the water requirement with the precipitation of that year (see ① in the diagram below).

When the water shortage is more acute than in this base year for water use, the river flow is reduced more largely than in the base year. On the other hand, since the dam capacity remains unchanged, it would be impossible to secure stable intake of water throughout the year, even with replenishment from the dam included (see ② in the diagram on the right).

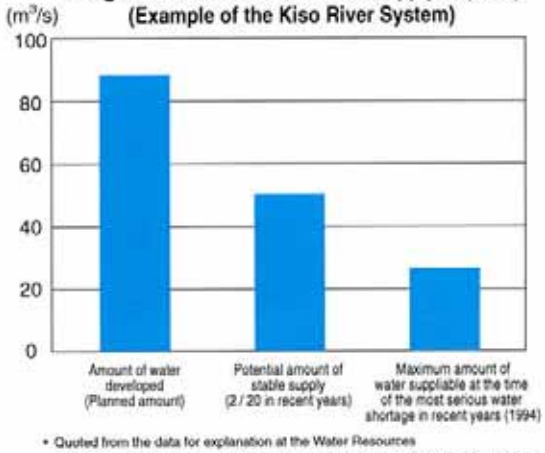
For 60% of the dams now in operation, the base year for water utilization is set within the years 1956 to 1975. (Refer to "Year-to-Year Fluctuation of Annual Precipitation in Japan"). Assuming that 1960 is the base year for water utilization, more acute water shortage is seen in 9 years out of about 40 subsequent years than in that year, resulting in the indication that water shortages occurred frequently. Thus, it is apprehended that stable water supply is impaired in various places in recent years.



- Examples of Decreased Safety of Water Supply

Water resources development facilities in the Kiso River System include Tokuyama Dam (under construction), Nagara River Estuary Barrage, Miso River Dam, Aki River Dam, Iwaya Dam and Makio Dam. At present, with these facilities functioning, 88 m³ of water per second is supplied according to the plan, though the result of the provisional calculation of the water amount suupliable in the year of the second most serious water shortage shows that only about 59 % of the water amount considered to be suppliable at the time of planning (equivalent to 1 / 10 water shortage). Furthermore, in the calculation using the flow amount in 1994 when the serious water shortage occurred, the water amount suppliable is reduced to abount 30% of that estimated at the time of planning.

Changes in Potential Urban Water Supply Capacity (Example of the Kiso River System)



• Quoted from the data for explanation at the Water Resources Development Subcommittee of National Land Development Council (May, 2004)

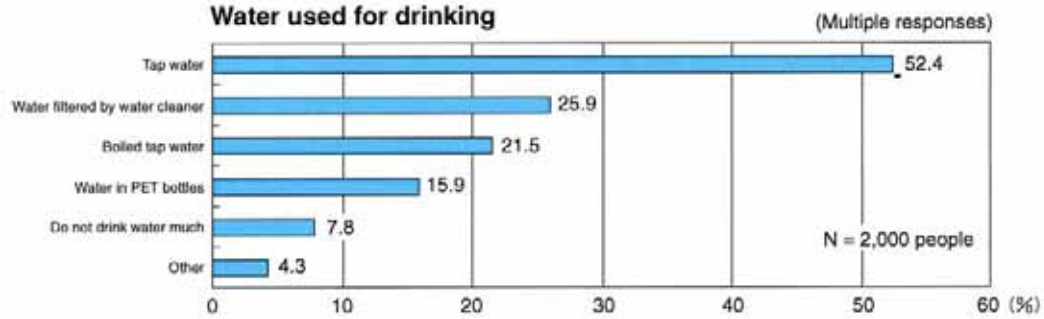
Securing Safe and Good Water

- Growing Interest in Safe and Good Water

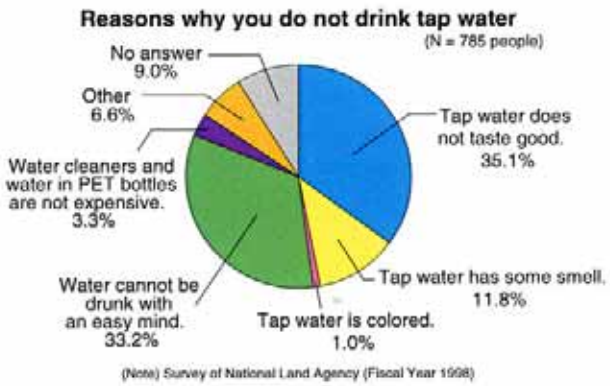
Water is essential to humans in physical needs. Looking back on the past, there are instances where mercury, cadmium and so forth were carried by the water acting as vehicle into rice or fish to be accumulated there and impair thehealth of people who ate them in the form of Minamata disease or ouch-ouch disease caused by the pollution. Thus, pollution of water damages our health.

In Japan, water supply system dissemination rate is about 97%, which means that Japan has a cheap supply of safe and immediately drinkable water. In recent years, however, increased consumption of mineral water and dissemination of water filter for domestic use reflects a growing social interest in and demand for "safe and good water" for drinking.

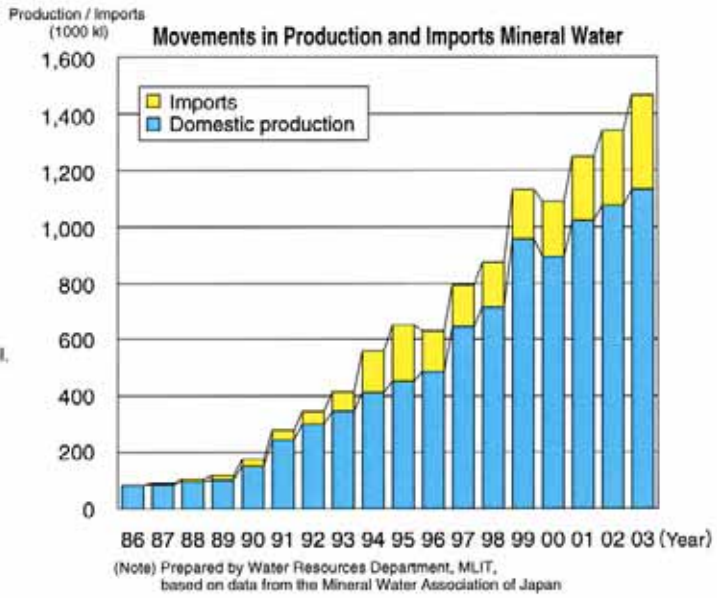
(Note) Cabinet Office, Opinion Poll on Water (Fiscal Year 2001)



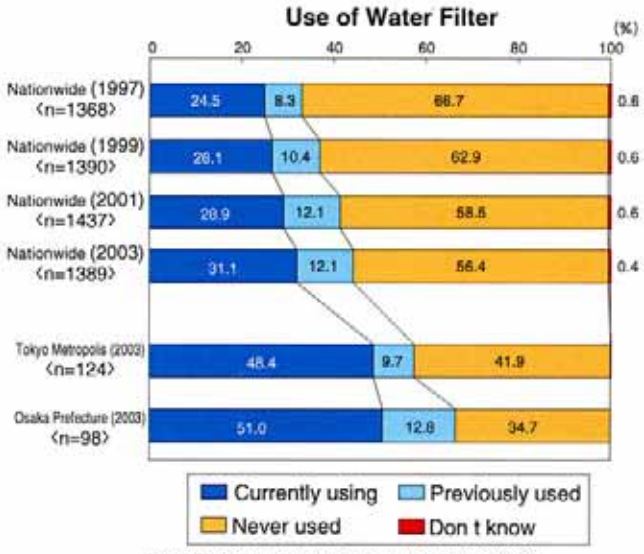
(Note) Survey of National Land Agency (Fiscal Year 1998)



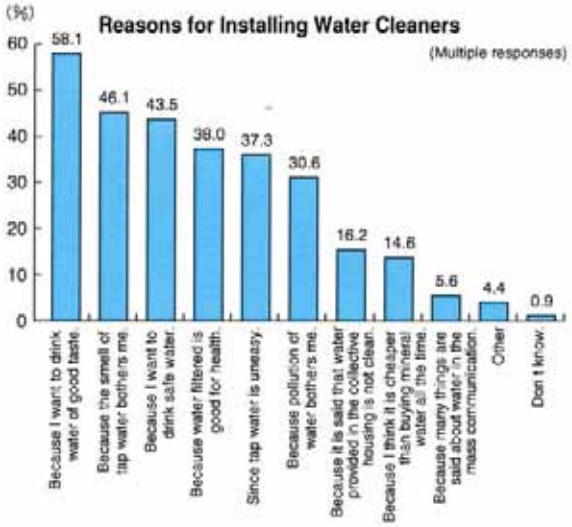
(Note) Survey of National Land Agency (Fiscal Year 1998)



(Note) Prepared by Water Resources Department, MLIT, based on data from the Mineral Water Association of Japan



(Note) Survey by Japan Water Filter Association (2003)



(Note) Survey by Japan Water Filter Association (2003)

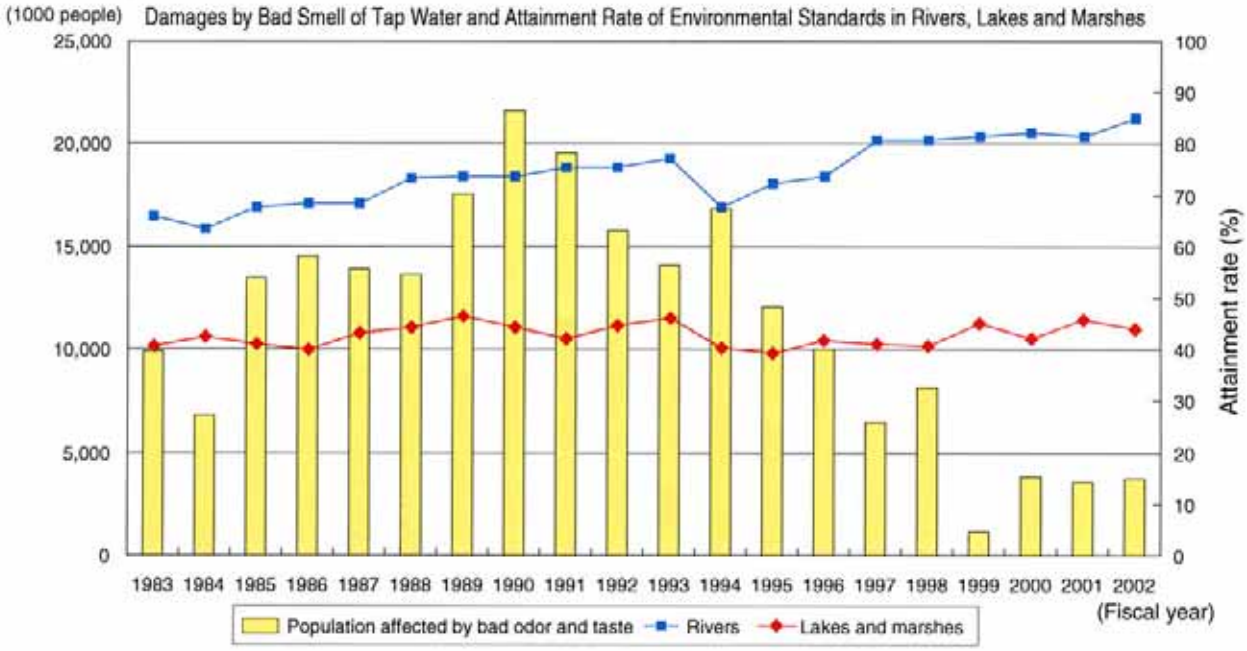
- Preservation of Water Quality at Sources

Approximately 75% of drinking water supply (actual record in the fiscal year 2002) is from rivers, lakes, marshes and so forth. For this reason, water quality deterioration in these water bodies leads to odorous and bad-taste tap water, generating foul smell of mold and chlorine, trihalomethane, suspected cancer-causing agent, as organic matters such as humic materials, reacting with chlorine injected in the process of purifying raw water for drinking, and so on.

Various types of efforts made by water supply utility operators in introducing advanced water purification techniques and so forth, have reduced problems of smelling and bad-taste tap water in recent years.

On the other hand, with respect to the condition of water quality from the viewpoint of the attainment rate of environmental standards, in rivers such ratio exceeds 80% in recent years, reaching about 85% in the fiscal year 2002, indicating that the quality of river water has improved in recent years, though the same cannot be said of lakes and marshes, where the attainment rate of environmental standards is between 40 and 50%.

In order to secure "safe and good water", it is important to improve water quality in the main sources of rivers, lakes and marshes, etc., making it necessary to promote efforts mainly for the preservation of water quality at sources continuously in the future.



(Note) 1. Based on data from the Ministry of Health, Labor and Welfare and Ministry of Environment
2. Figures are BOD for rivers and COD for lakes and marshes.
3. Attainment rate (%) = (water bodies where environmental standards are attained/applicable number of water bodies)x100

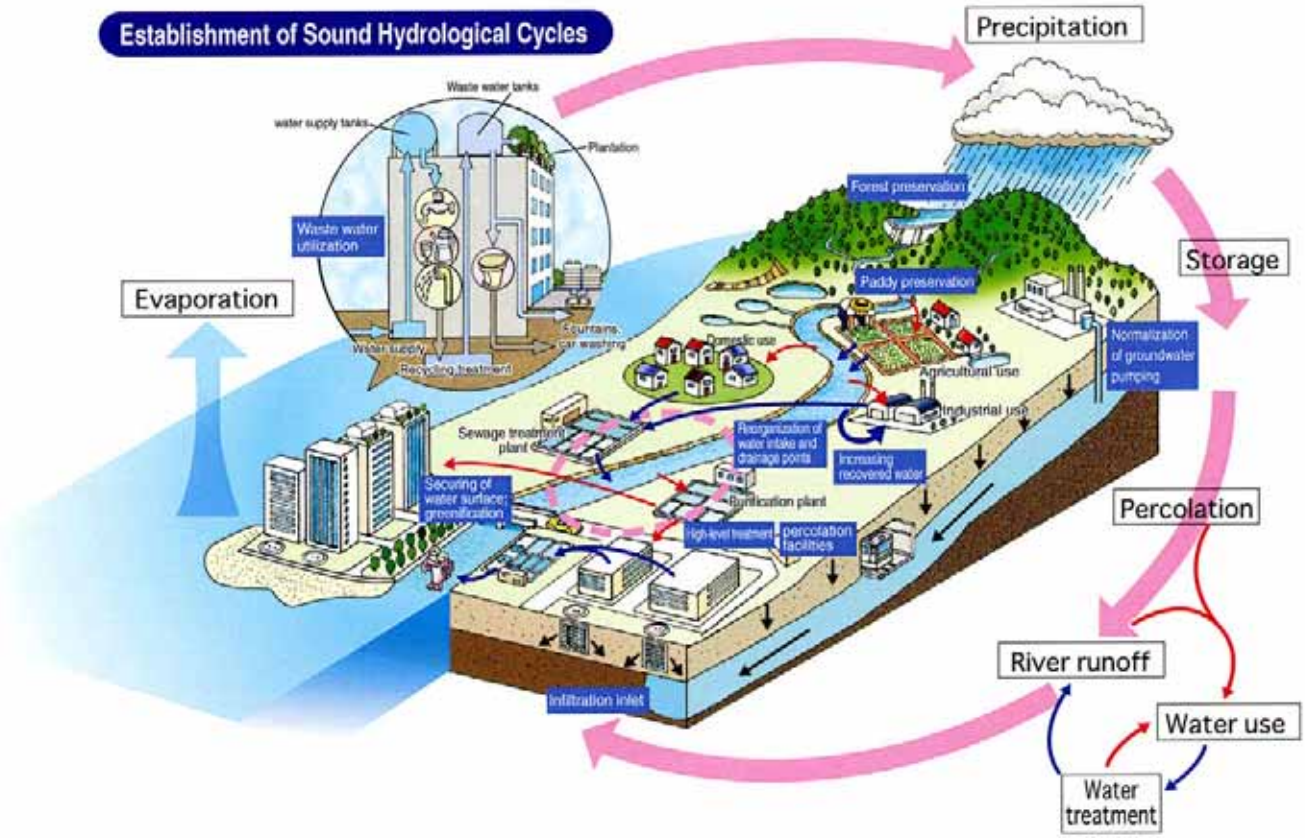
Efforts for the Promoting of Sound Hydrological Cycles

- What are Hydrological Cycles?

The hydrological cycles refer to the system forming overall flow of water consisting of 1) the natural hydrological cycle of evaporation, precipitation, storage, percolation and runoff in repetition, and 2) water flow in artificial courses such as water supply systems and sewerage systems. This system also incorporates domestic, industrial and agricultural water use, etc.

The concept of hydrological cycle ranges over various units from those on the global and continental scale to those on river-centered basin-wide scale. It is important, to understand hydrological cycle mainly in terms of river basin units, because the water for our daily use comes from rivers, lakes, marshes and groundwater, floods occur on the basin scale, and so on .

Since it is not very effective to make efforts alone to take individual measures in advancing specifically the promoting of sound hydrological cycles, five ministries involved in water (Ministry of Labor ; Health and Welfare ; Ministry of Agriculture, Forestry and Fisheries ; Ministry of Economy, Trade and Industry ; Ministry of Land, Infrastructure and Transport ; Ministry of Environment), setting up a liaison comittee, are drawing up "Aiming at the Planning for the Promoting of Sound Hydrological Cycles", guidelines with the intention of allowing regions to independently make efforts for the promoting of sound hydrological cycles.



<Various problems accompanying urbanization>

- Decrease in river flow at ordinary times
- Increase in river runoff at the times of rain
- Decline in the capacity of stable supply at water supply facilities
- Deterioration of water quality
- Depletion of spring water
- Ground subsidence, etc.

Necessity of sound hydrological cycles

- Securing of safe and tasty water
- Avoidance of urban flood damage
- Securing of river flow at ordinary times
- Alleviation of damage by water shortage
- Mitigation of the heat island phenomenon
- Restoration of diverse ecosystems, etc.

- Efforts Made up to this Date in the Liaison Comittee of Related Ministries and Agencies

In August, 1998, ministries and agencies involved in water established the "Liaison Comittee on the Promoting of Sound Hydrological Cycles", and in October, 1999 compiled and interim document of common recognition and so forth on the basic matters aimed at the promoting of sound hydrological cycles. The survey to examine the comprehensive measures in 4 basins was carried out between fiscal years 2000 and 2001, and after formulation of a revitalization vision in 2 basins as an urban revitalization project in the fiscal year 2002, "Aiming at Planning for the Promoting of Sound Hydrological Cycles" was formulated in October, 2003, making use of the attainments made up to that time.

- Outline of "Aiming at Planning for the Promoting of Sound Hydrological Cycles"

- Purpose

"Aiming at Planning for the Promoting of Sound Hydrological Cycles" indicates the basic concept for deriving specific measures in respect of how a region should actually grapple with the planning in pursuit of the promoting of sound hydrological cycles with what target and process.

- Features

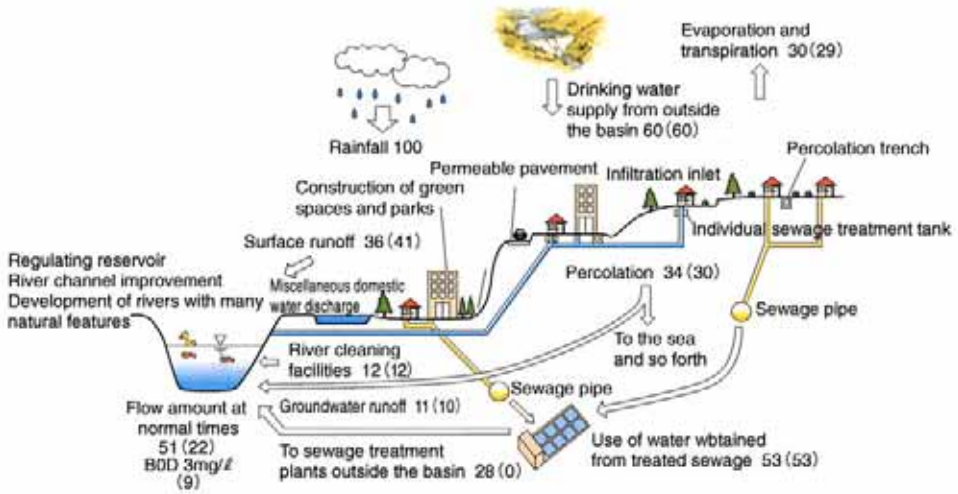
This serves as the reference for the plan of hydrological cycles in the region, provides clues for the development of the region-led basin and solution of problems in pursuit of resuscitating "good water" or "clean water", and manifests the importance of the manner of supporting the activities of NPOs and others, share of roles among main constituents, enlightenment of awareness and so forth through the planning. Moreover, it presents how the administration, inhabitants, business operators and so on should take measures in cooperation to deal with the damages caused by water shortage and flood as well as what their roles should be. In addition, it introduces 11 instances, in which NPOs and regions themselves took the lead.

- Presentation of Instances

In the basin of the River Ebi, sensitivity analysis was conducted for the cases where various measures were implemented, using models of hydrological cycles.

As the measures, preservation and construction of parks and green spaces, regulating reservoirs / storage of rainwater / percolation facilities and so on are envisaged, and figures for the cases where the measures were and were not implemented are indicated, assuming the precipitation at 100. By implementing these measures, surface runoff decreased, percolation and groundwater runoff increased, and, at the same time, improvement in water quality was noticed, as the amount of river flow at the normal time increased by making use of the water for treating sewage.

Example of changes in water balance along the Ebi River
— the case where efforts were made for the revival of hydrological cycles



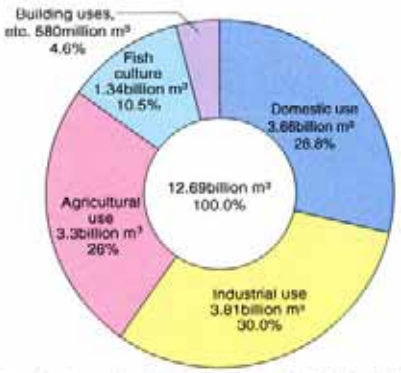
Figures in the figure is the index number, when the rainfall is set at 100. Figures in ( ) are those in the case where the measure is not implemented.

Source : Data of The Ebi River Basin Hydrological Cycles Revival Vision Council.

Groundwater Use and Ground Subsidence Prevention

- Current State of Groundwater Use

Groundwater has characteristics such as good quality, small changes in water temperature and no need for the large-scale water storage / intake / supply facilities due to the water intake from wells. Approximately 12.7 billion m³ of groundwater in total is used in Japan every year, and this accounts for roughly 13% of urban and agricultural water use.

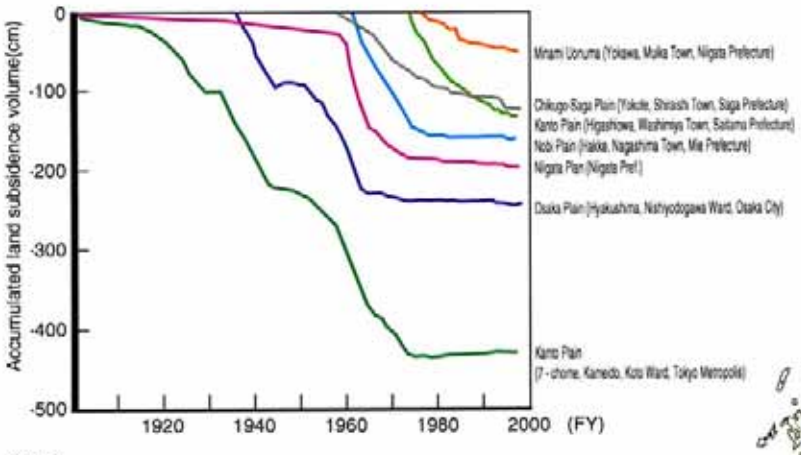


(Note) 1. Figures for domestic and industrial use (usage in 2001) are by the estimated Water Resources Department, MLIT
2. Figures for agricultural use are based on the Fourth Survey of Groundwater Utilization in Agriculture (October 1995 – September 1996) (MAFF)
3. Figures for fish culture are estimated by the Ministry of Land, Infrastructure and Transport, Water Resources Department, MLIT
4. Figures for building uses, etc. are based on the National Overview of Land Subsidence Areas Ministry of the Environment. This shows totals of groundwater use identified by notifications of ordinances, etc. at 29 local authorities (29 prefectures).

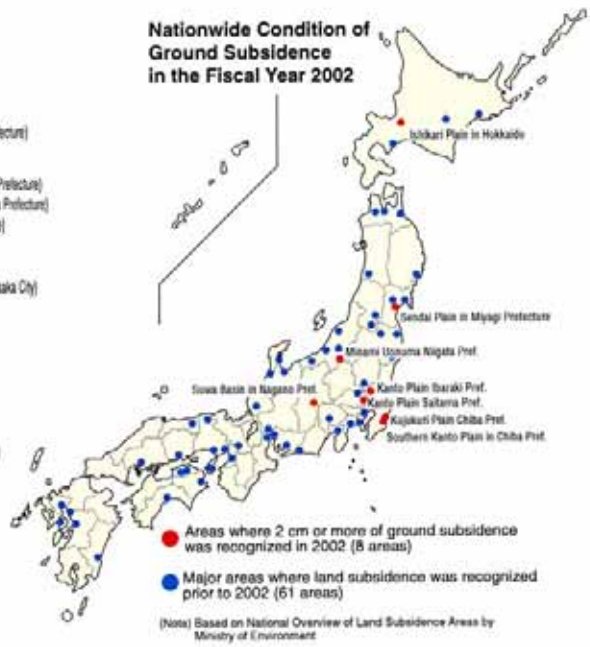
- Problems Concerning Groundwater

Due to the sudden increase in groundwater intake during the era of rapid economic growth, groundwater disorders, such as ground subsidence and salty water arose, and developed into major problems. Currently in Japan, mainly where groundwater disorders have become conspicuous, groundwater preservation measures such as intake restrictions and conversion to river water intake are being introduced based on laws and ordinances.

As a result, intense ground subsidence as the one noticed in a certain period has settled down in recent times. However, since the rapid increase in groundwater intake due to the effect of water shortage may cause large ground subsidence, it cannot be said even at present that the problem of groundwater intake and ground subsidence has been solved.



(Note)
1. Data from (Ministry of the Environment)
2. This is a graph of accumulated land subsidence in predominant areas.



- Groundwater Conservation Measures

Intake of groundwater is regulated for the purpose of preservating groundwater. "The Industrial Water Law" to regulate groundwater for indusrial use and "the Law concerning the Regulation of Pumping-up of Groundwater for Use in Building" to deal with groundwater for building uses prescribe restrictions on groundwater intake in respective designated areas of groundwater disorder occurrence. Moreover, control of pumping-up groundwater has been exercised by ordinances of local government. In three areas, namely Northern Kanto Plain, Nobi Plain and Chikugo-Saga Plain, where widespread and extreme subsidence has been seen, comprehensive measures have been taken, based on "Land Subsidence Prevention Rules" established by the related Ministers' Meetings.

- Quality of Groundwater and New Problems

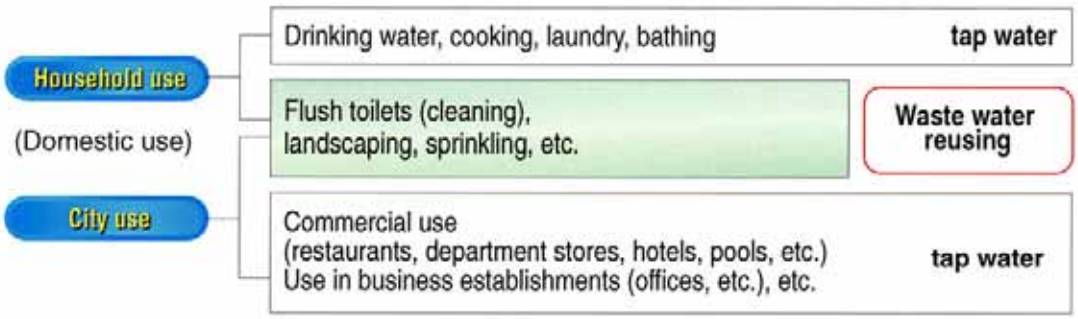
From the viewpoint of conserving water quality, prefectures started constant monitoring of groundwater pollution based on the Water Pollution Control Law from 1989. Moreover, in 1996, amendment to the law was made and institutional steps were taken for executing measures to purify contaminated groundwater.

In Tokyo, the groundwater level has been conspicuously restored by approximately 20m compared to the 1960s, which destabilizes the foundations of buildings that were constructed when the groundwater level was lower than today's, thus creating new problems accompanying with the restoration of groundwater level.

Waste Water Reusing

- What is Waste Water Reusing?

Waste water reusing is the generic term for the use of domestic water, lower in quality than tap water, such as toilet flush water, sprinkling water, cooling water, water for car wash and air conditioning water, obtained from reclaimed sewage , rainwater, etc. In some cases, the term, "intermediate water supply" is used in contrast to drinking water supply and sewage.



- Effect of Waste Water Reusing

Waste Water Reusing can be expected to reduce the amount of tap water use, raise awareness of water-saving and so forth to contribute to the wise use of limited water resources, and to the formation of a society resistive to water shortage, while an effect on environment can also be anticipated in terms of reducing sewage, improving the environment of the river, lake and sea, and so on.

- Types of Waste Water Reusing

Uses of waste water reusing can broadly be divided into two types: 1) wastewater reclamation and 2) rainwater use.

1. Wastewater reclamation

Wastewater reclaiming systems can be classified as follows:

a) Individual circulation systems, where wastewater is purified and recycled in a single building (for example, Saitama Stadium 2002);
b) District circulation systems, where buildings in designated districts jointly operate waste water reusing supply systems (for example, Tokyo Disneyland & Disney Sea); and
c) Wide-area circulation systems, where effluents from sewage treatment plants and industrial water are supplied over large areas (for example, Makuhari new city center district in Chiba).

2. Rainwater use

Rainwater is used as waste water reusing, sometimes combined with wastewater reclaiming systems. You can see both large-scale systems such as Tokyo Dome, and "rainwater barrels" that are widely installed in individual households in Sumida Ward in Tokyo.

Saitama Stadium 2002

rain water barrel in Sumida Ward

- Promotion of Waste Water Reusing

There are approximately 2,800 large-scale systems of water reclaiming and rainwater using in Japan, and the total amount of waste water reusing is approximately 150 million m^3 per year. To promote waste water reusing, projects for recycling sewerage water are being promoted, and measures for reducing corporate tax and income tax, providing low-interest loans and offering subsidies, etc. to facilities installed by the government and local authorities are being implemented.

Effective Use of Existing Facilities, etc.

- Reconstruction and Renewal of Facilities

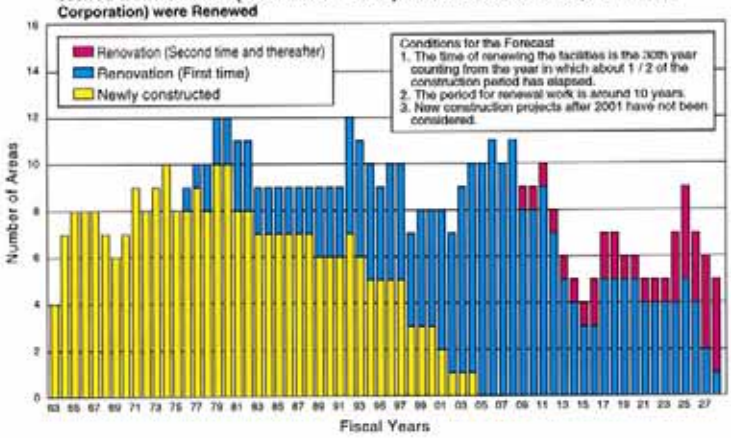
As a result of having promoted the construction of water resources development facilities, the stock of water supply facilities increased, and water supply is more stable than before to support the lives of people and industry. On the other hand , it has come to be important to carry out the timely reconstruction and renewal of existing facilities so as to prevent deterioration and resulting water leaks and ruptures to secure stable water supply.

- Conversion to other Sectors of Water Use

With mutual understanding and consent obtained from the parties involved, water uses have been converted to other sectors in line with changes in the socioeconomic environment in recent years and so on, when intention of the region for the water use is different from the one conceived in the beginning.

In the country's Class A rivers, approximately 64 m³/s of water has been converted from agricultural and industrial uses to domestic use, etc. between 1965 and 2003. This has resulted in the additional intake of approximately 52 m³/s of water for domestic use.

Movements in and Forecast of the Number of Areas in which Water Utilization Facilities, such as Water Channels (Those Constructed by Water Resources Development Public Corporation) were Renewed



- Effective Use of Facilities

Various measures are adopted in order to further enhance the effects of existing facilities and use them more wisely.

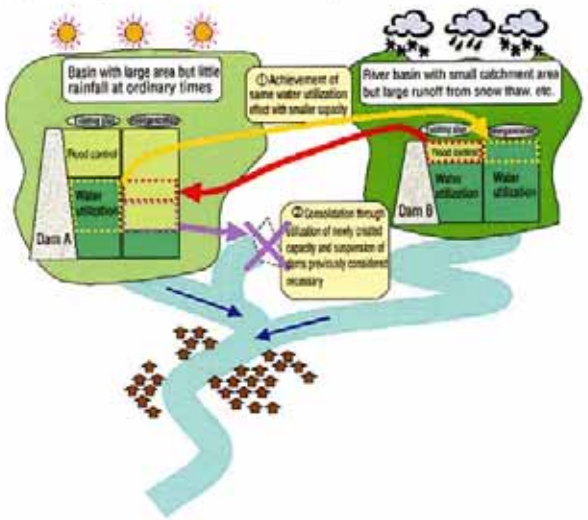
a) Integrated management
The stored water of numerous dams in the same river basin is integrally managed to achieve more effective water supply.

b) Dam redevelopment
The flood control / water utilization functions of dams are increased through raising dams, removing sediment, and so forth, or changing modes of operation by newly constructing water intake / discharge facilities, etc.

c) Projects of linking dams with channels
The capacity of existing dams can be used more effectively by linking dams with channels to store dead discharge in different dams.

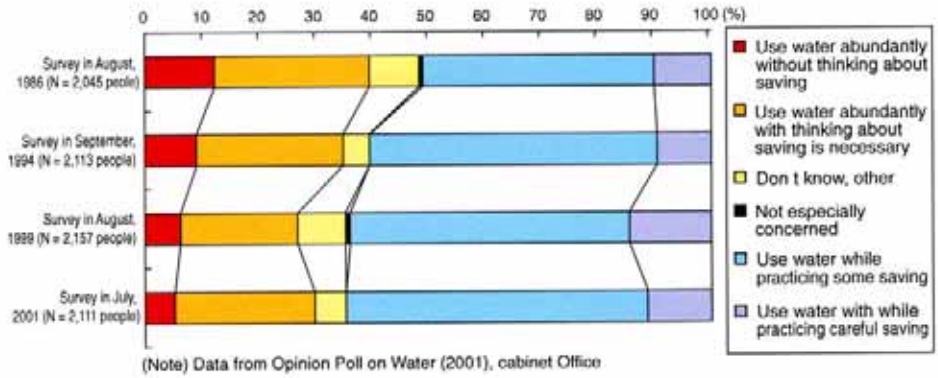
d) Reorganization of dam groups
The effect for flood control and river environment improvement can be improved by redistributing efficiently the storage capacity between a dam high in flood control function and another one high in water utilization functions.

Thinking Behind the Reorganization of Dams



- Water Saving

It is important for individual persons to take interest in the importance of water for the purpose of promoting effective use of water resources. Awareness of water-saving has been deepened in recent years.



(Note) Data from Opinion Poll on Water (2001), cabinet Office

Restoration and Nurturing of Water-Related Culture

- Water Day and Water Week

In order to raise public awareness and deepen understanding of the preciousness of water and the importance of water resources development, August 1 of every year has been declared Water Day, and the week starting from this day has been designated as Water Week. During this time, various events are staged in joint efforts between the government, local authorities and related groups.

Water Week event: Water-related Exhibition

- United Nations' World Water Day

The 47th General Assembly of the United Nations held on December 22, 1992 declared March 22 of every year to be World Water Day. It is proposed that activities of dissemination and enlightenment about development / conservation of water resources and implementation of recommendations under Agenda 21 be carried out on this day. Following this, "Water Resources Study Symposium" is held every year to raise the awareness of people for water.

Water Week event: Regatta in Sumida River

- 100 Selected Water Spots

In order to form a pleasant society and national land of beautiful water and green, it is necessary to reassess distinctive relationships between water and people founded on local features.
107 areas, which have been particularly successful in sustaining and developing local history and life culture based around water and advancing local town development while preserving and making use of water environments, have been designated as 100 Selected Water Spots. These water spots are effective in spreading information on water widely.

City of Water Nurtured by "Uchinuki" Artesian Wells

Saijo City, Ehime Prefecture

Saijo has traditionally been called the City of Water for it's Uchinuki artesian wells dotted all around the city.
Based around these artesian wells, local town development has been advanced in the Aquatopia Project that has seen, among other initiatives, development of a water-friendly park that makes use of local water and historical assets.
Moreover, in order to enhance the beautiful environment of these water-friendly facilities, civic cleaning activities by local citizens are implemented on a continuing basis.

Children drinking Uchinuki water

Uchinuki

Water-friendly park in the Aquatopia Project

* Details of the 100 Selected Water Spots are stated in the homepage of the Water Resources Department.
How to access : From the homepage of MLIT (http://www.mlit.go.jp) select the channel :
"Land / Water Resources- Related" → "Water Resources Department" →"100 Selected Water Spots

Reservoir Area Development Measures

- Reservoir Area Development Measures

Since dam construction often entails submergence of wide areas and consequent loss of not only land and houses but also whole communities, a major impact may be imparted on both residents of submerged land and citizens in surrounding areas.

In order to smoothly advance dam construction works, it is important to alleviate local unease by helping residents of submerged areas restart their lives, mitigating impact on and vitalizing reservoir areas.

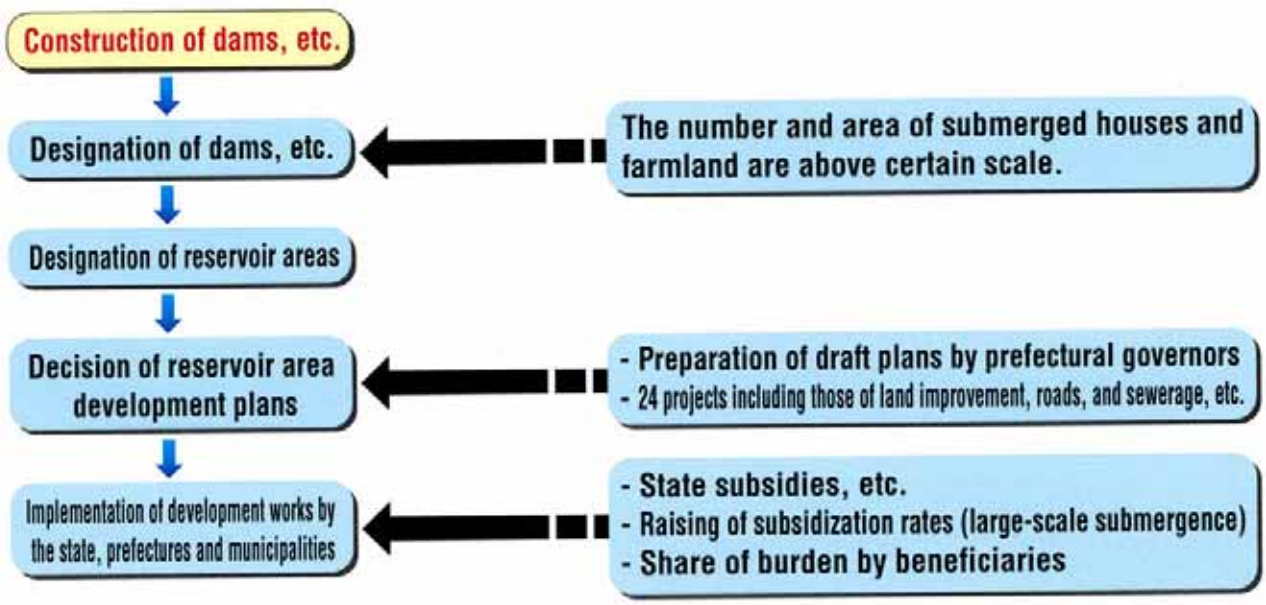
For this purpose, the following measures are adopted in reservoir areas:

1) **Compensation offered by dam owners,**
2) **Measures based on the Special Measures Law for Reservoir Area Development, and**
3) **Lifestyle reconstruction measures based on reservoir area development funds ***

Outline of the Special Measures Law for Reservoir Area Development (enacted in 1973)

Objective

By building the living environment and industrial base, etc. in reservoir areas where basic conditions will be greatly changed by construction of dams, etc., and by preventing pollution of water quality inside dam reservoirs, stabilize the lifestyles and enhance the welfare of affected residents, and thereby promote the construction of dams, etc. and contribute to development of water resources and conservation of national land.



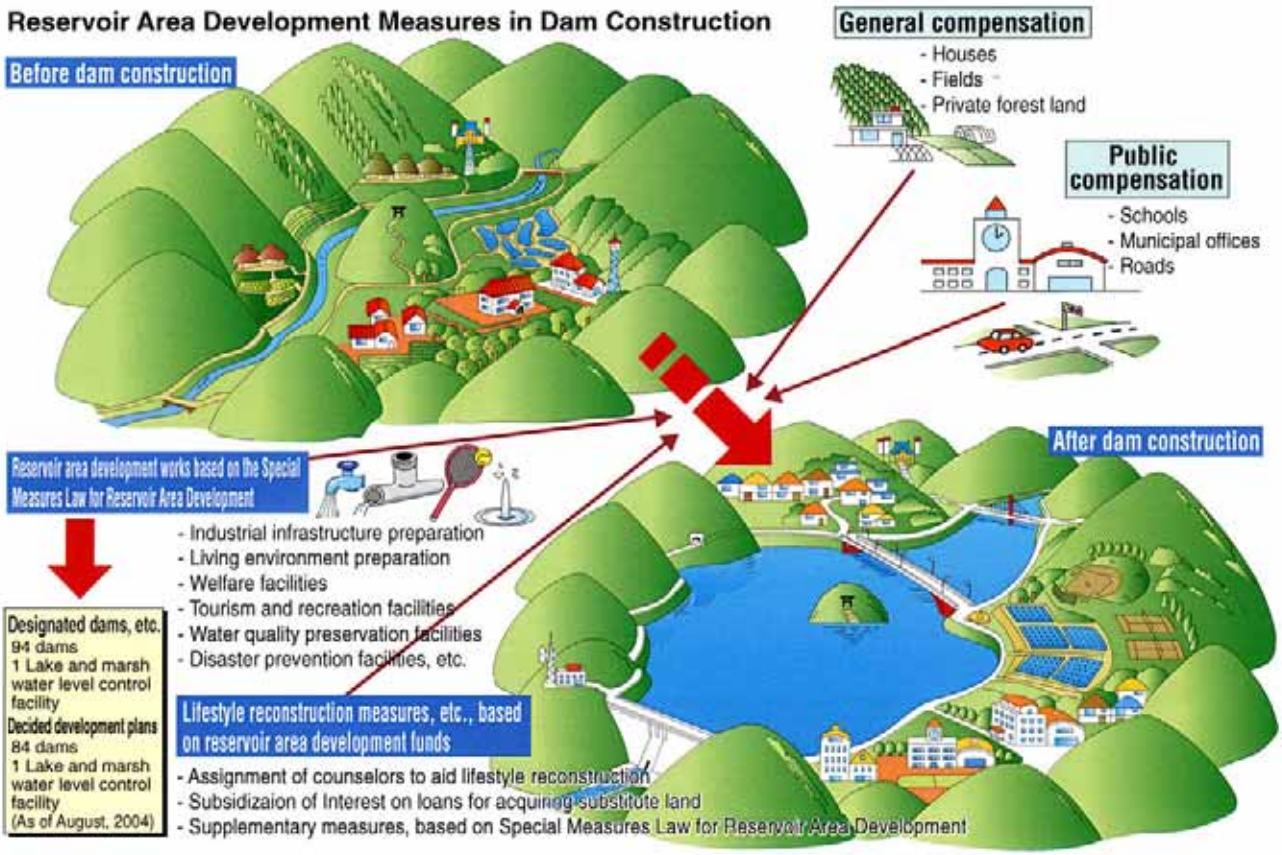
Measures for replenishment of lower income by local tax allocations based on differential levying of the fixed assets tax

Mediation of lifestyle reconstruction measures

Reservoir area revitalization measures

* Reservoir area development fund: This fund, contributed to by related local authorities and so forth in reservoir areas and beneficiary areas, is established in order to vigorously promote lifestyle reconstruction measures and reservoir area promotion measures.

Reservoir Area Development Measures in Dam Construction



- Visions of Reservoir Areas

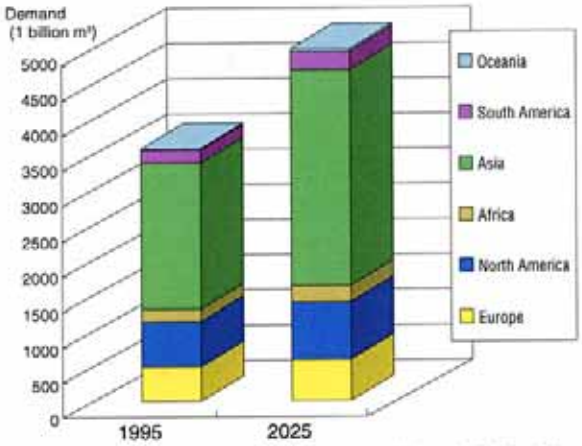
From the viewpoint of building sound hydrological systems, it is necessary for reservoir areas, which are the sources of river basins overall, to be sustained as attractive areas.
"Visions of reservoir areas" are compiled for each dam as action plans for realizing the autonomous and sustained vitalization of reservoir areas assuming dams to be the core facilities of local vitalization.

Responding to International Water Resource Problems

- The Worsening of Global Water Problems

As a result of rapidly increasing population and growing social development, water shortages are arising in many countries. In addition to shortages in the domestic supply of water, various problems such as serious food shortages, adverse impact on ecological systems, water pollution caused by insufficient development of sewage treatment facilities, and increasing flood damages due to the expanding resident population in the inundation-threatened dangerous areas among other problems are occurring. There is great concern that these problems including water shortage will be intensified as the world's population continues to grow in the future.

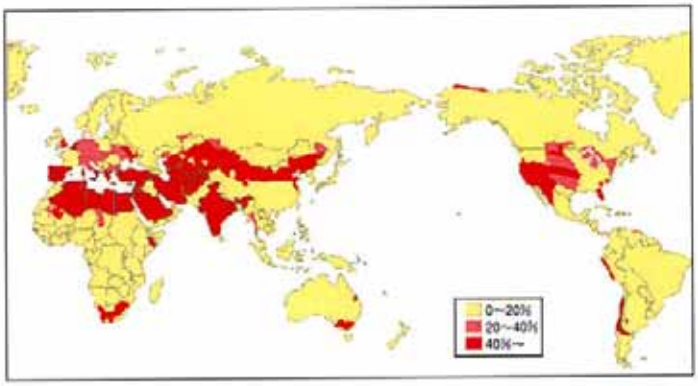
Future Projection of Water Demand in the World



(Note) From the Assessment of Water Resources and Water Availability in the World: Shiklomanov, 1996 (WMO)

State of Water Stress

Water stress means the proportion of the water intake to the inventory of water resources (described in Page 2), and when it exceeds 40%, it is said that a state of high water stress is existing.



(Note) Prepared, based on the data of 2000 from "World Water Development Report" by World Water Assessmen Programme

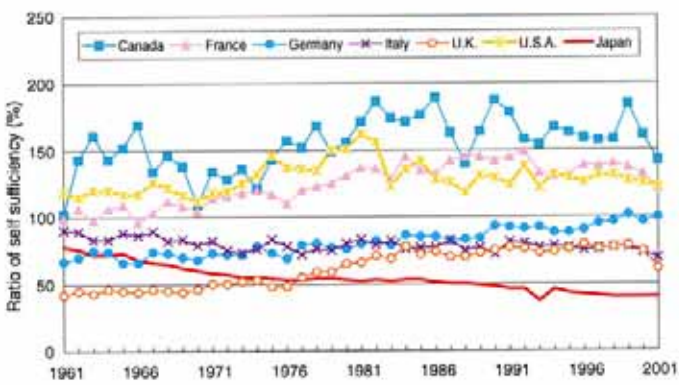
- Major International Issues Concerning Water

In international terms, discussion is currently underway concerning the following issues, regarded as the major problems of water: 1) securing safe drinking water and sanitation facilities, 2) securing water for food production, 3) preservation of river ecosystems, 4) risk management regarding flooding and other disasters 5) efficient utilization and effective distribution of water resources, and so forth.

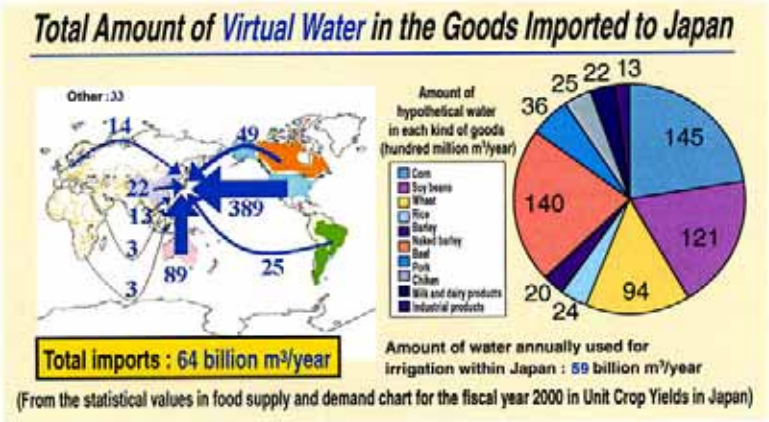
- Japan's Consumption of Water of the World

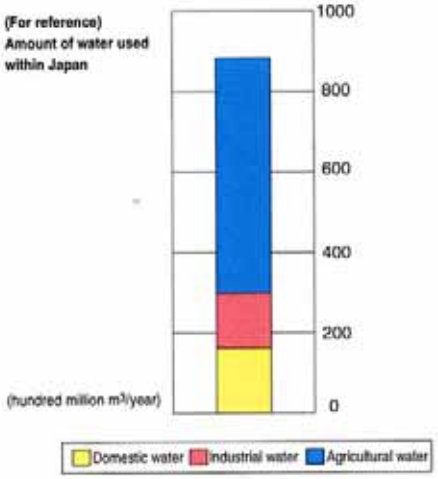
It is estimated that tens of billions of cubic meters of water are used to produce the food that is imported every year to Japan dependent on import for many goods including food. Therefore the increasingly serious world's water problems are of great concern to Japan as well. Japan's experiences and technology in the water sector gained through social development is utilized through numerous technical and financial assistance projects carried out in developing countries. It is necessary for Japan to take an interest in and play an active role in the world's water problems.

Ratio of Food Self Sufficiency in the World (Calorific Value Supply Base)



* Data : Calculated provisionally, based on Food Supply and Demand Chart by the Ministry of Agriculture, Forestry and Fisheries and Food Balance Sheets by FAO.





- The Worsening of Global Water Problems

<International Efforts>

At present, 1.1 billion people in the world cannot have access to safe drinking water, 2.4 billion people do not have adequate sanitary facilities. In the United Nations Millenium Summit of 2000 and Johannesburg Summit of 2002, the target figure was established to reduce the proportion of such people to half by 2015.

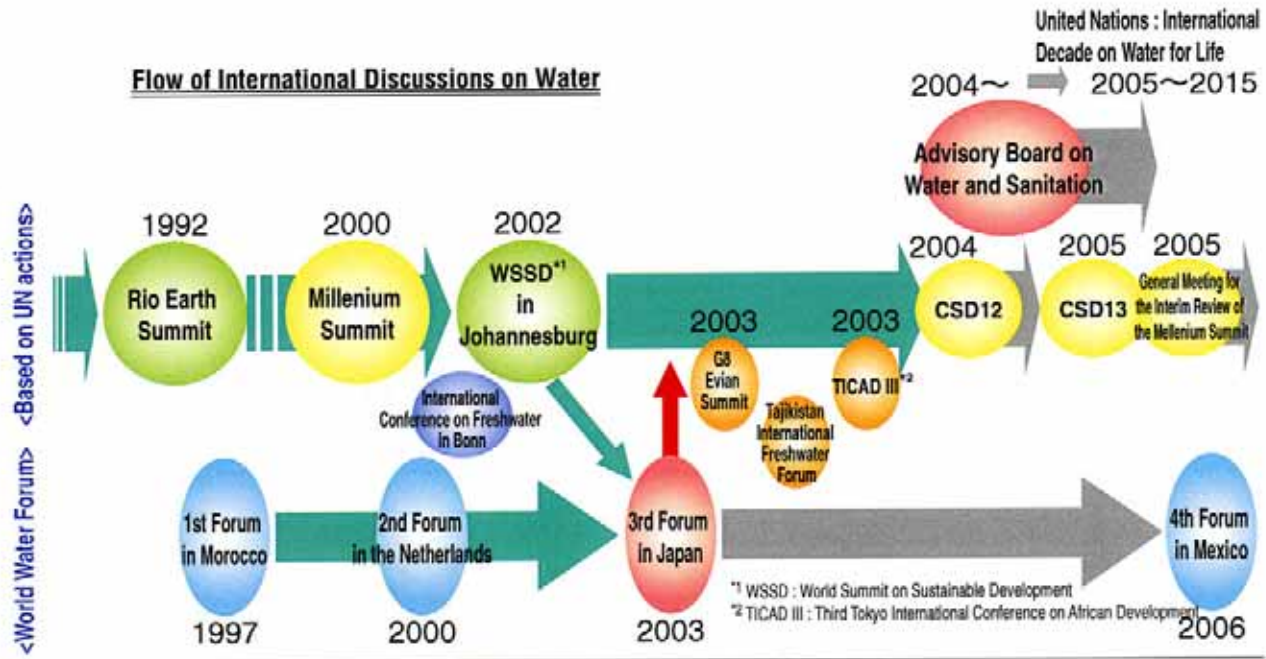
International efforts for solving the water problem were expressly made for the first time in the United Nations Water Conference held at Mar del Plata, Argentina in 1977. Later on, it was decided to proclaim the decade from 1981 to 1990 as the International Drinking Water and Sanitation Decade, while in the Agenda 21 of the United Nations Conference on Environment and Development, held in Rio de Janeiro, Brazil in 1992, it was stated to protect quality and supply of freshwater resources. Moreover, in 1993, in order to follow up the Earth Summit, "Water / Sanitation / Human Living" was established as the main theme for 2004 (12th Session of the United Nations Commission on Sustainable Development : CSD 12) and 2005 (13 th Session of the same commission : CSD 13).

In addition, "Advisory Board on Water and Sanitation" of which establishement was announced by the United Nations Secretary-General Annan on the World Water Day in March, 2004,has started its activities.

Furthermore, in the United Nations General Assembly it was resolved to proclaim the period from 2005 to 2015 as the International Decade on Water for Life.

On the other hand, in order to resolve the world's water problems, it is necessary not only for governments and international agencies but people from a variety of backgrounds to make a concerted effort. For this purpose, the World Water Council (WWC) was established by governments, international agencies, academic representatives, corporations and NGOs as an integrated think tank on water issues in 1996. The World Water Council stages the World Water Forum (WWF) once every three years as a part of its activity.

The First, Second and Third World Water Forum were hosted in Morocco in 1997, in the Netherlands in 2000 and in Japan in 2003 respectively. The Fourth is scheduled to be held in Mexico in 2006.



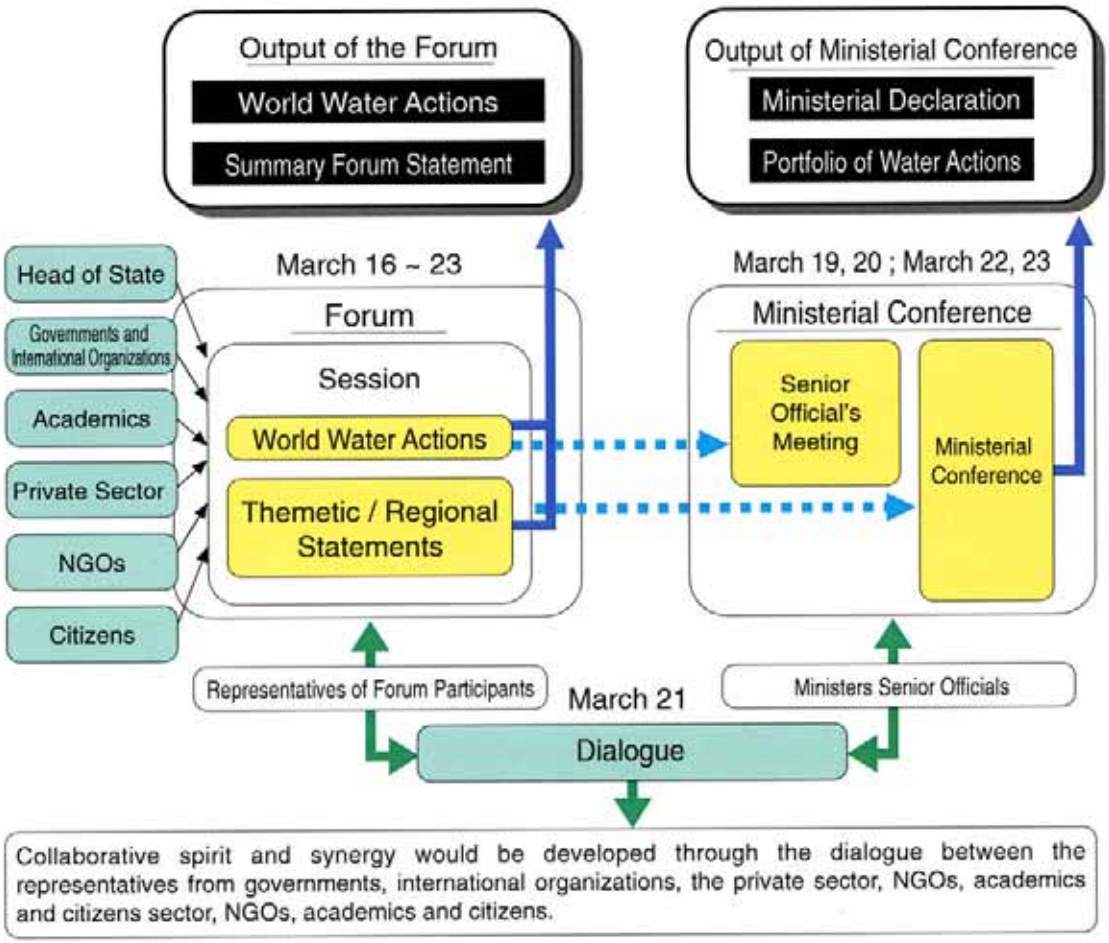
<Third World Water Forum and Ministerial Conference>

The Third World Water Forum was staged in the Lake Biwa and Yodogawa River basin in the Japanese prefectures of Shiga, Kyoto and Osaka in 2003 with participation of over 24,000 people from 183 countries and territories, including those from NGOs.

As a part of this event, the Government of Japan held Ministerial Conference in Kyoto. About 1,300 people from 170 countries / territories and 47 international organizations including about 130 participants of ministerial level attended this conference, which became one of the largest conferences at ministerial level, ever held in Japan.

As the result of Ministerial Conference, a ministerial declaration, advocating every effort for the solution of water issues was adopted, and at this opportunity of such conference, Portfolio of Water Actions (PWA) was announced, which put together 501 voluntary water actions by 43 countries / 18 international organizations.

Interaction between Forum and Ministerial Conference

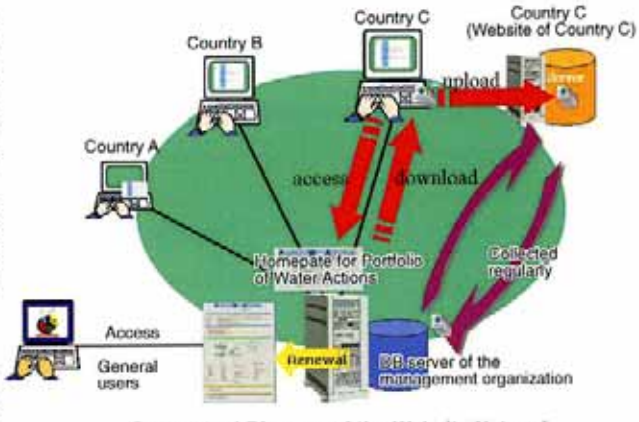


<Follow-up of PWA>

In the Ministerial Declaration, it was agreed to newly establish a website network with a view to steadily implementing PWA. Later on, it was encouraged to make use of PWA on this website network at the G8 Evian Summit held in June 2003 and also at the Tajikistan International Freshwater Forum in September, 2003. At present, MLIT is carrying out website network construction, PR activities and so forth under the cooperation with nations and international organizations.

(See http://www.pwa-web.org for details.)

Water Resources Department intends to reinforce international cooperation for solving world water resources issues, by participating international conferences actively and promoting specific efforts for water actions proposed by Japan.



Conceptual Diagram of the Website Network

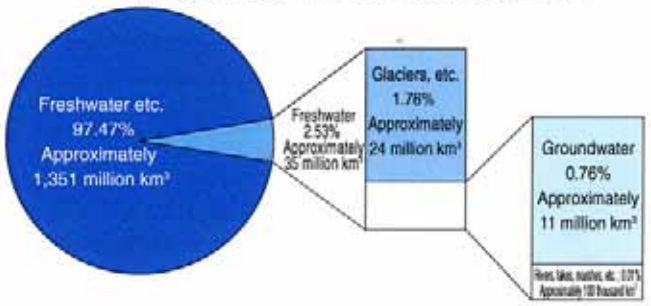
Did It Know? Things of Water Resources!

- Basic Information

1. Freshwater Resources

Amount of water on the earth :
Approximately 1.4 billion km³
- Seawater and so on : 97.5%
  (approximately 1.3 billion km³)
- Freshwater : 2.5%
  (approximately 35 million km³)
  - Glaciers and so on : 1.76%
    (approximately 24 million km³)
  - Groundwater : 0.76%
    (approximately 11 million km³)
  - Rivers / Lakes and marshes : 0.01%
    (approximately 100 thousand km³)

Water Resources on the Earth



(Note) 1. Prepared by MLIT, based on Assessment of Water Resources and Water Availability in the World ; I. A. Shiklomanov, 1996 (issued by WMO)
2. Groundwater on the Antarctic Continent is not included.

2. Precipitation

a) Annual precipitation in Japan is approximately 1,700 mm, roughly two times as much as the world average of about 880 mm.
b) Annual precipitation per capita is approximately 5,100 m³ in Japan, roughly 1 / 4 of the world average of about 19,600 m³.

3. Existing Amount of Water Resources (Amount of Precipitation less Amount of Evaporation / Transpiration

a) a) Amount of precipitation in an average year in Japan is approximately 650 billion m³. After deducting about 230 billion m³ lost in evaporation / transpiration, the existing amount of water resources is roughly 420 billion m³ (65% of precipitation).
b) The existing amount of water resources in Japan in a year of low rainfall occurring about once in 10 years is approximately 280 billion m³.
c) Amount of water resources per capita in Japan (approximately 3,300 m³) is less than half of that in the world (about 7,800 m³).

4. Amount of Water Used

a) Annual amount of water in Japan (amount of water intake) is approximately 16.3 billion m³ for domestic use, 12.9 billion m³ for industrial use, 56.8 billion m³ for agricultural use and 85.9 billion m³ in total.
b) Average amount per capita per day of water for domestic use is approximately 319 liters (132 liters in Asia ; 428 liters in North America ; 280 liters in Europe ; 63 liters in Africa).
c) Annual amount of groundwater is approximately 3.7 billion m3 for domestic use, 3.8 billion m³ for industrial use, 3.3 billion m³ for agricultural use and 10.8 billion m³ in total. (roughly 13% of the whole amount of water used)
d) The total amount of domestic production and import of mineral water increased by 10 times from that in 1990 to approximately 1.5 billion liters (in 2003), its price being about 600 times as high as that of tap water.

5. Amount of Water Resources Development

a) The amount of water resources developed with dam and so forth is 10.6 billion m³ for tap water (approximately 65% of the amount of water used) and 6.1 billion m³ for industrial water (approximately 47% of the amount of water used).
b) The amount of unstable water intake (amount available for taking in only when river water is affluent, because water resources development facilities serving as water sources are not completed) for urban water (domestic water + industrial water) in the metropolitan area (coastal area of Kanto) is 820 million m³, accounting for about 15% of the total amount of water used.

- Crisis-related Information

1. Water Shortage

a) After the water shortage during the Tokyo Olimpics (1964), a large-scale water shortage occurs once in roughly 10 years.
b) Recently the nationwide water shortage in 1994 affected about 16 million people in tap water use, causing damage of roughly 140 billion yen to agriculture.

2. Global Warming

a) The average temperature during the 20th century rose by about 0.6℃ on the entire earth, and by roughly 1.0℃ in Japan. According to IPCC, it is forecast that it will rise by 1.4 ~ 5.8℃ from 1990 to 2100.
b) The amount of precipitation in Japan during the 20 th century is on a decreasing trend in the long term (decrease of around 100 mm over the past 100 years). There is a widening tendency for the difference in precipitation between high and low rainfall years (The precipitation in the years of low rainfall decreased by approximately 200 mm in these 100 years).
c) There is a possibility that there will be many years of extremely low rainfall, amount of snow accumulation will diminish, and snow will thaw earlier.

Ministry of Land, Infrastructure and Transport

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