

Basic Plan for Water Resources Development in the Tone and Ara River Systems

1. Forecasted Water Demand by Application and Supply targets

The forecasted water demand and supply of various regions in Ibaraki, Tochigi, Gunma, Saitama, Chiba and Tokyo Prefectures which depend on the Tone and Ara River systems will be concretized sequentially by the future researches on the two river systems and other concerned. Here, forecasted new water demand by application and supply target between 1970-1985 is generally summarized as follows.

(1) Forecasted new demand by application

The forecasted new demand can be generally summarized as follows, taking into account the available water supplies from the two river systems, reasonable water utilization, groundwater alternatives as countermeasure against land subsidence, the planned renewal of household and other factors.

With regard to the domestic water, the forecasted amount of water needs, which will increase as water supply infrastructure is developed, is about 95 m³ per second in various regions within the basins of the two river systems and some regions out of the two basins in Chiba and Tokyo Prefectures.

With regard to the industrial water, the forecasted amount of water needs, which will increase as industrial water supply infrastructure is developed, is about 50 m³ per second in various regions within the basins of the two river systems and some regions out of the two basins in Chiba and Tokyo Prefectures.

With regard to the agricultural water, the forecasted amount of water needs, which will increase as agricultural infrastructure is developed and other measures for modernization of agriculture are implemented, is about 50 m³ per second in various regions related to the two river systems.

(2) Supply targets

The total amount of supply targets to meet those new water demands is about 195 m³ per second. For that purpose, dams groups in the upstream areas, facilities for lake and marsh water level adjustment, barrages, multi-purpose or solo-purpose canal systems in the middle and down stream areas and other facilities for water resources development and utilization will be constructed. Moreover, rationalization of agricultural water use in the regions where remarkable urbanization has been seen, and rationalization of other water utilization such as

reclaimed use of sewage treated water will be carried out in the middle and down stream areas (snip).

2. Basic Matters concerning Construction of Facilities Necessary to Achieve Supply Targets

In order to achieve the supply targets shown above, the following facilities will be constructed to secure about 160m³ per second in total (As the first supply target, about 150m³ per second in the Tone River System, and about 10m³ per second in the Ara River System will be secured.)

(The Tone River System)

(1) Tonegawa Estuary Barrage

Project purpose: This project aims to maintain normal functions of river water including prevention of salt damage, while at the same time, securing domestic and industrial water for Chiba, Saitama and Tokyo Prefectures, and some of the required amount of water in the agricultural regions of Hokuso-Tobu area in Chiba Prefecture.

Operating body: Water Resources Development Public Corporation (WARDEC)

Name of river: Tone river

Crown height: Y.P. about 2 meters

Construction schedule: From 1964 to 1971

(2) Kusaki Dam construction project

Project purpose: This project aims to control floods and maintain normal functions of river water, while at the same time, securing the required amount of water for the agricultural regions along the Watarase River in Gunma and Tochigi Prefectures, and domestic and industrial water for Gunma, Tochigi, Saitama and Tokyo Prefectures.

In addition, the Kusaki Dam will be also utilized for hydropower generation.

Operating body: WARDEC

With regard to the hydropower generation, WARDEC will be entrusted additionally by Gunma Prefecture.

Name of river: Watarase River (tributary of Tone river)

Volume of new water supply: About 46,000,000 m³

(Effective storage capacity: about 50,500,000 m³)

Construction schedule: From 1965 to 1976

(3) Hokuso-Tobu Canal project

Project purpose: This project aims to secure and supply the required amount of water to the agricultural regions in the Hokuso-Tobu areas in Chiba Prefecture by constructing water intake facilities and canal systems.

Operating body: WARDEC

Name of river: Tone River

Volume of water intake: About 3.7m³ per second

Construction schedule: From 1970 to 1980

(4) Boso Canal construction project

Project purpose: This project aims to supply domestic and industrial water to Chiba Prefecture by constructing new canal systems as well as utilizing the existing Ryoso Canal, while at the same time, securing some of the said water supply by constructing dams (regulating reservoir).

Operating body: WARDEC

Name of river: Tone River

Volume of new water of the Nagara Dam: About 9,600,000m³

(Effective storage capacity: about 9,600,000m³)

Construction schedule: From 1970 to 1979

(5) Omoigawa Development project

Project purpose: This project aims to secure the required amount of water for the agricultural regions in the Tochigi Prefecture including Tochigi central upland fields and municipal water for Tochigi, Tokyo and other Prefectures, while at the same time, controlling floods and maintaining normal functions of river water by constructing the Nanma Dam, water intake facilities and canal systems.

In addition, concrete measures shall be taken based on research concerning adverse effects due to water intake and utilization of the lower reaches of Daiya River and other rivers including intake points.

Operating body: WARDEC

Name of river: Daiya river and Omoigawa river (tributary of Tone river)

Volume of water newly utilized of the Nanma Dam: About 100,000,000m³

(Effective storage capacity: about 140,000,000m³)

Construction schedule: From 1970 to 1983

(6) Kasumigaura Lake Development project

Project purpose: This project aims to control floods around the Kasumigaura Lake in combination with the existing Hitachigawa gate, while at the same time, securing the required amount of water for the agricultural regions including

the Ishioka upland area in Ibaraki Prefecture, and municipal water for Ibaraki, Chiba and Tokyo Prefectures.

In addition, (iii) effects of this project on the fishery will be considered adequately with regard to the implementation.

Operating body: WARDEC
Name of river: Kasumigaura Lake (tributary of Tone river)
Available depth for water utilization: About 1.3 meters
Construction schedule: From 1968 to 1983

(7) Narita Canal project

Project purpose: This project aims to secure and supply the required water to the agricultural regions in the Narita area (Chiba Prefecture), (snip), by constructing water intake facilities and canal systems.

Operating body: WARDEC
Name of river: Tone river
Amount of water intake: About 1.4m³ per second
Construction schedule: From 1971 to 1978

(8) Toso Canal project

Project purpose: This project aims to secure and supply the required amount of water to the agricultural lands in the Toso area, located in the northeast of Chiba Prefecture, and domestic water to the same areas.

Operating body: WARDEC
Name of river: Tone River
Amount of water intake: About 2.2m³ per second
Construction schedule: From 1974 to 1980

(9) Naramata Dam construction project

Project purpose: This project aims to control floods and maintain normal functions of river water, while at the same time, securing municipal water in Gunma Prefecture and other lower reaches.

Operating body: WARDEC
Name of river: Naramata River (tributary of Tone River)
Volume of water newly utilized: About 72,000,000m³
(Effective storage capacity: about 85,000,000m³)
Construction schedule: From 1973 to 1984

(10) Kawaji Dam construction project

Project purpose: This project aims to control floods and maintain normal function of river, while at the same time, securing the required amount of water for the agricultural lands along the Kinu River of Tochigi Prefecture and in the lower

reaches of the Tone River in Chiba Prefecture, and domestic and irrigation water for Tochigi and Chiba Prefectures.

Operation body: Ministry of Construction (MOC)
Name of river: Kinu River (tributary of Tone River)
Volume of water newly utilized: About 71,800,000m³
(Effective storage capacity: about 76,000,000m³)
Construction schedule: From 1968 to 1980

(11) Kitachiba Water Conveyance Canal project

Project purpose: This project aims to drain landside water around the Tega Pond and the Saka river, and to purify the water quality of the Tega Pond, while at the same time, adjusting the flow of the Tone and Edo Rivers, securing municipal water for Chiba, Saitama and Tokyo Prefectures, and conveying water to the Edo River, which is secured by the Tonegawa Estuary Barrage Project and Kasumigaura Lake Development Project. However, municipal water shall be newly conveyed to the Noda Water Conveyance Canal provisionally until the completion of Kitachiba Water Conveyance Canal Project.

Operating body: MOC
Name of river: Tone and Edo Rivers
Maximum amount of water conveyance: About 40m³ per second
Construction schedule: From 1972 to 1983

(12) Watarase Retarding Basin Development Project

Project purpose: This project aims to maintain normal function of river and to secure municipal water by digging the retarding basin, (snip).

Operating body: MOC
Name of river: Watarase River (tributary of Tone River)
Volume of new water supply: About 21,400,000m³
(Effective storage capacity: about 26,400,000m³)
Construction schedule: From 1973 to 1983

Meanwhile, with regard to implementation of this project, another utilization at the retarding basin such as park and other public use shall be considered.

(13) Yanba Dam construction project

Project purpose: This project aims to control floods and secure municipal water for Gunma Prefecture and other lower reaches.

In addition, efforts shall be made to build the consensus among the inhabitants of the submersion area, and plans for their lifestyle stability and long-term growth of the area shall be developed.

Operating body: MOC
Name of river: Azuma River (tributary of Tone River)

Volume of new water supply: About 90,000,000m³
(Effective storage capacity: about 90,000,000m³)

(14) Other projects (Snip)

(The Ara River System)

(15) Takizawa Dam construction Project

Project purpose: This project aims to control floods and to maintain normal functions of river water, while at the same time, securing domestic water for Saitama and Tokyo Prefectures.

Operating body: WARDEC
WARDEC took this project over from MOC.

Name of river: Nakatsu River (tributary of Ara river)

Volume of new water supply: About 49,000,000m³
(Effective storage capacity: about 58,000,000m³)

Construction schedule: From 1969 to 1982

(16) Urayama Dam construction Project

Project purpose: This project aims to control floods and to maintain normal functions of river water, while at the same time, securing municipal water for Saitama and other Prefectures.

Operating body: WARDEC
WARDEC took this project over from MOC.

Name of river: Urayama River (tributary of Ara River)

Volume of water newly utilized: About 38,300,000m³
(Effective storage capacity: about 48,000,000m³)

Construction schedule: From 1972 to 1984

(17) Other projects (Snip)

The assumption of the total project cost for the above (1)-(17) will be about 880 billion yen, including the cost for flood control, maintenance of normal river function and hydropower generation.

In addition to these projects, some part of the facilities of the Tone Canal will be renovated (snip).

(1) Asaka Canal Renovation Project

Project purpose: This project aims to renovate the Asaka Canal, (snip), whose functions have been degraded due to ground settlement around the canal.

Operating body: WARDEC
With regard to a project for conveyance of purification water, WARDEC shall be entrusted additionally by the National Government.

Name of river: Tone and Ara Rivers

Amount of water intake: About 16.6 m³ per second

Construction schedule: From 1976 to 1980

Project cost: About 10 billion Yen

3. Important Matters concerning Comprehensive Development and Streamlined Utilization of Other Water Resources

- (1) In order to achieve the supply targets earlier, measures for contribution to the lifestyle stability and welfare of concerned inhabitants shall be taken proactively by reservoir area development, while at the same time, making efforts to take measures including forestry maintenance in order for watershed conservation.
- (2) The water resources development and utilization of the two river systems have been progressed so far. Therefore, in order to satisfy the water demands in this area, comprehensive measures for water resources development will be promoted mainly in the both river systems, while at the same time, the following measures related to the rationalization of water use will be taken.
 - i) With regard to water uses, measures for water saving including inhibition of wasteful water use, improved recycling rate of discharge and prevention of water leakage shall be promoted.
 - ii) (snip)
 - iii) Adoptions shall be made to the changes in land utilization and industrial structure that have been occurred in recent years by the economic and social development, and existing water shall be effectively and properly utilized. In addition, irrigation water facilities shall be developed to contribute to the agricultural development in the area where urbanization is remarkable, while at the same time, measures for promotion of water use rationalization shall be taken.
- (3) In operating the present projects, consideration shall be given to consistency of various kinds of long-term plans, economic social conditions, and financial conditions.

In comprehensive water resources development and water uses rationalization, preservation of the natural environment including water quality conservation shall be given adequate consideration.

Explanatory material (1) Basic Plan for Water Resources Development in the Tone and Ara River Systems

Table of assumed demand by prefecture and applications of water

	Name of prefectures	Amount of developed water by 1969	Edo & Naka river urgent & provisional water	Forecasted water demand 1965-1980	Total	New water demand generating area	Remarks
		m3/s	m3/s	m3/s	m3/s		
Domestic Water	Ibaraki	-	-	7.3	7.3	Cities near the Kasumigaura Lake, Cities along the Tone River	
	Tochigi	-	-	5.0	5.0	Cities along the Watarase River and the Kinu River	
	Gunma	-	-	5.0	5.0	Cities along the Tone River, Watarase River and Tori River	
	Saitama	1.6	-	20.6	22.2	Broad Area No.1 and No.2	
	Chiba	-	1.5	16.8	18.3	The areas near the capital, Ohtone-Kujukuri area	
	Tokyo	16.6	5.3	40.0	61.9	The 24 Wards and Tama area	
	Kanagawa	-	-	-	-		
	Subtotal	18.2	6.8	94.7	119.7		
Industrial Water	Ibaraki	-	-	17.6	17.6	Kashima, Kasumigaura, Ishioka, Southward of Ibaraki Pref	
	Tochigi	-	-	5.0	5.0	Utsunomiya, Sanaoka, Kanuma, Southward of Tochigi Pref, Oyama	
	Gunma	-	-	4.5	4.5	Maebashi, Takasaki, Isezaki, Tomo, Eastward of Tatebayashi	
	Saitama	1.8	-	6.5	8.3	South, West and North areas of Saitama Pref	
	Chiba	5.0	-	11.3	16.3	Katsunan, Tokatsu, Chiba, Boso coastal areas	
	Tokyo	-	-	5.0	5.0	Johoku	
	Kanagawa	-	-	-	-		
	Subtotal	6.8	-	49.9	56.7		
Irrigation Water	Ibaraki	-	-	27.2 (3.6)	27.2	(Snip)	
	Tochigi	-	-	8.6 (1.6)	8.6	(Snip)	
	Gunma	13.6	-	4.9 (1.2)	18.5	(Snip)	
	Chiba	2.0	-	8.4 (1.3)	10.4	(Snip)	
	Subtotal	15.6	-	49.1 (7.7)	64.7		
Total		40.6	6.8	193.7	241.1		

(Note)

1. Volumes of water for domestic and industrial use are average annual quantity of water intake.

2. Volumes of water for irrigation are average quantity of water intake during the period of irrigation in summer.

However, the figures in parentheses express the average quantity of water intake during the period of irrigation in winter.

Explanatory material (2) Basic Plan for Water Resources Development in the Tone and Ara River Systems

Table of water supply target by respective projects and respective applications of water

Name of Projects	Municipal water			Agricultural water	Total	Concerned Prefectures or areas
	Domestic	Industrial	Total			
(Tone River System)	m3/s	m3/s	m3/s	m3/s	m3/s	
Tonegawa estuary barrage	15.4	4.6	20.0	2.5	22.5	Chiba, Saitama, Tokyo
Kusaki Dam	7.0	1.9	8.9	3.5	12.4	Gunma, Tochigi, Saitama, Tokyo
Hokuso-Tobu Canal	-	-	-	-	-	Chiba
Boso Canal	-	1.8	1.8	-	1.8	Chiba
Omoigawa Development	(TBD)	(TBD)	(TBD)	(TBD)	17.0	Tochigi, Saitama, Chiba, Tokyo
Kasumigaura Lake Development	(TBD)	(TBD)	23.4	16.6	40.0	Ibaraki, Chiba, Tokyo
Narita Canal	-	-	-	-	-	Chiba
Toso Canal	-	-	-	-	-	Chiba
Naramata Dam	(TBD)	(TBD)	(TBD)	(TBD)	8.0	Gunma, other lower reaches
Kawaji Dam	2.6	4.5	7.1	3.5	10.6	Tochigi, Chiba
Kitachiba Water Conveyance Can.	(TBD)	(TBD)	10.0	-	10.0	Chiba, Saitama, Tokyo
Watarase Retarding Basin	2.5	-	2.5	-	2.5	Tochigi, Ibaraki, Saitama, Chiba, Tokyo
Yanba Dam	(TBD)	(TBD)	(TBD)	(TBD)	16.0	Gunma, other lower reaches
Saitama Intake Unification Phase	3.1	-	3.1	-	3.1	Saitama, Tokyo
Other Projects			About 7		About 7	
Total					About 151	
(Ara River System)						
Takizawa Dam	4.6	-	4.6	-	4.6	Saitama, Tokyo
Urayama Dam	(TBD)	(TBD)	3.9	-	3.9	Saitama, Tokyo
Arakawa Regulating Reservoir	(TBD)	(TBD)	3.5	-	3.5	Saitama, Tokyo
Other Projects			About 2	-	About 2	
Total					About 14	
(Others)					About 30	
Total					About 195	