

# From the Great East Japan Earthquake and Tsunami to the Sendai Framework for Disaster Risk Reduction and River Basin Resilience and Sustainability by All

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## 1. The Road to River Basin Disaster Resilience and Sustainability by All

“River basin disaster resilience and sustainability by all” means “sustainable flood control measures carried out by all stakeholders in an entire river basin.” This is not a new concept, but rather, the traditional thinking on countermeasures for flood disasters in Japan, and it has been shared internationally as a philosophy of disaster risk prevention and mitigation.



Photo-1 Condition of disaster damage in the East Japan tsunami (2011)

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| <ol style="list-style-type: none"><li>1. Understanding of disaster risk;</li><li>2. Strengthening of disaster risk governance that controls disaster risk;</li><li>3. Investment in disaster risk reduction for resilience;</li><li>4. Improvement of readiness for effective disaster response, and “build back better” in the recovery and reconstruction process</li></ol> |
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Table-1 Four priority fields of the Sendai Framework for Disaster Risk Reduction (2015)



Photo-2 Condition of inundation in the Kinu River Flood (2015)

The Great East Japan Earthquake and Tsunami (**Photo-1**) occurred on March 11, 2011. The total number of dead and missing persons exceeded 22 000, and more than 90 % of the dead drowned as a result of being caught up in the tsunami. This was the largest human casualty due to a water-related disaster since 1959.

Although the Sanriku coastline where the tsunami occurred was protected by breakwaters and seawalls, the external force of the tsunami exceeded their capacity. Were there no lives that could have been saved in spite of this? This regret was shared by everyone in Japan, and in response, the Law Concerning the Creation of Tsunami Disaster Prevention Areas was enacted in 2011. The basic stance is “to aim to mitigate disasters by a total mobilization of hardware and software measures based on the concept of protecting human life by all possible means, assuming a large-scale disaster exceeding expectations.” The law also notes that “disaster mitigation means reducing damage as far as possible while continuing to protect human life,” and adopts the concept of “continuing efforts for disaster prevention and mitigation.”

This concept was shared internationally through the Third United Nations World Conference on Disaster Risk Prevention, which was held in Sendai, Japan in March 2015, and is the “Sendai Framework for Disaster Risk Reduction 2015-2030.” Japan shared its experiences, and the world’s countries recognized that the primary responsibility for disaster prevention resides in each country, and the participation and cooperation of the society as a whole is necessary for risk reduction. The framework laid out the four priority fields of understanding disasters, risk governance, investment in disaster prevention and “build back better” after a disaster occurs (**Table-1**).

In September of the same year, the Kinu River flooded as a result of torrential rains caused by linear precipitation rainbands (**Photo-2**). Following that event, conditions where unprecedented damage occurs due to external forces exceeding the capacity of disaster prevention infrastructure have become an annual occurrence. Because countermeasures for disaster prevention and mitigation for frequently-occurring large-scale disasters were urgently needed, the Ministry of Land, Infrastructure, Transport and Tourism (MLIT) formulated “River Basin Disaster Resilience and Sustainability by All,” and proposed

community development, housing development, and improvement of the storage and permeation function based on water damage-related risk with the cooperation of all stakeholders in addition to hastening the development of hardware.

## 2. Efforts of the River Department

In promoting River Basin Disaster Resilience and Sustainability by All, the roles of the River Department are to recognize and assess risks, study countermeasures, build a consensus among all stakeholders, and carry out social implementation. Research and development of both the hardware aspect and the software aspect are demanded in order to support the decision-making of the stakeholders of diverse projects.

As a concrete example, the River Department conducted model experiments on levee structures that tenaciously resist even overtopping and provided technical guidance on the recovery policies after a disaster (**Photo-3**). In the hardware aspect, support for facility administrators continues to be an important mission (**Photo-4**). In the future as well, we will continue research for improvement, including both functions and sustainability.

In the software aspect, we put great effort into supporting local stakeholders such as residents and companies. The department predicts the water level rise due to flooding in advance and provides the water level predictions to contribute to evacuation action during floods (**Fig.-1**) and supports the chain of command of Flood Prevention Groups (**Fig.-2**). Along coastlines, we also predict the wave runup height to prevent wave damage. We will carry out social implementation of information dissemination to protect human life when a disaster occurs.

In combination with this, we will also make efforts to improve the capabilities of not only researchers, but also persons engaged in practical work in the field.

## 3. Future Outlook

At present, when the effects of climate change are becoming increasingly apparent, it is indispensable to pursue reliability in infrastructure facilities. At the same time, in order to promote “River Basin Disaster Resilience and Sustainability by All,” effective techniques for building disaster prevention areas “by all” are also demanded. From this viewpoint, it is important to envision a wide range of research targets, from civil engineering to the social sciences and humanities.

Furthermore, as the Sendai Framework shows, disaster countermeasures are a challenge for all the world’s countries. Thus, the knowledge gained by this challenge in Japan, which has an abundance of experience in disasters and reconstruction, must be shared with all countries.

In the River Department, we will steadily continue the research activities demanded of us, and we will also take on the challenge of new issues and provide those results to all stakeholders, both inside and outside of Japan.



Photo-3 Actual-size overtopping experiment using large-scale experimental facility



Photo-4 Survey of a dam damaged by the Noto Peninsula Earthquake

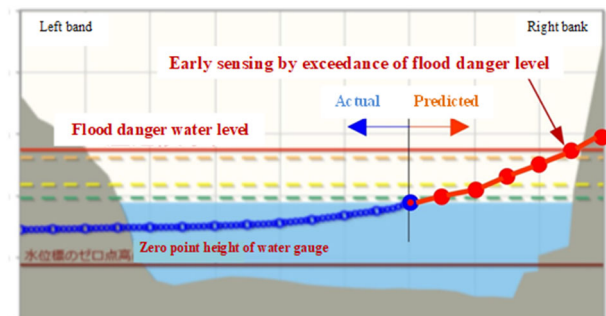


Fig.-1 Prediction of the future water level based on the risk line during flooding



Fig.-2 Display of the Flood Prevention Group activity information-sharing support system