



The History of Agricultural Water and Water Rights

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1. Functions of Water Use in Rural Area

Agricultural water has been demonstrated various functions such as irrigation, which is directly necessary for crop growth, as well as domestic use, protecting ecosystem, fire-fighting and so on. Those uses are in conformity of the order of water use which has been formed through repeated water use as custom and practice and occasional water conflicts.

Water conflicts formed the order of water use and sometimes changed it gradually.



On the basis of the order of water use socially accepted

Domestic Use



Protecting Ecosystems



Amenity, Landscape



Water Quality Control



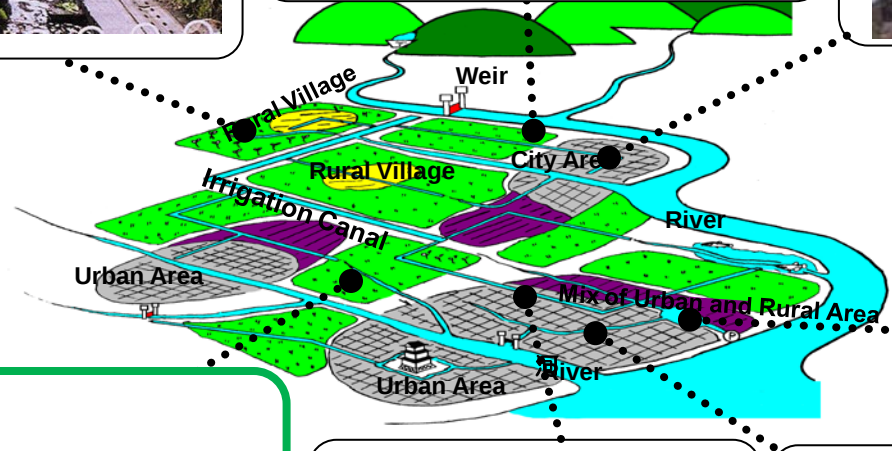
Irrigation



Melting, Clearing and Removing Snow



Fire-fighting



Topics: Water Conflicts on the Takina river (San-noukai Land Improvement District)

The alluvial fan along the Takina river, in the center of Iwate Prefecture, had been reclaimed as paddy fields since recorded history. By the Edo Era, paddy fields reached 822 ha and were irrigated by several weirs. As there was little rainfall compared to cultivated fields, serious water conflicts occurred frequently. Those conflicts were so terrible that some people were killed eventually. At the end of the Meiji Era, the drought and poor harvest made farmers thirst for new water resources.



27 weirs along the Takina river



San-noukai Dam constructed in 1952



People waiting for water running from the Dam

The prefectural governor at the time made trees planted on the dam body, hoping a water conflict would never occur.

As the agriculture of this area developed, The dam was reconstructed to resolve the water shortage happening again. The current area of the San-noukai LID is approx. 3,800ha.



San-noukai Dam constructed in 2001

2. The Purposes of the River Law and Principles of River Administration

(Purposes of the River Law)

Article 1.

The purpose of this Law is to contribute to land conservation and the development of the country, and thereby maintain public security and promote public welfare, by administering rivers comprehensively to prevent occurrence of damage due to floods, high tides, etc., utilize rivers properly, maintain the normal functions of the river water by maintaining and conserving the fluvial environment.

(Principles of River Administration)

Article 2.

A river is public property and its conservation, utilization, and other forms of administration shall be properly performed so as to attain the purposes stated in the preceding article.

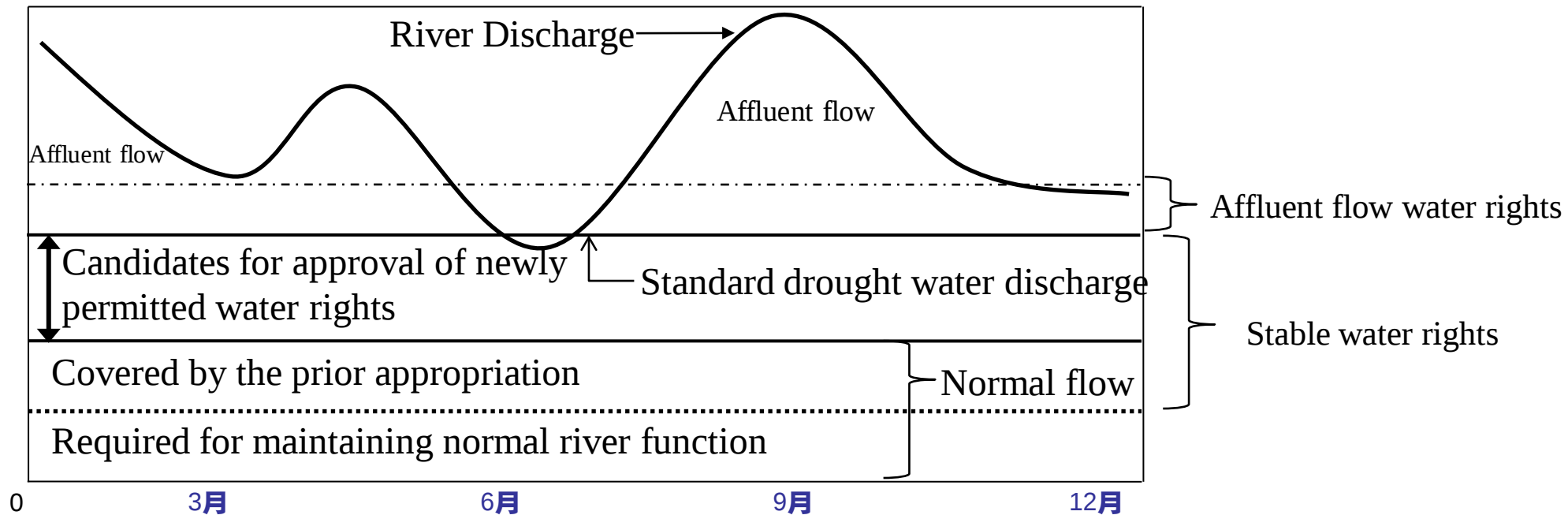
2 The water of a river cannot be made the subject of private rights.

(Permission for River Water Use)

Article 23.

Any person who intends to use the water of a river shall obtain the permission of the river administrator as may be provided for in detail by Ministry of Construction Ordinance

Concept of Water Rights in Japan



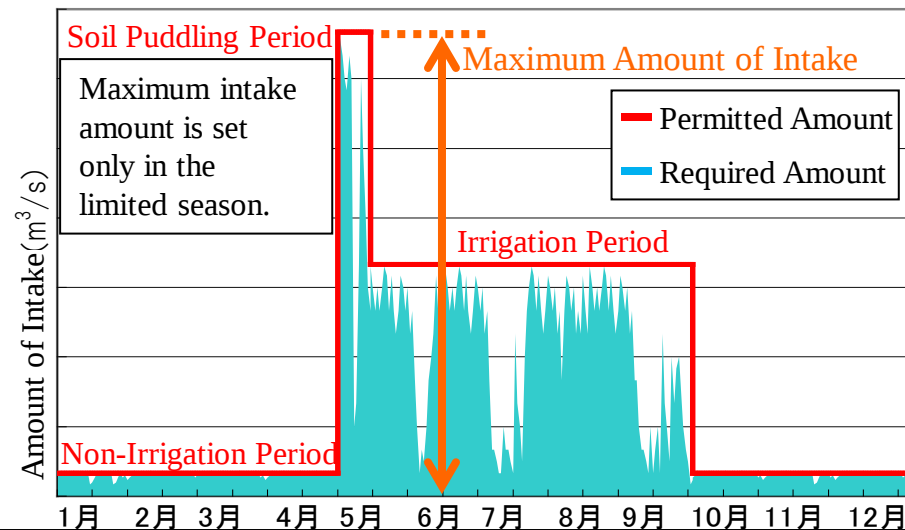
3. Characteristics of permitted Water Rights for Agriculture

To use the water of a river, the permission of the river administrator should be obtained.

Agriculture water rights permitted by the river administrator are determined those purpose as “irrigation” and have each limited intake amount appropriate for each period. Excess intake and water uses for other purposes are prohibited.

Irrigation Use

かんがい水利使用イメージ



Permitted amount varies seasonally.

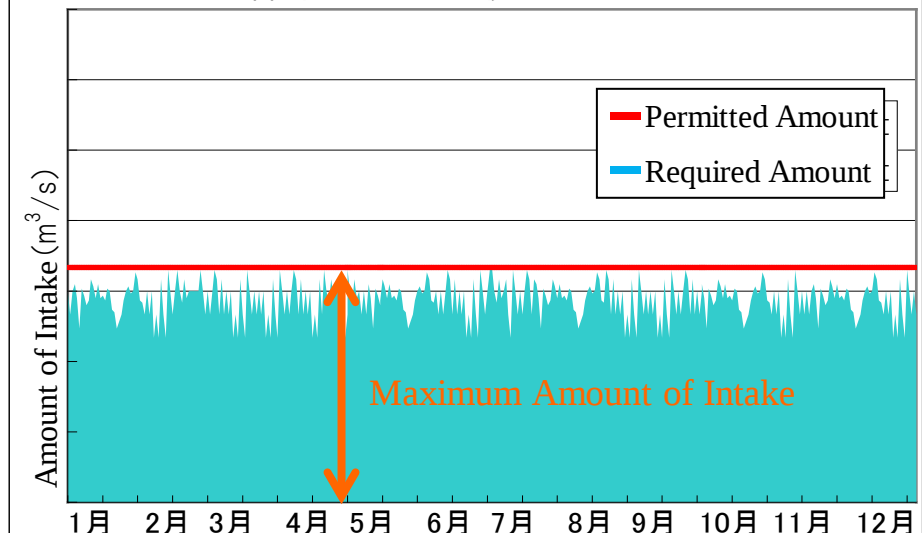
Required amount should be below the permitted and varied according to weather and stages of farming.

Required amount is calculated to satisfy the maximum demand of 10 years return period, which indicates, practically, water use would be below the permitted in the average year.

Bad climate condition such as low or high temperature, lack of sunlight, etc. changes the required water amount.

Municipal Use

都市用水水利使用イメージ



Permitted amount is steady through the year.

Required amount is almost the same level as permitted.

Besides agricultural use, there are domestic use, industrial use and hydro power use. An inland fishery right holder is also one of concerned river users.

Generally, the most amount of intake water is used by hydro power, then irrigation, domestic and industrial to the least. Water used by hydro power is not consumed and shall return to river.

4. Customary Water Rights

Customary Water rights are socially accepted on the basis of custom and practice of water use for a long time by the enactment of the River Law. Those are recognized by the Law and “look upon” as water rights permitted under the Law.

The validity does not expire unless the substances change. The permission should be obtained when some modification of the substances are made. Almost all of customary water rights in large-scale agricultural area over 1,000 ha have already converted into water rights permitted by the river administrator.

Type of Water Rights

Type	Facilities		Amount of Intake		Irrigation Area	
	Number	Ratio (%)	cm/s	Ratio (%)	Thousand ha	Ratio (%)
Permitted	22,964	24.0	5,960.3	49.3	1,606	62.5
<u>Customary</u>	72,721	<u>76.0</u>	6,141.0	<u>50.7</u>	965	<u>37.5</u>
Total	95,685	100.0	12,101.3	100.0	2,570	100.0

A customary water right has (1) ambiguity in those substances, (2) no chance to be assessed properly and periodically, (3) no records of water intake. The river administrator recommends the conversion into a permitted water right on the occasion of reconstruction of facilities. As customary water holders are individuals or small organizations, it is not so easy to get the permissions by preparing formal documents.

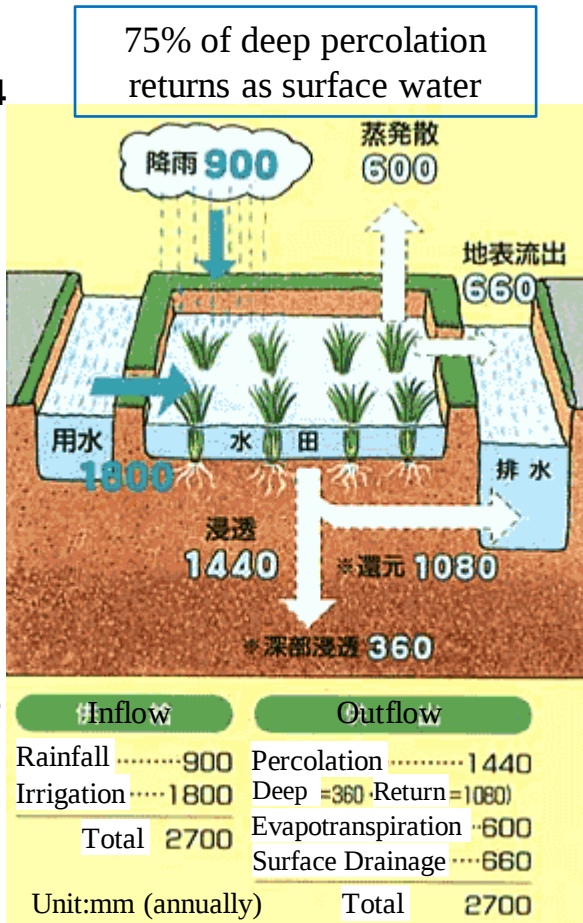
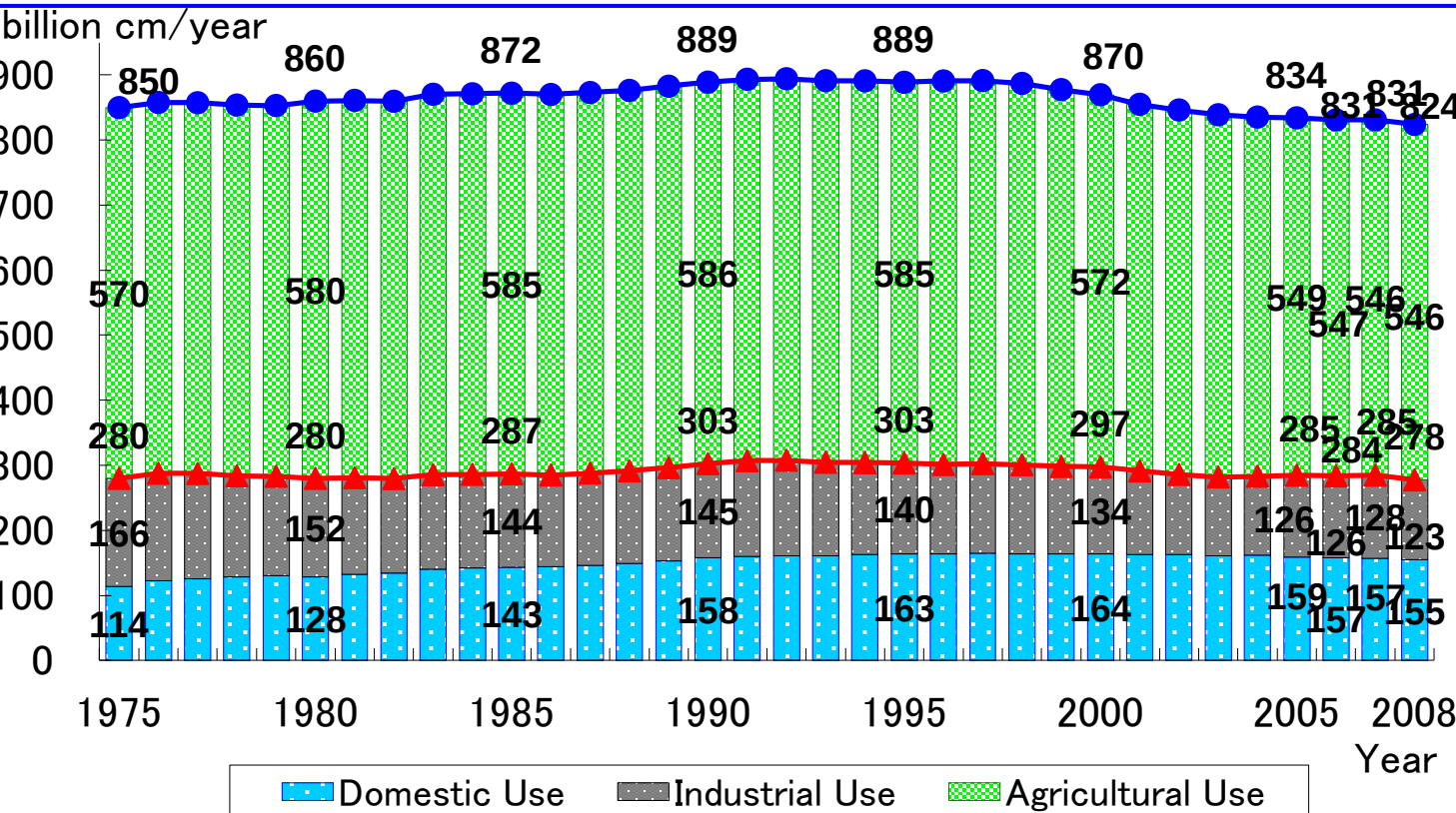
Perceptions toward conversion into permitted water right

The River Administrator	Customary Water Users
Rationalization of water management Reconstruction of facilities makes it possible to measure amount of intake water clearly. While permitted water right holders are clearly defined with water quantity, customary water intake is sometimes defined only by the means of intake.	They are unwillingly to (1) apply for a permit of water use, computing for the applied quantity of water intake. (2) accept 10 years of the validity newly. (3) introduce intake limit of each period in a year. (4) measure intake water daily and report annually.

5. The Characteristics and the Challenges of Agricultural Water

(1) Volume of Water for Agriculture and its Recycle Use

Annual water consumption in Japan is about 81 billion cm. Annual irrigation water use accounts for two thirds of that. Although the cultivated land areas tend to decline, irrigation water use remains on almost the same level as the past. The area of well drained, multi-purpose paddy fields increases, while independent setting of irrigation and drainage canals reduces traditional reuse of water. Extra water to maintain intake level is required to irrigate steady. Almost of agricultural water returns to rivers and underground water, and those are reused downstream.



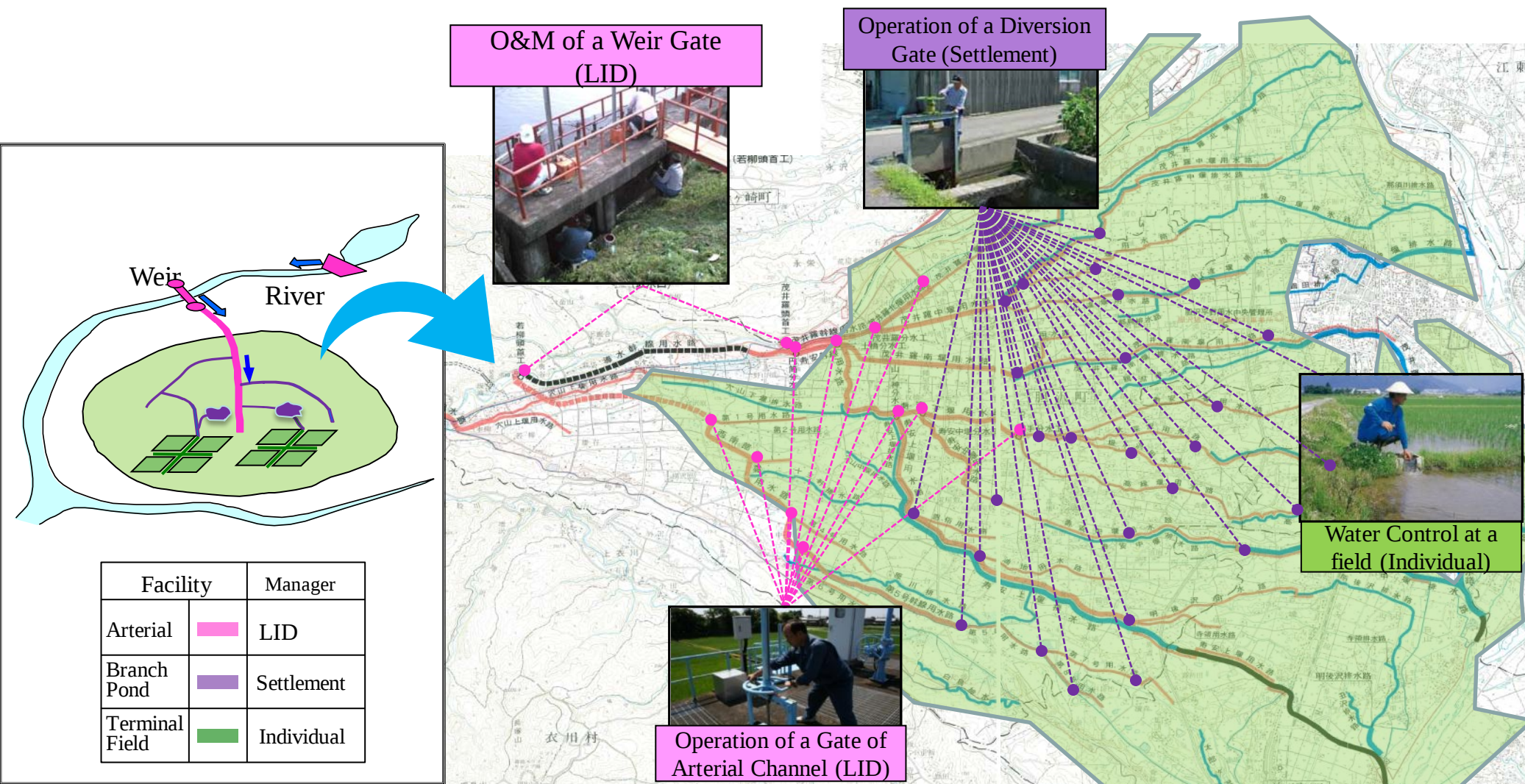
Source: "Water Resources of Japan 2011", MLIT

While the average consumption as domestic use of per person per day is approx. 0.3 cubic meter, agricultural water require 600 cubic meter of per day for a piece of paddy field, considering the area of the paddy field 30 are and the percolation of per day 20mm.

5. (2) Water Use Management mainly by LID (Land Improvement Districts)

After intake from river till distribution to each field, LID, settlement and individuals have been cooperating historically, sharing their own roles, while the river administrator focuses only on river intake.

In recent years, although LID which constructed ponds and weirs calls for water saving, aging farmers prefers labor-saving farming to severe water control such as frequent operation of gates and pumps.

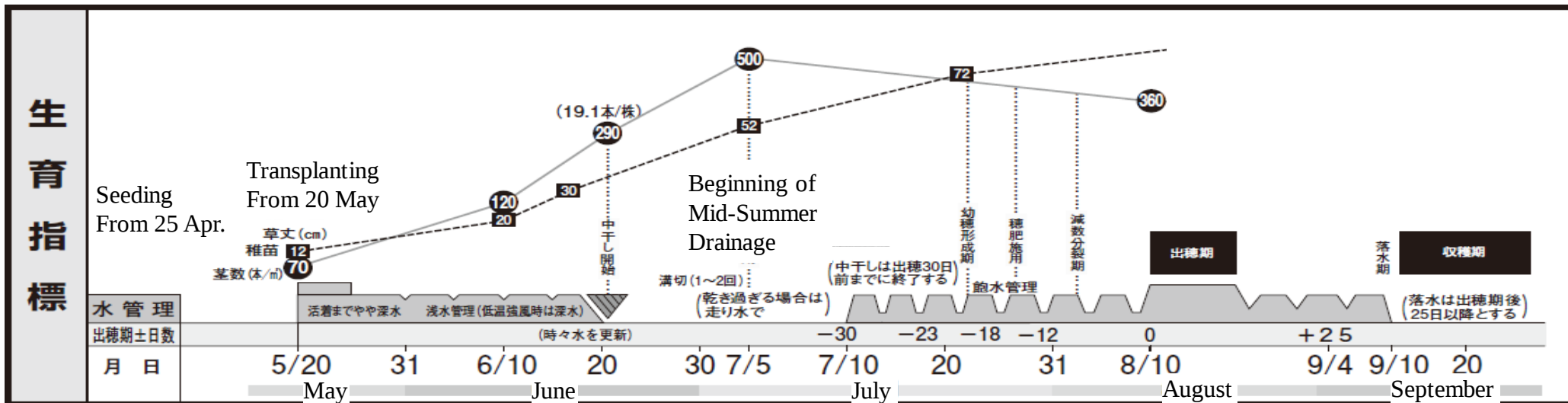


5. (3) Changes of Farming Methods and the influences on Water Demand

Climate change, unseasonably bad weather and market-oriented diversification of rice variety are driving force of agricultural water demand change.

Water is efficiently utilized for late transplanting and surface flooding irrigation to avoid grain damage under high temperatures during ripening of rice .

<A Crop Calendar of rice production and Several Notes on Water Management>



Soil Puddling Period

Part-time farmers puddle only on weekends. On the other hand, as the number of farmers declines, puddling period gets longer. Furthermore, early harvest makes puddling earlier and late transplanting is beneficial to avoid grain damage under high temperature.

Water for Nursery Bed

Domestic water has been used. In these days large-scale farmers use irrigation water.

Mid-Summer Drainage

It stabilizes rice yields. Standing water is drained one month after transplanting and this situation is kept for one to several weeks.

After Mid-Summer Drainage

Required amount of water increases temporally as small cracks in soil are formed.

Dissemination of Direct Seeding and rice for feeding

The commencing time for farming gets earlier or later than the ordinary farming.

Emergence of Rice Ear

Much amount is consumed. Insufficient amount may result in serious damage such as not emerging of rice ear.

High Temperatures during Ripening

Surface flooding and “deep in daytime and dry in night” irrigation avoid damages by high temperature.

Release of water

Early release may brings quality loss which leads to lower pricing.

Blue framed articles describe the recent noted changes and tendencies.

5. (4) Various Effects of Agricultural Water

Agricultural water is used effectively for crop growth as well as maintaining natural flows where sands and garbage are likely to be piled up, removal of injurious insects and prevention from frost damages of new tea leaves.

Maintaining natural a flow



The sands are piled up and water bloom appears in case instream flow is not enough.

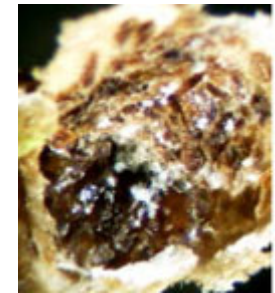


The sands are not piled up as instream flow is steady.

Sprinklers to have eggs of injurious insects damaged



Almost all of eggs went bad and never hatch.



Removal of injurious insects by ponding



Ponding of more than 40 days shall remove injurious insects. This method is almost the same effect as pesticide application and safer and cheaper.

The release of latent heat prevent from frost damage



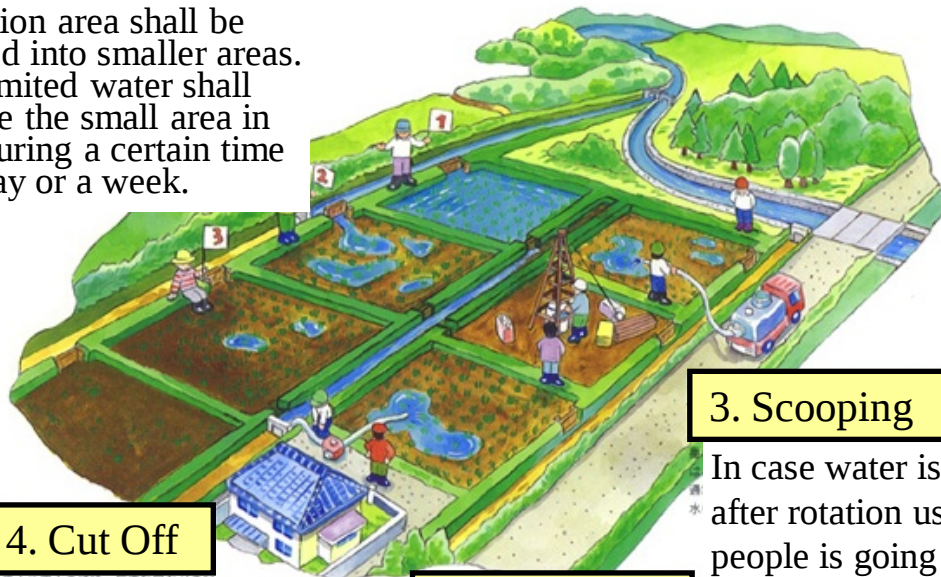
5. (5) Countermeasures against Serious Droughts

Once a drought occurs, water right holders, respecting each other, coordinated and made adjustment with the quantities of water intake. Historically, LID and farmers made every effort to save water and some of the water is to be used for other uses such as drinking water.

Countermeasures to be taken

1. Rotation Use

Irrigation area shall be divided into smaller areas. The limited water shall irrigate the small area in turn during a certain time in a day or a week.



4. Cut Off

As a last resort, water delivery to some paddy fields is to be stopped not to suffer poor harvest in all paddy fields.

2. Reuse

To reuse drainage water by pumping

3. Scooping

In case water is insufficient after rotation use and reuse, people is going to scoop possible water resources such as bottom water of ponds or dams. Sometimes wells are dug temporally and transported by vehicles.

Rotation Use



Reuse

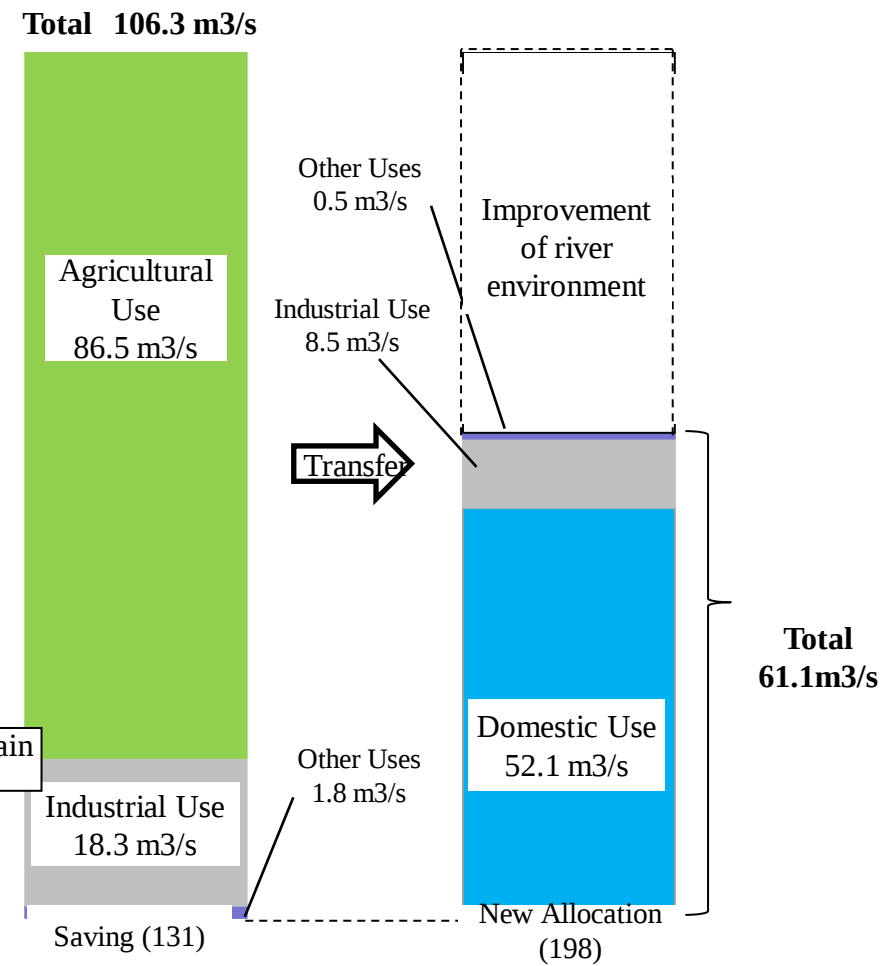
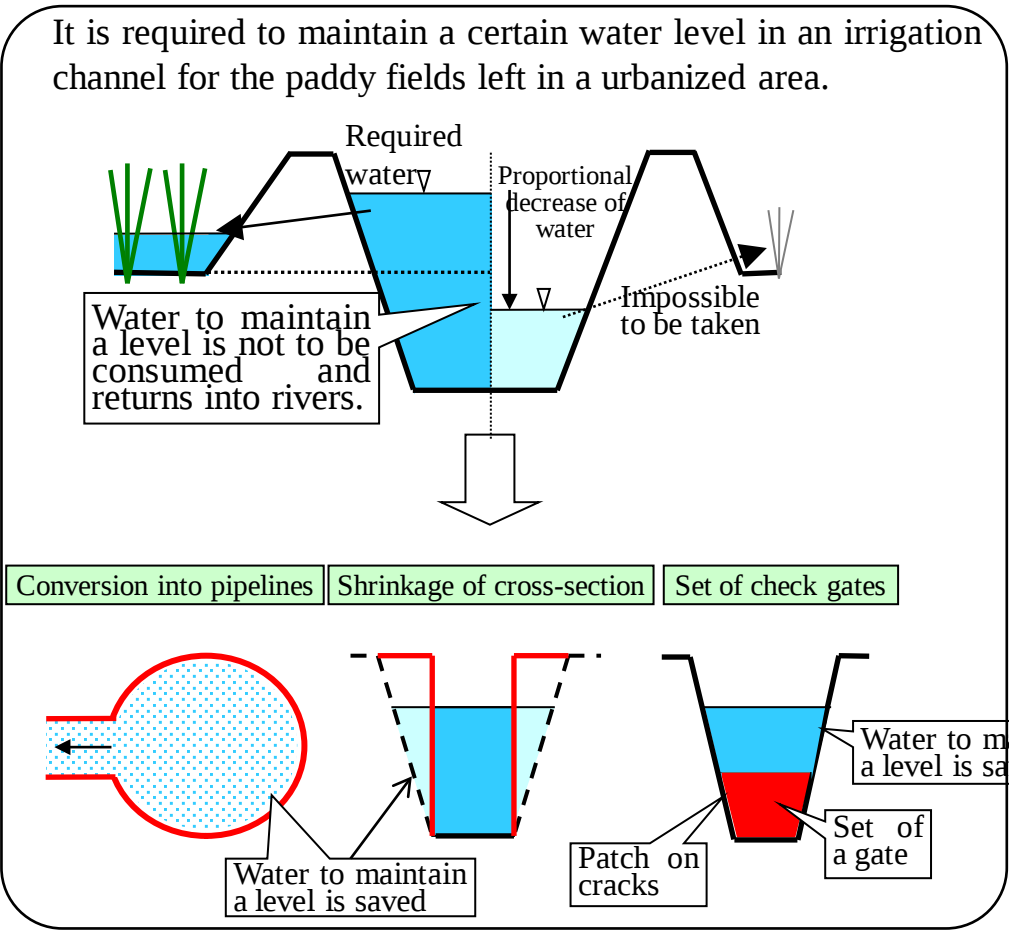


Scooping



5. (6) Rationalization of Agricultural Water and its Reallocation

Irrigation water requirement does not decrease proportionally to decreasing paddy fields. Reconstruction of facilities by Land Improvement Projects made it possible to save water and some of it have been transferred to other water uses. Since 1970 till 2009, rational water uses were realized by transferring from 126 water rights of irrigation to urban uses and industrial uses.



Transfers among different water uses on Class A river since 1970 till 2009