

Water Resources in Japan from the Perspective of “Water for the Ocean”

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Introduction

Appropriate allocation of water resources and compatibility between development and water environment conservation are problems that are both old and new. In Japan, many ways have been tried to solve these problems, including research and creation of consensus-building mechanisms. However, in order to clearly highlight the issues involved, an unconventional, large-scaled perspective is now needed.

“Water for the ocean” is one such perspective.

The worsening problems of the coastal environment are sending a wake-up call about the state of water resources on land. Problems in Japan’s coastal areas started during its high-economic growth period, including water pollution, land reclamation and so on; these were problems that could be easily located since the environment was affected dramatically over a short period. Recently, problems have expanded into longer-term, more chronic phenomena, such as ecosystem change, coastal erosion and depletion of fishery resources.

Recently, river management is attracting attention as the cause of these problems. Conventional coastal environmental studies on river management used to focus mainly on reducing the inflow burden and preventing water pollution. But recently, the issue has expanded to encompass the “artificial transformation of water circulation” caused by construction of dams and other river structures together with excessive water intake. Researchers had to start studying the already-changing system without enough baseline data on the dynamics of sediment and nutrient salts being transported in water systems.

For these researchers, deductive approaches, with hypothetical thinking and control experiments, could have been possible if these problems had been predicted. As it turned out, inductive approaches had to be taken by integrating individuals’ knowledge about river basins and coasts in order to understand past phenomena. For this reason, cases of long-term fixed-point observations, including ones conducted by local government fisheries experiment stations, turned out to be very important.

Meanwhile, the largest stakeholder group concerned with coastal environmental problems is people in fisheries. Although river fisheries in Japan have become too minor today to support anyone’s livelihood, sea fisheries constitute an industry employing about 200,000 fishers throughout Japan. For example, in the Ariake Sea coastal area, changes in the ecosystem and natural conditions have been affecting the lives and economy of residents in the coastal area, and this has become a serious social issue with political implications.

Many cases of similar fishing-industry declines caused by decreases in natural resources have been occurring inside and outside Japan, but most cases have not taken on the form of a social issue. This is largely because this process takes many decades, during which, fishers continue to gradually stop fishing or start doing other work. Since fisheries form an industry, compensation issues are involved, and it is realistically difficult for them to disclose their data completely without social implications.

“River management from the perspective of ecosystems and environment” is a concept that can change the stalled situation in the Japanese social system. As discussed later, “water for environmental use” will be more acceptable to society than “water for fishery use,” because environmental water is not water for industry, but is “water for the public.”

Under these circumstances, the research environment in Japan has long required researchers to deliberately verify that “rivers affect the coastal environment,” despite the fact that this is an empirically well-known natural phenomenon. Strangely, in Japanese coastal fisheries, the impacts of water pollution caused by artificially created muddy-water and toxic-water discharge have been clarified, but the impacts of an artificially transformed water cycle caused by dams, weirs and estuary barrages have been put aside as issues too difficult to handle.

In this paper, I will discuss how the “ocean” is conceptualized and why this concept has not been incorporated into the social system, as well as how consensus building and countermeasures have been achieved in individual river basins. I would then like to discuss the future of rebuilding the system for dealing with water issues so that it includes the ocean, which has remained a blank domain.

“Water Resources” Means Freshwater Only

Only supplies of freshwater, which is useful for humans, have been considered as water resources. Freshwater, which can be used for agriculture, industry, drinking and power generation, loses its value if salt is mixed in. Through history, it has been taken for granted in society that freshwater resources should be fully distributed for maintenance of land-based industries and cities, while only “residual water” would be discharged into river channels when there was no further use for it, where it will flow into the sea and “become useless once salt is mixed in.”

So much water has been taken from rivers even while they are flowing across the land’s surface that there is little water left in some rivers. Even though society has witnessed this situation, it has been slow to see the need for improving it. The necessity for freshwater inflow into brackish water and marine areas, which is more invisible, is still not recognized at all inside and outside Japan.

Although it has been known that brackish water environments support many creatures as habitat and breeding grounds, and that they are critical for migratory organisms, such awareness has not led to the further step of directly reviewing human water use on land.

Land-based water resources present clear economic benefits as this water is used to generate hydroelectric power, supply the needs of cities, and produce agricultural and industrial products. Therefore, the necessity for users to pay for it is obvious. The principle of paying costs has created consensus-building opportunities and sophisticated systems, where awareness about water has been raised through regular industrial activities. Correspondence between the size of industries and the amount of necessary water has also been well elaborated.

However, among coastal and estuary fishing industries, the idea that “water resources are necessary for the ocean, too,” has failed to evolve into a concept or system. Especially, the lack of quantification of the amount of water resources needed for fishing constitutes a vital difference from the case of land-based industries. They have not tried to secure water resources as aggressively as land-based people have.

In river water-resource development projects involving dams or dikes, water users bear some of the costs in addition to public outlays by national or local governments. The fishing industry may have received compensation for lost fishing grounds, etc., but it has never considered itself or been considered by others as a sector that can claim an interest in water use. As river development cut down the inflow of water, causing biological disturbance and other changes to natural rhythms, the fishing industry has tended to become fixed into a position of the victimized party, and has never been a party with a positive say in water-resource allocation.

Ways to Promote “Water for the Ocean”

So far, the River Act was amended in 1997 to include environment conservation as one of its purposes, and the Fisheries Basic Act was enacted in 2001. Enactment of the basic law on fisheries was realized 40 years after equivalent laws were enacted for agriculture and forestry. Possible measures for institutionally realizing “water for the ocean” are discussed below.

(1) “Water for environmental use”

In order to maintain the habitats of useful fish and to conserve river ecosystems, ecological approaches have been tried, and concepts of “water for environmental use” have been formed and implemented on an international basis. When reaching agreement in terms of industrial use by the fishery industry proves difficult, a consideration of the conservation of aquatic wildlife habitat becomes more important.

In Japan, too, an awareness of the need to secure minimum flow volumes arose, because dry sections appeared in rivers as early as the beginning of the 20th century and flow depletion dramatically accelerated during the high-economic growth period. The situation was serious enough to bring about an amendment to the River Act in 1964 explicitly specifying the maintenance of flowing water. In the context of dam development projects, amounts set aside as “unspecified volumes” can be effectively allocated to environmental sustainability, which is after all a public use. This can be regarded as Japanese-style “water for environmental use;” it was a hard-won countermeasure under the straitened conditions of an under-developed environmental legal system.

However, environmental water set aside in dam construction will possibly be a counter-productive measure in terms of environmental health, as it may cause major problems, such as disruption of biological and material movements and spatial disconnection. It should not be prematurely included in plans before thorough investigations are made about the propriety of water-resource allocation and the volumes to be increased.

(2) Water rights claims based on indigenous status of fishery people

As stated earlier, water for fishery use needs to be conceptualized pursuant to a review of the conventional water institutions. Indigenous status is a factor of consideration in claims of rights to natural resources. It has been learned from ancient shell mounds, and corroborated by references to coastal fishing activities in the “Gishiwajinden” (a 3rd century Chinese historical record), that people in the Japanese archipelago have harvested water creatures since ancient times.

With the advent of technologies for securing exclusive use of water through the construction of facilities, in contrast to a situation of naturally flowing water, institutional systems for water use became necessary. The fishery industry has no such system even now because fishing can be carried out whenever there is water and so there has been almost no need to claim an exclusive right to water. Measures that can appeal to society aimed at promoting a review of fishery people’s potential rights can be based on detailed research of their historical background.

(3) Environment-conservation type fisheries and the multifaceted functions and public nature of the fishery industry

It is also necessary to explain through easily understandable examples that fishery people are not only recipients of ecosystem services, but that they also contribute to marine environment conservation through environmental monitoring and preventing over-fishing through the system of fishing rights. The multifaceted function and public nature of the fishery industry are important factors in securing water for the ocean as water for environmental use, and for claiming indigenous status.

In addition, since the postwar reconstruction era, national policy on fisheries has mainly focused on deep-sea and offshore fisheries, while coastal fisheries have continued to decline as they compete with industrialization and urbanization.

In the 21st century, a realignment of industrial structures is likely to take place in relation to environment and food supply aspects.

Water rights are renewed once every few decades. If an agreement is reached that the fishery industry should officially take part in the system the next time they are renewed, a change may possibly take place.

(4) Problem solving and systematization in an individual river basin

There are some cases in which a response has been obtained to the maximum extent possible within the limits of the conventional system, even though the relevant social

institutions do not really suffice. When individual cases bring problems to light, they can be incorporated into systems in the form of policies and laws.

Responding in 2001 to poor nori (laver seaweed) harvests in Ariake Bay, and also to poor nori harvests in the Seto Inland Sea, discharges from dams and barrages on the respective Chikugo River in Kyushu and Yoshii River in Okayama Prefecture were carried out as special operations during the nori cultivation season. Similarly, a discharge from an estuary dam on the Yodo River in Osaka Prefecture is being considered in order to improve the habitat environment of Shijimi clams

These are the cases where fishery administration or river-management authorities have accepted the fishery industry's claims, and conduct "flexible operations" in coordination with water for urban, power-generation, industrial and agricultural uses.

These marine areas are characteristically governed by individual sea-based laws, such as the Law Concerning Special Measures for Conservation of the Environment of the Seto Inland Sea (1973) and the Act on Special Measures concerning Rejuvenation of Ariake Sea and Yatsushiro Sea (2002). In these cases, information has been collected, and so consensus among stakeholders and administrative authorities can be relatively promptly formed.

In addition, as nori farmers and Shijimi fishers target non-migratory creatures, their fishing grounds are limited to certain areas. Therefore it is relatively easy to determine the numbers of target creatures and quantitatively monitor their growth. It is also a major merit that data for determining a cause-and-effect relationship with river-water volume can to a certain extent be obtained.

(5) Improvement of legal systems and precautionary measures

The Basic Act on Ocean Policy, enacted in 2007, organized formerly un-integrated ocean policies across disciplines and governing authorities for the first time from a holistic-ocean point of view. Language about taking a precautionary stance toward conservation of the marine environment is included in Article 18, while language dealing with impacts from the land in coastal-zone management is included in Article 25.

Clear numbers and cause-and-effect relationships are required in water-source allocation. However, although quantification and engineering approaches to habitat environments and landscapes incorporating aquatic wildlife are evolving, more investigative studies are still needed to attain the same level of accuracy as in similar data sets for land areas. But we cannot just sit and wait for progress in this field to catch up to reality. What we can do now is to take precautionary measures, which is the approach currently favored in environmental problems or even in medical care, as the goal of our discussion of "water for the ocean."

(6) The public nature of seacoasts and the ocean

If land-based people have to be forced to put up with some inconvenience for the sake of the marine environment, great impetus will be needed to gain consensus.

The sea around Japan is legally a publicly owned water body and the seacoasts are public space under national or local government control as natural public property. The environment itself is also a public commodity, and water is common property. Now that we have learned a great deal more about the coastal environment, we should open a new discussion on the public nature of the ocean.

A widespread understanding needs to be attained that “water for the ocean” will not only benefit the people in fishery businesses, but also will also contribute to the welfare of all people and benefit them through their enjoyment of marine products and waterfront environments. The term “ecosystem service” is widely known and a viewpoint of appreciating the value of creatures other than human beings has been growing. At the same time, fishery people who depend on the coastal environment, its wildlife and natural resources, are also recipients of marine-area environmental services where abundant river water is supplied.

(7) How to think about natural resources in the era of global environment

Regarding global environmental problems, the focus is now on responses to major disasters or adaptation to humanly uncontrollable circumstances. At the same time, the relationship between climate change on land and marine dynamics is becoming clarified. As present trends progress, a social system assuming a limited range of fluctuation, as in the case of land-based legal systems, will no longer be sufficient.

In this regard, we need to review the very methodology of managing things by simply excluding hard-to-handle factors, like the ocean factor in terms of the water-resource regime. Learning to incorporate a factor as dynamic as the ocean into the water-resource system will be a good exercise or test in the era of global environment.,

In some water-resource issues that include conflicts over dam construction or environment deterioration, directions that cannot be recommended from a scientific and technological point of view seem to be the ones selected as a result of priority being given to human sentiment and circumstances. “The right answer” can fluctuate depending on social context. The scientific literacy and ability of decision-makers to make decent, viable judgments are put to the test, and the consequences are very serious and important.

For Japanese water-resource issues, “water for the ocean” is a challenge to the existing system, which has formed as a complex of scientific technologies and social circumstances. What are required for science are not only observation methods, data accumulation and technology development, but also improvement of the judgment and consensus-formation skills of the whole society with respect to how the results will affect nature and the society.

Recent State

On March 11, 2011, a magnitude eight earthquake occurred on the floor of the Pacific Ocean, east of Japan’s Tohoku (“northeast”) district. A terrifying tsunami attacked its coast; more than 10,000 people lost their lives and nearly 10,000 more are still missing.

Japan sunk deeply in sorrow due to the losses sustained in this disaster, and all of us are battling the fear that similar-scale earthquakes and tsunamis will happen again during our lifetimes.

This situation has clarified the need to substantially overhaul the way our country is being run, which has been very focused on land-based activities.

Many people are now considering the philosophical side of the question of how humankind is to conduct its relationship with the sea – in both its bountiful and fearsome aspects.

When Japan left its feudal society behind and entered the modern era, its economic system took shape centered squarely on rice cultivation. Wetlands were filled in to expand the area under wet-rice agriculture. As modernization progressed, even more coastal areas were filled in to provide land for industrial, urban and residential development.

We are now being forced to take a good, hard look at how our insatiable greed led us to advance too far into territory strongly subject to the external forces of the sea.

For the first time in 400 years, we are being called on to re-design our land- and water-management structures that have been focused on land. Studies will be renewed concerning the border zone between land and sea, which was defenseless and destroyed in the disaster. Of particular importance will be securing “buffer zones.”

This paper looks at how the basic approaches of Japan’s water-management systems have been biased towards on-land activities.

Should the future bring climate change, sea-level rise, etc., events similar to the earthquake/tsunami disaster Japan is now experiencing might arise in other parts of the world.

Prevention measures are of course vital, but in the course of preparing for and setting up such measures, knowledge of Japan’s present difficulties could be a great help. I would particularly like to appeal for the re-examination of social systems in view of their relationship with the sea.

FIGURES

Figure 1. Aerial photograph of Rikuzen Takada, Iwate prefecture, Japan, after the earthquake and tsunami disasters (Japan Geographic Survey).

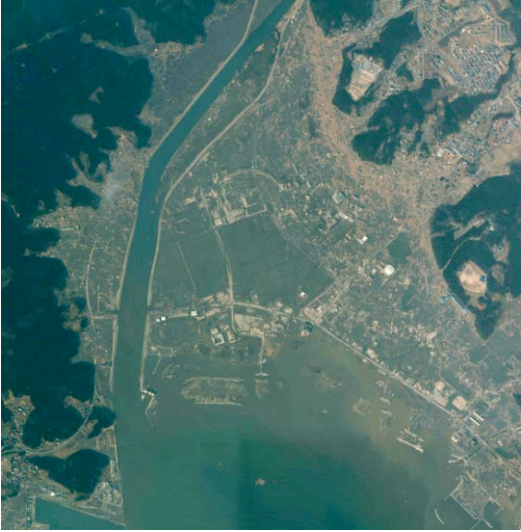


Figure 2. Broken coastal dikes and facilities (June 6, 2011).



Figure 3. The residential and rural areas along the lower reaches of the river were washed out by the tsunami (June 6, 2011).



Figure 4. The residential areas were washed out by tsunami and still subsided (June 6, 2011).

