

Efforts to respond to water quality accidents by regional collaboration with water utilities in the basin area

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INTRODUCTION

The Tone and Arakawa river systems, the main water resources of Japan's capital region, contain 42 water utilities that include the Tokyo Metropolitan Area. These water utilities cooperatively form the Liaison Council for the Water Utilities of the Tone and Arakawa River Systems.

The council has built cross-regional water quality monitoring systems, and has been largely effective in initial responses during water quality accidents and also in preventive measures for such accidents. In addition, through jointly implementing accident response training and technical training, it is also helping to strengthen water quality monitoring systems and improve technical levels at each water utility.

Here we will illustrate these efforts and also the importance of cooperation between the water utilities in the basin area.



Figure 1 Positional relations between the Tone and Arakawa river systems and water utilities in the basin area

The founding of a cross-regional water quality monitoring network

The Tone and Arakawa rivers are main water resources of the Tokyo Metropolitan Area and the neighboring five prefectures, as seen in Figure 1. In the event where such elements as untreatable chemical substances are released into rivers, serious harm is inflicted on urban activities and the lives of citizens.

On January 2nd 1970, cyclohexylamine discharged from an upstream factory of the Tone river system reacted with chlorine resulting in a putrid, onion-like odor in tap water. It affected 1.26 million households in Tokyo (approx. 60% of all households) and also spread to neighboring prefectures which used the same river as a water resource.

In order to respond to this type of unexpected and cross-regional accidents, it was necessary to cooperate with water utilities. In doing so we could meet the demands of regulation reinforcement for building communication systems and preventing water quality accidents.

The "Liaison Council for the Water Utilities of the Tone River System" was set up in January 1970. With the completion of the Arakawa River System Urayama Dam, it was changed to the "Liaison Council for the Water Utilities of the Tone and Arakawa River Systems" in October 1996. It currently cooperates with 42 utilities, and implements the activities shown in Figure 2.

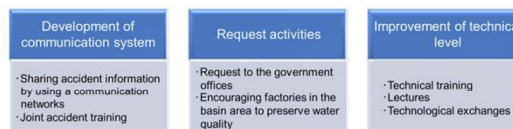


Figure 2 Main activities of the Council

Efforts for improving water quality accident response capability

The following efforts are being carried out for the effective functioning of the council's network and the improvement in capability of each water utility.

【Implementation of joint accident training】

- Participation of all utilities in the council.
- Training for communication between water utilities.
- Field dispatch of water examination vehicles.
- Water examination at main purification plants.

Effective in the prompt grasping of the causative substance's flowing status and in defining the accident's origin.



Figure 3 Implementation of joint accident training

【Implementation of technical training】

- Practical training suited to the needs of water utilities.
- Fundamental water treatment techniques, such as determining the injection ratio of coagulant and powdered activated carbon.
- Highly specialized inspection techniques, such as methods of inspecting algae.

Even for water utilities with a small number of water quality staff, regular training and classes on new technologies can be taken so that improved technological levels and standardization can be aimed for.



Figure 4 Implementation of technical training

【Information sharing on water resource quality risks】

- Around 1,500 agricultural irrigation ponds exist within the basin area.
- Ponds that were made over 100 years ago and which have vulnerable control also exist.
- There are also cases where substances that cause a musty odor (2-MIB) are discharged from irrigation ponds to water resource rivers, inflicting damage on water utilities downstream.
- Understanding irrigation pond distribution maps, discharge destinations and operation conditions.

Utilizing risk management by sharing information in advance.

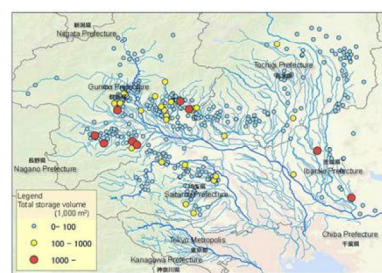


Figure 5 Agricultural irrigation pond distribution map

The results of a cross-regional network

Due to the efforts of the council mentioned above, during a water quality accident in 2012 where an outbreak of formaldehyde occurred in the Tone river system, quick communication was carried out between the council utilities before the water quality standards were exceeded. This ensured measures were able to be taken such as stopping the water intake and water supply at certain purification plants. As a result, the water utilities were able to minimize the damage from formaldehyde, of which has harmful effects on human bodies.

Even though there are limits for single utilities in gathering information and monitoring water resources, with the cooperation of utilities in the basin area results have been achieved that include the early detection of accidents, the quickening of initial responses and the specifying of responsible parties. Furthermore, by conducting request activities in line with the basin area as a whole, we are applying the opinions of water utilities into national measures, such as the strengthening of environmental standards.

The Japan of recent years has not only witnessed the water pollution caused by factory wastewater, but also the increase of such risks as sudden changes in water quality caused by local heavy rain and terrorism. Due to this, it is becoming all the more crucial to increase the response capability for water quality accidents through cross-regional cooperation with water utilities that share the same water resources.

(References)

Report: (2014) Responses to water quality accidents by the Liaison Council for the Water Utilities of the Tone and Arakawa River Systems. M. Ota et al., Tokyo Waterworks Research Presentations.
Documents: River Databook 2016. Ministry of Land, Infrastructure and Transport, Water Management and National Land Conservation Bureau http://www.mlit.go.jp/river/toukei_chousa/kasen_DB_2016.pdf
Irrigation pond. Ministry of Agriculture, Forestry and Fisheries http://www.maff.go.jp/j/nousin/bousai/bousai_sagai/b_tameike/