Chapter 20

The Reality of Urban Reconstruction and Its Challenges

Field of expertise: Civil engineering, urban planning

Katsuya Hirano

Summary

The city's reconstruction after the Great East Japan Earthquake was based on the contradiction between the "extremely rare tsunami" and the "actual tsunami," which led to the first large-scale reconstruction under a demographic declining with the migration of the city. Various new initiatives were implemented to rebuild the city into a sustainable, attractive, and high-quality city. In practice, the importance of coordination and total design that transcends vertical divisions was clarified.

Keywords: urban reconstruction, civil engineering, landscape and design, coordination, total design

Introduction

I have been deeply involved in the reconstruction of Ishinomaki City and Onagawa Town in Miyagi Prefecture. In this chapter, I back at the challenges of rebuilding after the Great East Japan Earthquake. The following is an overview of the recovery and urban planning process's challenges, reflections, and achievements.

1: Challenges Faced by Recovery Planning after the Great East Japan Earthquake

The reconstruction planning started with contradictions

Before the Great East Japan Earthquake, the standard for coastal levee planning was basically "the best yet." Of course, due to budgetary and site constraints, not many coastal levees could achieve this standard. Nevertheless, the Great East Japan Earthquake and Tsunami were too huge to continue the planning policy of coastal levees based on the "best yet" policy. In June 2011, the Central Disaster Management Council, which is the highest decision-making body for national disaster prevention policy, decided to abandon this idea of and to define Level 1 (L1) tsunamis as tsunamis that occur relatively frequently (once every ten to 100s of years) and to build physical countermeasure such as coastal levees. For extremely rare tsunamis (once every 500 to 1,000 years), the policy is to prepare for Level 2 (L2) tsunamis by focusing on evacuation. This policy was introduced concerning the fact that it is not reasonable to take physical protection against extremely rare disasters, the fact that the government regretted its overconfidence in

physical protection and the fact that L1 and L2 earthquake ground motions are already used in the seismic design of bridges.

On the other hand, for the survivors, the tsunami was an actual tsunami that they experienced. It is difficult for them to agree on a recovery plan for a future L2 tsunami that will cause similar damage. Naturally, it was necessary to develop a recovery plan that would be safe against an L2 tsunami. This type of contradiction between rationality and consensus-building is bound to occur in the recovery from a severe, low-frequency disaster. And so far, there is no solution to this contradiction. The question of how people can coexist with nature, which brings both blessings and tragedies, is a serious issue that confronts the very foundation of the Japanese view of nature.

Reconstruction involved the movement of towns

While physical defenses such as coastal levees can only guarantee safety up to L1 tsunamis, how can we create a safe city even in L2 tsunamis? In the ria coast area, moving to higher ground was installed, another hand, in the plain area, a high embankment road was constructed as a de facto two-line levee, and towns on the seaward side of the road were relocated to the inland side.
Both of these methods were unique in that they involved moving the city and rebuilding all social infrastructure (roads, rivers, lifelines, etc.) from scratch.

Urban planning under a declining population

In terms of recovery from a large-scale disaster, this was the first time that a declining population was involved in reconstruction. While there was no clear system or planning technology to deal with a declining population, the challenge was to make the area more attractive and sustainable in the future. This is the root cause of the failure of the common sense approach to reconstruction.

2: The Required Paradigm Shift

The externalities of levees

Coastal levees have a significant impact on the attractiveness of coastal areas, and many of the L1 levees were planned to be over 10 meters high. In Miyagi Prefecture, plans were also made to build or raise river levees at the mouths of rivers to protect them from tsunamis, in line with the L1 levees. The higher the levees, the more safety they provide from a tsunami. On the other hand, the higher the embankment, the more significant the negative impact on the landscape. Coastal embankments are built for safety, and as you can see from the beaches filled with wave dissipating blocks all over the country, except for some scenic spots, they were not generally designed to reduce the negative impact on the landscape. If we do not break through such common practices in coastal levee design, we will not recover and maintain our status as a beautiful and sustainable region.

Sectionalism from "vertical" to "horizontal

In the case of regular reconstruction, the basic principle is to restore all infrastructure facilities in situ. As long as the scale of the project is not expanded, there are already sites

available, and there is almost no need for adjustment. In the beginning, not only in reconstruction but also in the era of expansion, the roles of infrastructure facilities have been divided according to the type of infrastructure. For example, the formation of an appropriate road network was influential in developing infrastructure such as roads, and coordination with other social infrastructure facilities was not a significant issue. Although sometimes derided as a vertically divided administration, it was a good division of roles in the era of expansion.

However, the reconstruction involving the movement of towns means rebuilding all infrastructure. For example, the prefectural government planned coastal embankments, river embankments, and prefectural roads even for small fishing villages. The municipal government planned projects to promote the relocation of disaster-stricken groups and fishing ports (prefectural government management for second-class fishing ports and above), all with different decision-making systems. This is why it took so much effort to coordinate them. Therefore, it was imperative to switch from what used to be common practice, a vertically-integrated approach used before the earthquake, to a more horizontal approach that would unite the vertical divisions of the infrastructure facilities.

A paradigm shift necessary for urban planning in a declining population

At the same time as this shift in thinking from vertical to horizontal, a drastic change in urban planning itself is also necessary. As typified by the recent trend of compact and walkable cities, the need to break away from automobile-oriented urban planning has become a significant paradigm shift. For example, in concrete terms, the ironclad rule of road planning was to disperse automobile traffic to avoid congestion. Still, in the face of a declining population, it was necessary to tackle planning completely differently from what had been conventional, such as concentrating traffic to support sustainability by increasing commercial potential.

3: A New Approach to Recovery Planning

Several practical and pragmatic measures were explored in response to this paradigm shift.

Balancing safety and attractiveness

To reduce the negative impact of coastal and river levees on the landscape and to make the sea and rivers more attractive, the hinterland was raised to the same height as the levees to ensure a good view of the sea, and facilities were constructed (Oya Beach, Kesennuma City, Miyagi Prefecture; Ogatsu downtown area, Ishinomaki City, Miyagi Prefecture; Ayukawa district, Ishinomaki City, Miyagi Prefecture; Onagawa downtown area, Miyagi Prefecture, etc.). And the method of absorbing the negative effects of levees through buildings integrated with the levees (Kesennuma City Bay District, Ishinomaki City Central District) were adopted and realized. The embankment of the old Kitakami River in downtown Ishinomaki has also been carefully designed. In a sense, these efforts were recognized not only by considering the levee project as a levee project but also by coordinating with various projects.

From coordination to total design

The importance of such coordination is not limited to the levee project. In the reconstruction of Ishinomaki City, a collaborative team of civil engineers, architects, and urban planners from Tohoku University's International Research Institute of Disaster Science played a de facto

coordinating role, sometimes going beyond vertical divisions to present a complete design for levees, roads, square, and buildings. In the reconstruction of Onagawa town, the team played a de facto coordinating role. The rebuilding of Onagawa Town was coordinated by a team led by Mr. Sue of Chuo Fukken Consultants CO., LTD., and the design was implemented in its entirety by the Onagawa Town Reconstruction Design Council, of which I was the chairman.

In both cases, of course, there were many regrets. Still, I believe this is a concrete example of the necessity of a total design implementation system with human resources that can accurately grasp the paradigm shift and strengthen the horizontal skewers to realize high-quality urban development with enhanced sustainability, which is necessary for urban development under a declining population. This is a concrete example of the need for a total design implementation system with human resources to grasp the paradigm shift accurately.

4: Achievements and the Future of Urban Planning for Disaster Recovery

Ten years have passed since the earthquake, and as we look around at the results of the reconstruction projects in the tsunami-affected areas, we can see that despite the various contradictions and challenges, we have reached a point in developing an attractive city. At the same time, however, we notice that there are not many cases where reconstruction has been carried out with a new approach based on this type of paradigm shift.

In the future, it will be necessary to consider the quality of reconstruction after a large-scale disaster, what the key points were to improve the quality, and how to improve the quality of reconstruction further. It is also true that it is difficult to openly say that the quality of recovery in this city is high. In contrast, the quality of recovery in this city is low, considering the survivors and the people who made an effort. Still, if we avoid fair criticism, we will only repeat the same thing after the next large-scale disaster. This is where I feel there is a new direction for disaster science. In addition, this was the first large-scale reconstruction under a demographic decline. Even if public works projects are not developed on such a large scale in general urban development, it is necessary to discuss what can be said about general urban development under a demographic decline. The contradiction between rationality and consensus-building, which I mentioned at the beginning of this article, remains an essential issue, although we don’t yet know how to solve it.

Conclusion - from the author

Civil engineering is first and foremost for the public. However, as I have been working in reconstruction, I have wondered whether various researches in civil engineering are helping to solve this problem. For example, Isamu Hiroi (1862-1928), one of the founders of modern civil engineering in Japan, apparently said, "An academic without a field is not an academic," and I feel that civil engineering itself needs a major paradigm shift.

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