

Effect of Wholesale Water Quality Monitoring By Citizens and Administration Using a Simple Pack Test Carried Out in 56 Rivers Inflowing into Lake Kasumigaura

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ABSTRACT

Lake Kasumigaura, a representative maritime lagoon lake located in the Kanto basin Japan is prone to easy eutrophication due to high population in the catchment area. The lake water was desalinated four decades ago, and now provides a vital water resource utilized as agricultural irrigation water, industrial water and drinking water for the Ibaraki Prefecture and Tokyo metropolitan area. Recent values in water quality are approximately 7~8mg/l in COD (Mn), 0.1mg/l in total phosphorus, 1.0mg/l in total nitrogen. The water quality improvement is an essential matter not only for national and local government but also for local residents and users.

Ibaraki Prefectural Government has aided with a wholesale water quality monitoring system using a simple pack test annually at about 280 points in 56 inflowing rivers in the autumn season for the last five years. Every autumn, over 300 persons participate in this monitoring exercise, including school children, school teachers, housewives, farmers, and administrative officers. This consists of Council to Resolve Pollution Problems of Lake Kasumigaura staff members, Ministry of Land, Infrastructure & Transport staff members and Kasumigaura Citizens' Association members. In addition, every June, we participate in an all-Japan wholesale water quality monitoring exercise with about 8500 participants at about 5000 points in rivers and lakes. These exercises are good examples of the partnership between citizens and administrations for raising public awareness to familiar water environments and improving the water quality. Through these exercises, residents, especially the young generation have raised their interest in the water environment, as well as further noticed and learned current values of water quality of rivers, lakes, and reservoirs, including the mechanisms of water pollution, aquatic living organisms, ecosystems and the improvement of domestic waste water quality.

Keywords: citizen, administration, partnership, public awareness, water quality

INTRODUCTION

Lake Kasumigaura in Ibaraki Prefecture Japan is a typical wide and shallow lake (max.depth:7m, mean depth:4m, surface area:220km²). Lake Kasumigaura has 2157 km² of catchment area and 56 inflowing rivers. Its water quality has deteriorated over the years due to rapid eutrophication and desalination. Water quality improvement is a most important matter for not only local residents who use lake water as tap water and industrial water but also the local or national government along with the people who live in the Tokyo Metropolitan area.

Water quality monitoring is essential for improvement of the lake water and inflowing river water. In Lake Kasumigaura and the main inflowing rivers, monitoring has been performed periodically for four decades by administration and institutions. However, the number of environmental standard monitoring points and frequency are not enough for the analysis of pollution to include the small rivers and tributaries. The Ibaraki prefectural administration launched a scheme to help the water quality monitoring exercises by citizens and school children six years ago. Water quality monitoring activities

spread over the whole watershed of Lake Kasumigaura and provides numerous valuable data for analysis as well as raising the awareness of local residents including the younger generation to become familiar with the water environment.

METHODS & RESULTS

The water quality monitoring activities by citizen participation has a history of about two decades. In the early days, during summer vacation, several researchers helped the citizens using a simple photometer to measure the water quality of many sampling points for chemical oxygen demand, inorganic nitrogen and phosphorus. They also recorded the water temperature, color, odor, suspended substances, living organisms, dyke conditions, riverbed conditions, the width and depth of rivers, flow speed etc. In this period, the scientific literacy of the local citizens participating was raised and grew eventually to a level high enough to coach other residents.

After the 6th World Lake Conference (1995, Kasumigaura Japan), Ibaraki Prefectural Government evaluated the citizen activities and aided in their

exercises on water quality monitoring. Fortunately, a convenient simple Pack Test was developed simultaneously and used widely by the citizens and school children. This Pack Test is very useful for measuring many items of water quality without the need for expensive instruments.

Therefore, a wholesale water quality monitoring system using the Pack Test has been performed annually at about 280 points including many tributaries in the 56 inflowing rivers in the autumn season over the last five years. Every autumn, over 300 persons participate in this monitoring exercise, including school children, school teachers, housewives, farmers, and administrative officers (Fig. 1, Fig. 2). The exercise consists of a Council to Resolve Pollution Problems of Lake Kasumigaura staff members, Ministry of Land, Infrastructure & Transport staff members and Kasumigaura Citizens' Association (KCA) members. The municipal government recruited the participants from residents, school teachers and children. The valuable data gained are analyzed by the researcher in KCA and delivered officially as an annual report (Fig. 3, Fig. 4, Fig. 5).

Since 2004, we have participated in an all-Japan wholesale water quality monitoring exercise every June with about 8100 participants at about 5400 points in rivers, irrigation channels, lakes and reservoirs. This nation-wide scale water monitoring activity is carried out by an executive committee and supported financially by the Foundation of River & Watershed Environment Management and Ministry of Land, Infrastructure & Transport, Japan.



Figure1: Inflowing river water was collected by citizens, recording water temperature, color, odor, transparency, bottom situation, dyke construction, living organisms and so on.



Figure 2: Both citizens and children cooperated in measuring the water quality of river water using simpl Pack test

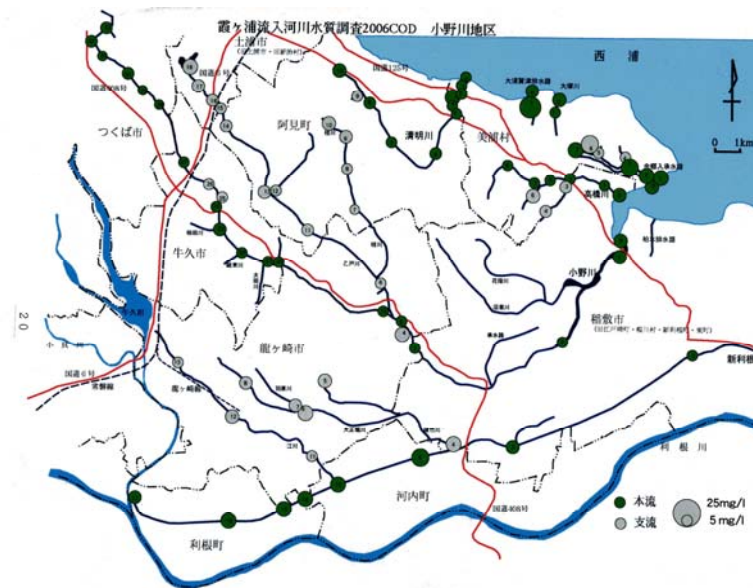


Figure 3: Results of monitoring at many points of inflowing rivers were represented as water quality map. Size of each circle depicted the concentration of chemical oxygen demand. Participated citizens were able to understand the current situation of pollution by this map.

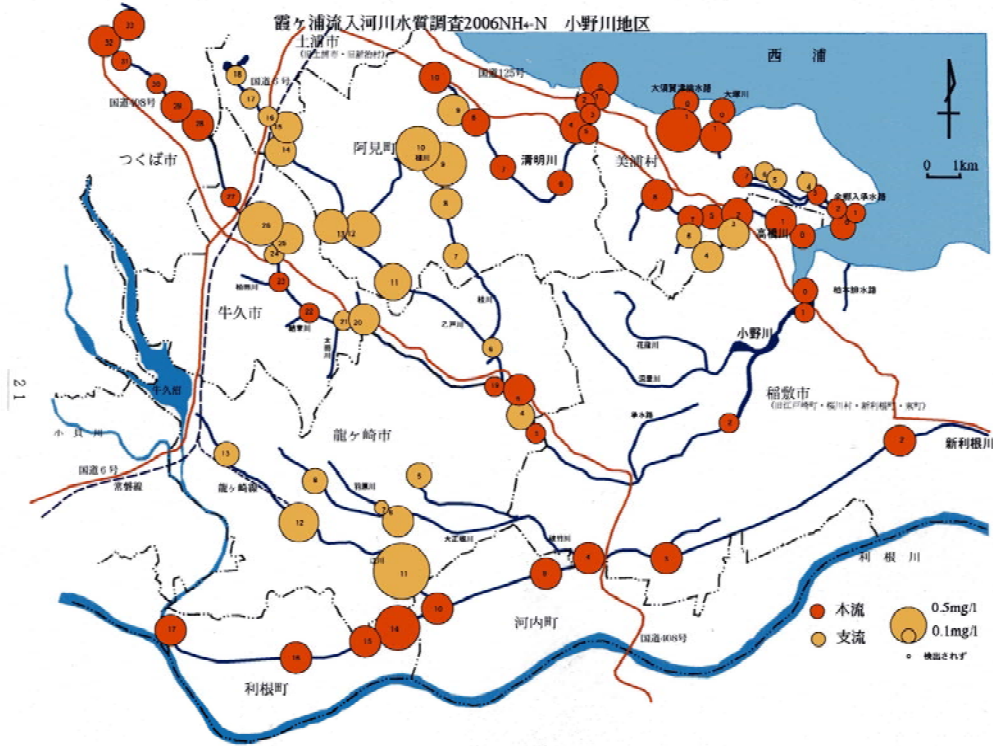


Figure 4 Results of monitoring at many points of inflowing rivers were represented as water quality map. Size of each circle depicted the concentration of ammonia nitrogen.

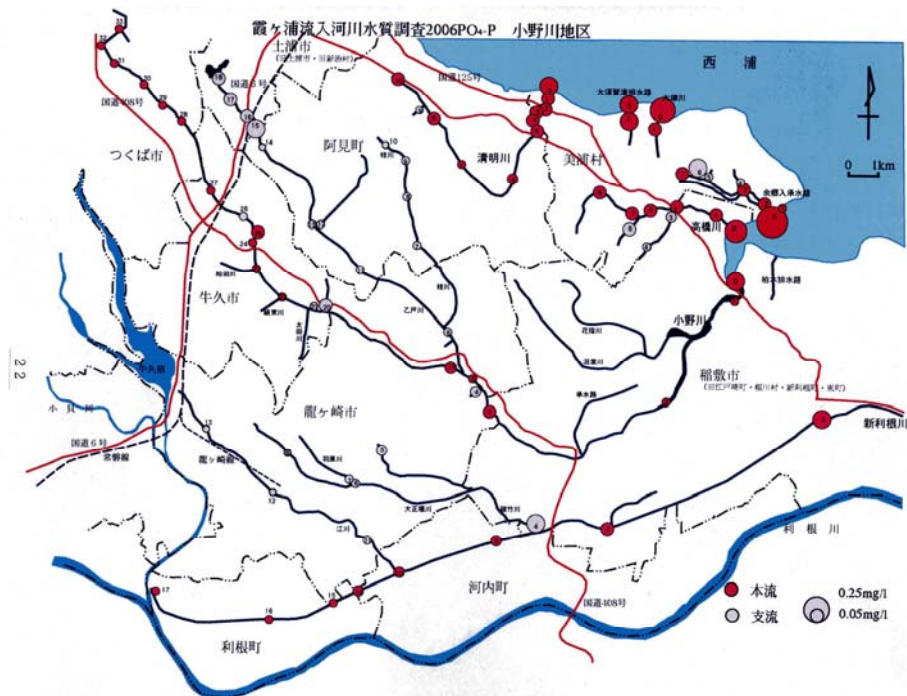


Figure 5: Results of monitoring at many points of inflowing rivers were represented as water quality map. Size of each circle depicted the concentration of phosphate phosphorus.

DISCUSSION

Through such activities, the citizens and younger generation including primary school children, junior and senior high school students have raised their interest in the water environment, learned scientifically about the mechanism of water pollution and ecosystem. Furthermore, housewives, farmers, fishermen, school teachers have become publicly aware under the guidance of administration or association staff. To build a partnership between the residents and administration is one embodiment of the Kasumigaura Declaration at 6th World Lake Conference.

Participants eventually learned to bear in mind the keeping of water quality around our familiar environment. They become aware of the household wastewater quality from their own homes, especially kitchen waste water. For example, many families got into a habit of washing dishes after removing the dirt. They understood that even small amounts of soy sauce, milk, noodle soup, miso (soy bean paste)-soup and cooking oil discharged into the kitchen sink, needed a great amount of clear water for dilution to help recover the fish living-water quality in a river.

As a result, the water quality in some tributaries into inflowing rivers has improved during the last 5 years. We hope such successes will spread to all the inflowing rivers into Lake Kasumigaura and eventually the lake water will regain an adequate quality for fishing, drinking and swimming. For that purpose, we, the residents around Lake Kasumigaura have to continue to mature as Kasumigaura-conscious citizens.

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