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# "Efforts to Communicate"

## - Toward Mutual Understanding between Residents and Administration -

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### 1. Introduction

The South Hyogo Prefecture Earthquake on January 17, 1995, with a maximum intensity of 7 on the Japanese scale, led to the first comprehensive public disclosure of landslide hazard areas (a general term for areas susceptible to mudslides, landslides, and steep slope failures) in Japan. Landslide hazard areas had been identified across Japan by then. However, many of these areas had not been disclosed publicly because of concerns about their potential impact on the local reputation and property values.

The South Hyogo Prefecture Earthquake also marked the initiation of measures to prevent landslides in urban areas.

### 2. Landslide preparedness and community development through consensus of all stakeholders

#### 2-1 Publication of landslide hazard map

The South Hyogo Prefecture Earthquake triggered multiple collapses on mountainsides in the Rokko Mountains. Helicopter surveys conducted immediately after the disaster, along with on-site inspections on the mountainsides by officials from construction bureaus and municipalities across Japan who arrived to provide support, confirmed over 700 collapsed areas. The Rokko Erosion Control Construction Office, part of the Kinki Regional Construction Bureau, began removing stones from existing erosion control weirs, installing steel frame weirs that could be quickly constructed, and implementing direct measures for collapsed slopes to prepare for the flood season. They also lowered the evacuation warning standard rainfall, taking into account ground loosening caused by the earthquake, in consultation with Hyogo Prefecture.

Given these conditions, the local governments at the foot of the mountain, having experienced multiple

landslides due to rainfall in the past, opted to prioritize residents' safety by mapping and publicizing areas prone to landslides. First, they published a map in a local newspaper, indicating the mountainside collapse location identified by the Rokko Erosion Control Construction Office right after the earthquake. The map, though rough, displayed the locations of collapses in relation to the urban area, major roads, railroads, and rivers. By June, they distributed a more detailed map that included landslide hazard areas in addition to the specific collapse site.

#### 2-2 Toward a comprehensive landslide preparedness<sup>1</sup>

Meanwhile, Hyogo Prefecture and local governments at the foot of the mountain recognized the necessity to develop erosion preparedness measures for their area's restoration. They decided to integrate traditional preventive methods, such as installing individual erosion control facilities, with city development efforts to be better prepared for future disasters. As part of earthquake reconstruction efforts, Hyogo Prefecture and Kobe City introduced Disaster Preparedness and Green Conservation of Mt. Rokko. Within this plan, Kobe City incorporated the concept of the *mountain-base greenbelt axis*, a strategy for disaster-prepared town planning at the foot of the mountain, into its reconstruction plan.<sup>2</sup> The mountain-base greenbelt axis serves as a buffer zone during disasters, preventing mountain collapses from reaching urban zones, and restricts unregulated urban development during normal times.<sup>3</sup> To support this project, the Ministry of Construction and the Rokko Erosion Control Office collaborated with local governments and experts. Together, they identified designated erosion control zones, high-risk slope failure areas, landslide prevention zones, and conservation forests within watersheds and slopes at the mountain's base. These interconnected high-risk erosion areas were designated as *mountain-base urban*

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*greenbelts*,<sup>4</sup> encompassing areas linked with special green conservation zones under the Urban Greening Act. This initiative was positioned as their erosion project, termed the Mountain-base Urban Greenbelt Initiative and Project. Additionally, Hyogo Prefecture and Kobe City implemented specific actions to ensure the permanent preservation of green areas at the foot of the mountain. These steps included the initial urban planning decision in 1998 to classify slopes facing urban areas<sup>4</sup> as erosion control facilities (under the City Planning Act) and as special green conservation areas (under the Urban Greening Act) within the Mountain-base Urban Greenbelt.<sup>4</sup> As a result, certain urban areas have been designated to limit future development. This has allowed landslide preparedness measures to be incorporated into urban development plans.

This occurred because the local residents and the government shared a mutual understanding of the landslide risks in the disaster preparedness measures for the towns at the base of Mt. Rokko. As a result, they had a common foundation on which to build landslide preparedness measures and promote green urban development after the earthquake.

2-3 Efforts by the government and the private sector built on mutual understanding<sup>1</sup>

In multiple meetings, the public and private sectors discussed and mutually agreed upon the functions of the Mountain-base Urban Greenbelt. These functions include preventing sediment disasters, preserving and nurturing pleasant urban environment, scenic beauty, ecosystem, and biodiversity, curbing urban sprawl, and offering healthy recreational spaces. This has led to government-led disaster preparedness initiatives and the following efforts within the community. Residents are cleaning up local green spaces to sustain a safe and attractive living environment. The Board of Education has developed textbooks<sup>5</sup> on disaster preparedness and environmental education for schools. Additionally, private companies are engaging in green conservation initiatives, using government policies as part of their corporate social responsibility (CSR) efforts. However, these were routine activities that each of them had been carrying out daily. Administrative support, which involved offering forests as activity fields and providing tools and equipment for sharing maintenance policies,<sup>6-9</sup> was put in place. This

support ensured the continuous implementation of these activities.

### 3. Landslide preparedness measures and urban development based on information sharing as a prerequisite

In July 1999, multiple landslides struck a vast region, spanning Hiroshima and Kure cities. This event led to the enactment of the Act on Sediment Disaster Countermeasures for Sediment Disaster Prone Areas in April 2001. This law focuses on the intangible aspects of disaster preparedness. According to this law, in the case of a collapse, mudslide, or landslide on a steel slope, prefectural governors are mandated to designate areas where residents' lives and health are at risk as the landslide warning zone (commonly known as the yellow zone). If building damage is imminent and residents' lives and health are significantly endangered, governors must designate the area as a landslide special warning zone (known as the red zone). This empowers governors to establish a warning and evacuation system. The previous landslide hazard areas referred to places near streams and slopes susceptible to landslides, but lacked legal definition. In contrast, the new law mandates the identification of areas prone to damage with legal backing. These zones are established using a method<sup>10</sup> developed by analyzing landslide data collected nationwide by the Sabo Department of the NILIM and a sediment management group at the Public Works Research Institute (PWRI).

Prefectural governors are not obligated by law to seek residents' consent when designating an area. However, officials from prefectural and municipal authorities diligently explained the details to residents, ensuring they fully understood before obtaining their consent. The advantage of zoning is that it ensures that residents in the relevant areas receive evacuation orders during heavy rainfall events. However, this benefit is only effective if residents within the area understand the zone designation. In fact, a study on evacuation rates during heavy rainfall found that areas designated as landslide disaster warning zones had higher evacuation rates compared to non-designated areas.<sup>11</sup> This no doubt highlights the significant contribution of thorough explanations to residents (through information sharing and mutual understanding) about zone designation.

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We aim to consistently offer technical information useful for government officials. By taking this approach, residents will have even greater trust in the safety information disseminated by the government.

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