

Green Infrastructure for local disaster-struck areas, tourism resources and natural environments: analysis of reconstruction plans of the Kumamoto earthquake and actual changes in their landscapes

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Considering the influence of the landscape caused by the earthquake, the first change occurring in the landscape is caused by sediment-related disasters such as damage to the building, landslips and landslides. After that, during the earthquake disaster recovery process, housing supply and infrastructure improvement etc. are carried out in order to provide convenience and safety on daily life, and the landscape changes accordingly. This is the second change. What is important about this change is that it affects the relationship between humans and the environment due to the double changes.

The purpose of this research is to analyze the reconstruction plan prepared by the affected municipalities of the Kumamoto earthquake and compare the landscape change read from the plan and the actual landscape change actually occurred and make clear how the cities and nature have changed during the reconstruction process.

In this research, we firstly gathered and analyzed the earthquake reconstruction plans created by each local government for all 45 municipalities in Kumamoto prefecture. In this analysis, while studying each municipal original plan, we primarily focused on the background, features, and landscape references of the plan formulation. During this analysis, we grasped the relations between the reconstruction plan and the landscape change, and also clarified what exactly each local government emphasizes independently. As the next step, basing on the field survey, we analyzed the actual state of the landscape changes described in the plan. As a method, we took the photographs at places where the plans adopted by each municipality in Kumamoto prefecture were scheduled or executed, and after recording the current situation and the surrounding landscape, we made a comparison with the photographs taken at the same place in the past. By doing this, we revealed what kind of changes have occurred between the past and the present due to the disaster, and how they affected the surrounding landscape.

Among the 45 municipalities in downtown Kumamoto Prefecture, we found that earthquake reconstruction plan was formulated in 16 municipalities, and 5 municipalities planned to formulate. There were references that "consideration of the landscape when promoting housing improvement and infrastructure development" and "to consider the landscape from the tourism viewpoint". Also, there were plans to utilize the process of reconstruction itself as a resource for tourist attraction. Furthermore, as a result of analyzing the individual plans described in the reconstruction plan, the reference to landscape, reference to the prediction of landscape change, reference to landscape protection exists in all 16 cities, towns, and villages. Totally 117 relevant plans have been found. Although many of them were intended to cope with the damage at the time of the disaster, there were several plans originally adopted by the local governments to make necessary improvements of the problems they had from the past by conducting disaster recovery.

The field survey was conducted for 16 municipalities in total in Kumamoto Prefecture. One year has passed since the earthquake disaster, and recovery works progressed in a wide range in Kumamoto

Prefecture. In the recovery sites in various places, a secondary change of the landscape, which caused the recovery activity aimed at improving the convenience of life and safety, has already been taking place. Moreover, recovery works progressed also in Kumamoto castle which is also cultural asset and tourist attraction, as well as the station and the government office which are the center of town. As a result, we could confirm the change of landscape.

In this research, through the analysis of the reconstruction plan created by the municipalities affected by the Kumamoto earthquake and the field survey, from the viewpoint of Green Infrastructure, we could make clear the process of the landscape change occurred during the process of recovery/reconstruction of the living base, the tourist resources, the natural environment in the affected areas and its influence respectively. Although few local governments have formulated landscape-friendly reconstruction plans, to gain medium- and long-term benefits, we should make landscape-friendly reconstructions from the original planning stage. This is because it is the factor determining the richness of living base, tourism resources, and natural environment.

Keywords: green infrastructure, natural environment, the Kumamoto earthquake, tourism resources, the reconstruction plan, changes in landscape