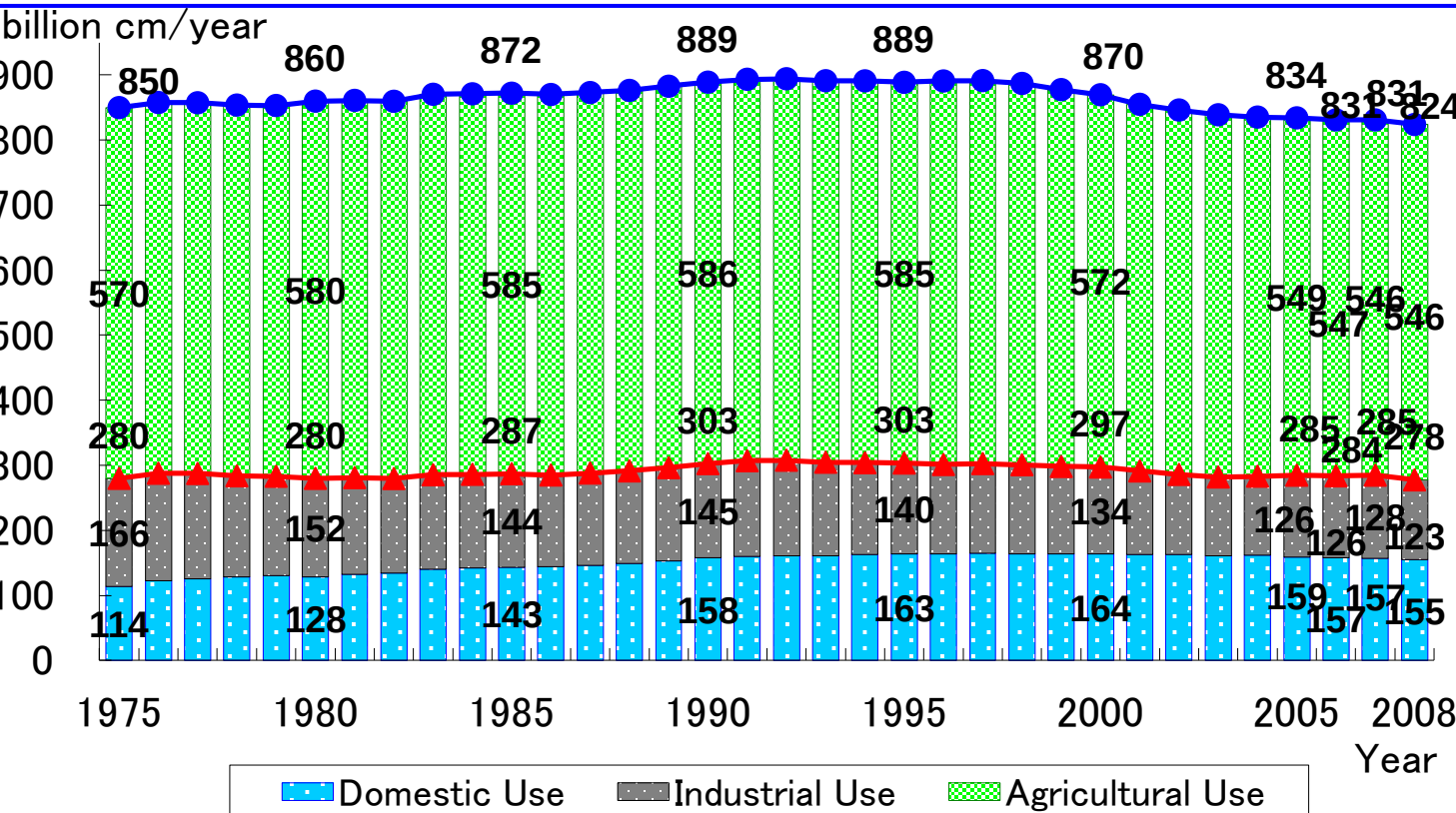


5. The Characteristics and the Challenges of Agricultural Water

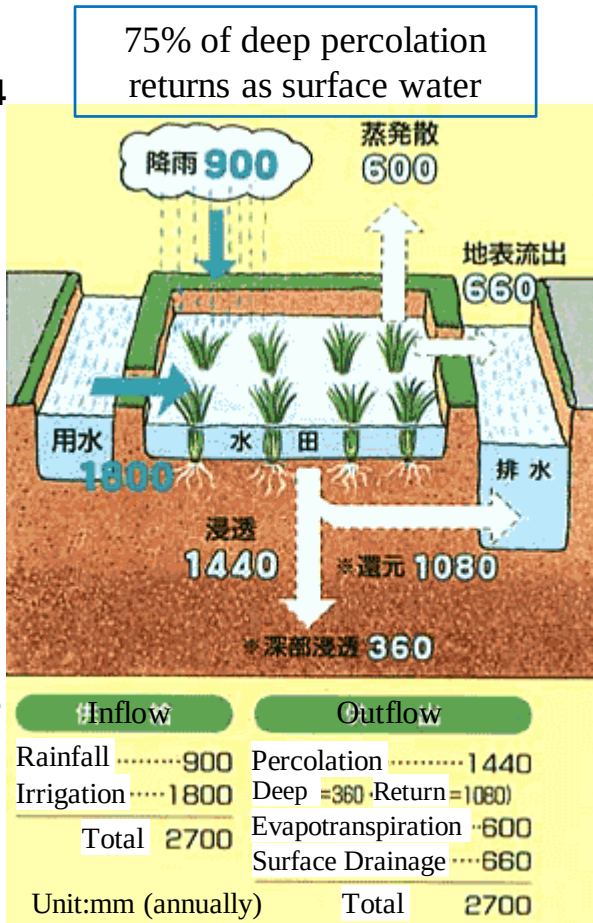
(1) Volume of Water for Agriculture and its Recycle Use

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

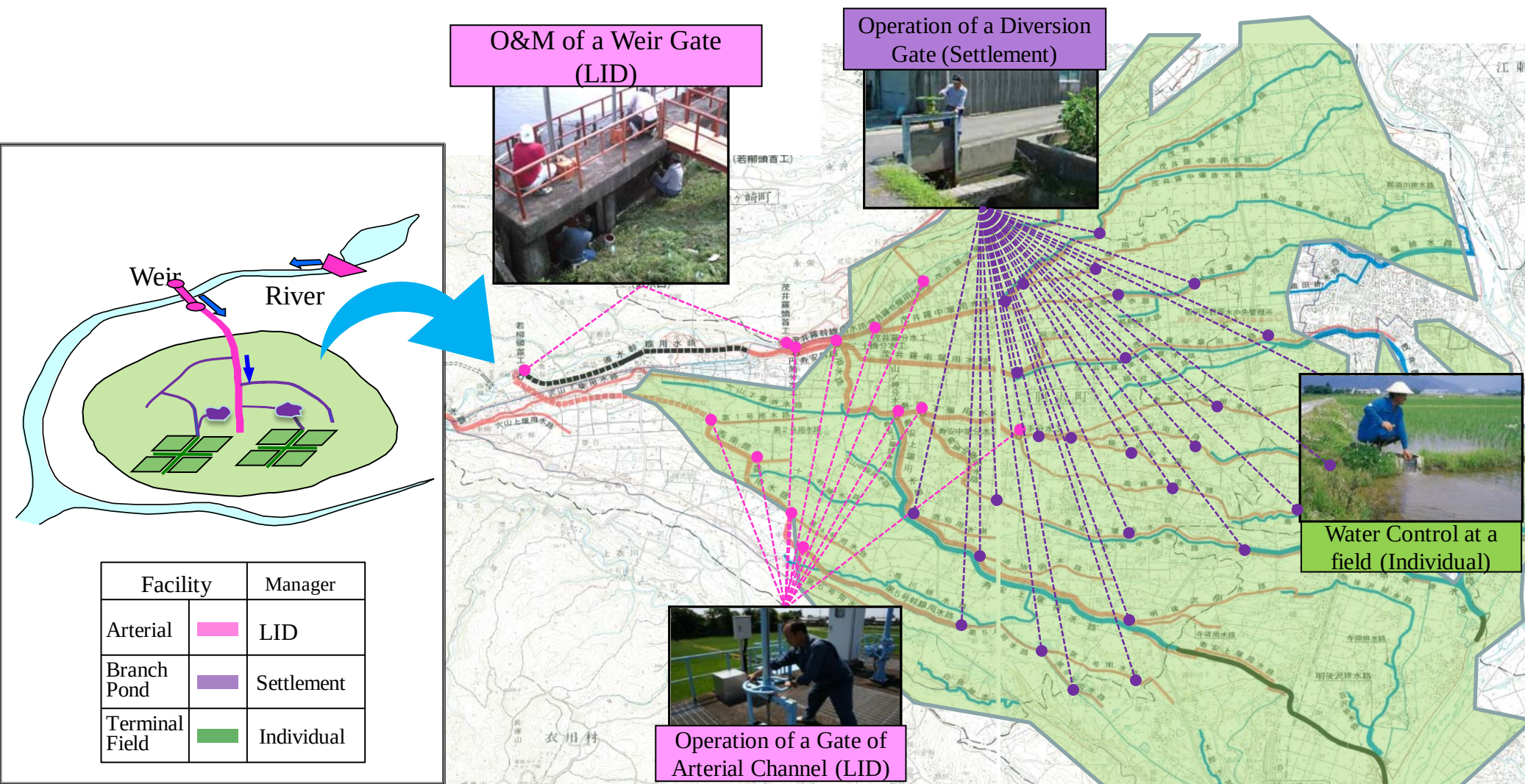
While the average consumption as domestic use of per person per day is approx. 0.3 cubic meter, agricultural water require 600 cubic meter of per day for a piece of paddy field, considering the area of the paddy field 30 are and the percolation of per day 20mm.



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.

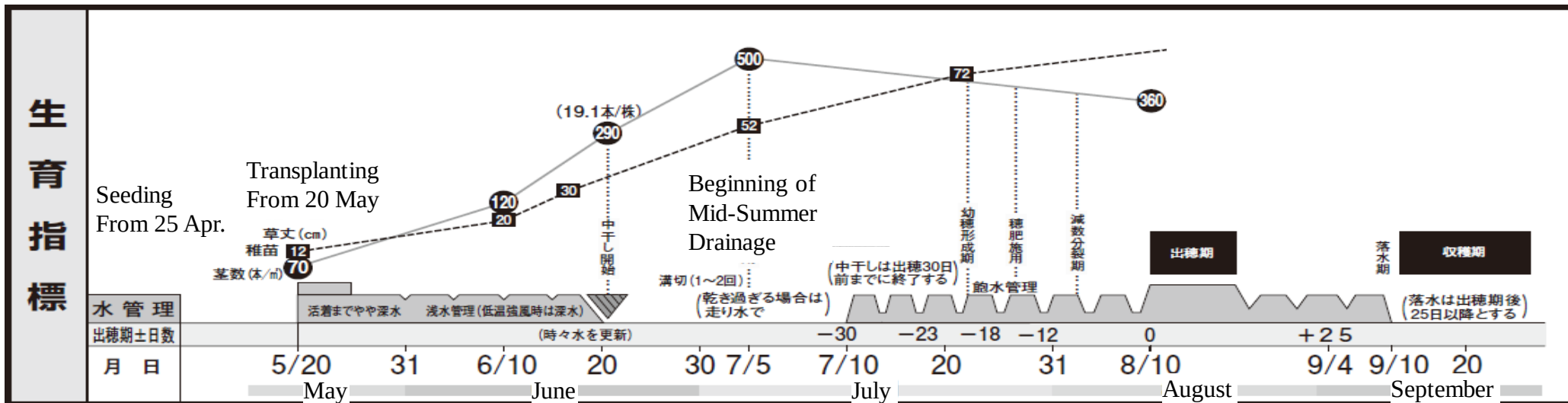


5. (3) Changes of Farming Methods and the influences on Water Demand

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.

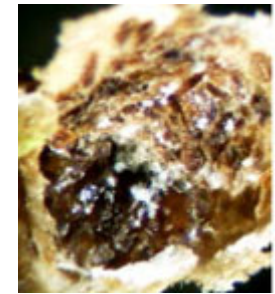


The sands are not piled up as instream flow is steady.

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



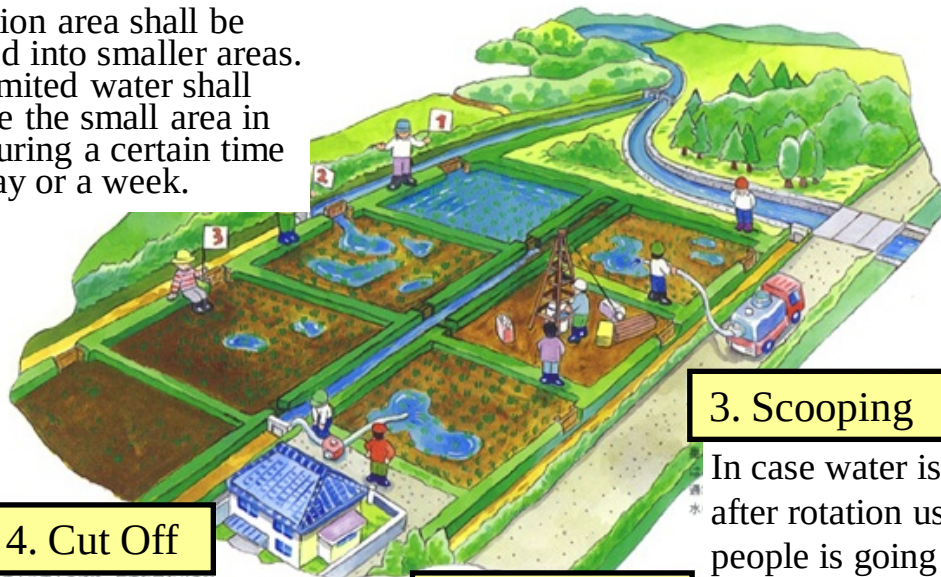
5. (5) Countermeasures against Serious Droughts

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

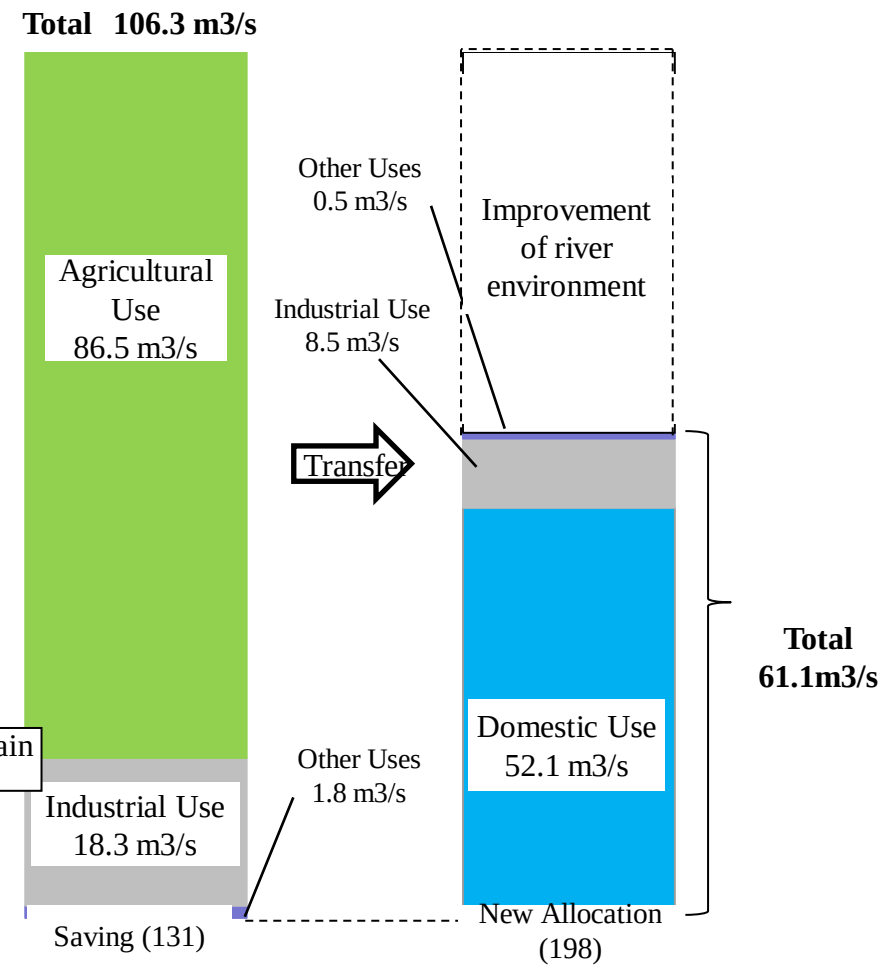
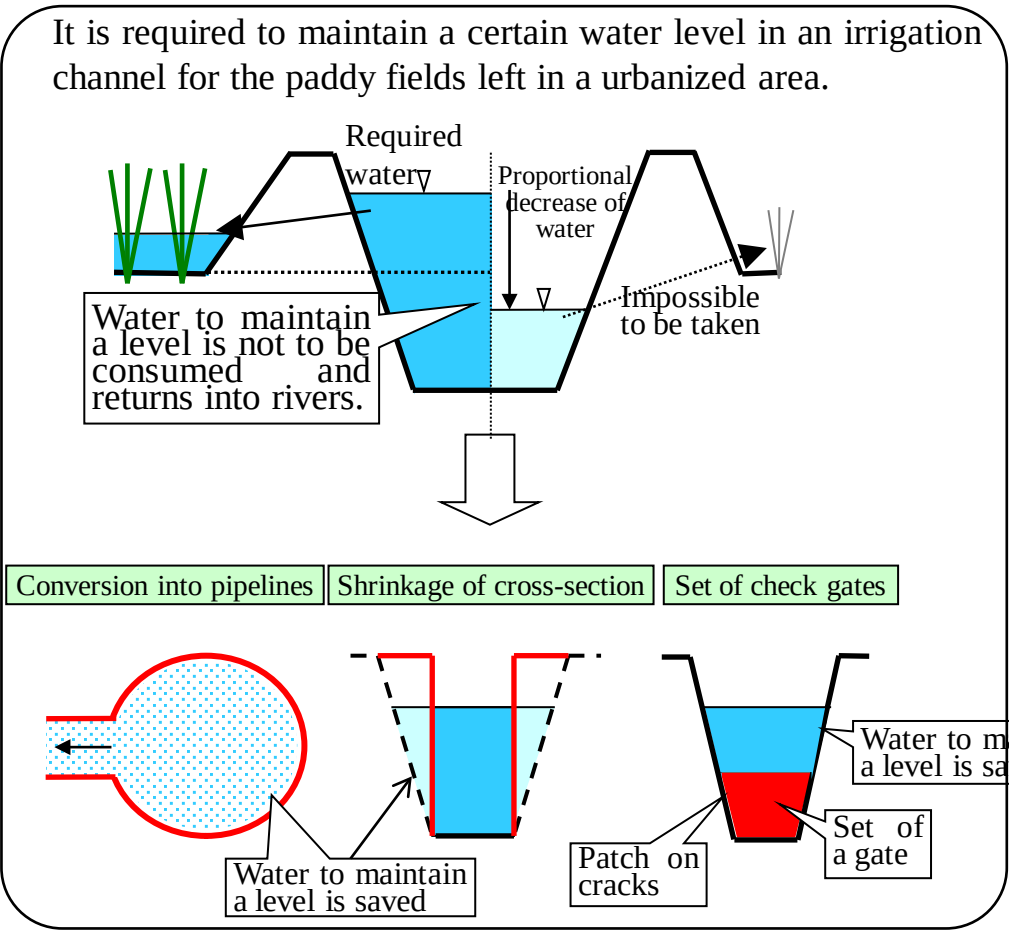


Scooping



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