

Sabo works in Wakayama Prefecture

-Historical disasters and Sabo-

Keio CHITO¹, Katsuya KITA¹, Kazuya OHHASHI¹, Shogo KODAMA¹,
Tsuneshi NISHIOKA^{1*}, Akifumi HISADA², and Satoru MORIKAWA³

¹ Erosion and sediment control division, Wakayama Prefecture

² Road maintenance division, Wakayama Prefecture

³ Naga regional bureau, Wakayama Prefecture

*corresponding author. E-mail: sabo-wakayama@r6.dion.ne.jp

1. Introduction

Sediment-related disasters occur every year in Wakayama prefecture whose territory is covered by rugged and fragile mountains and is affected by typhoon. Moreover, the occurrence of a mega earthquake is being forecasted in recent years. This study introduces examples of the disaster prevention countermeasures and considerations about the local government's activities in the future.

2. Natural factors related to sediment-related disasters

2.1 Geomorphological and geological feature

The mountainous area is above 1000m from the sea-level and most of the rivers, which eventually flow its way to the sea, originate from these mountains. The erosive action of these rivers is harsh since its outflowing routes are short and are simultaneously accompanied by heavily steep slope. The geological condition of the prefecture can be observed into two parts as the Median Tectonic Line (MTL) that crosses the northern part of the land area makes the division. The southern part of the MTL is composed of the Pre-Tertiary accretionary zone sediments that have been formed throughout the Paleozoic era to Cenozoic era. Tectonic lines and faults, however, still exist within this geological zone and therefore the geological conditions of these mountains are extremely fragile.

2.3 Precipitation

The concentration of rainfall occurs in summer and autumn, especially in June, July and September. The annual precipitation of the southern part is estimated to be more than 2000mm and with the south-eastern part of the mountainous region exceeding 3500mm, the figures suggest that the prefecture is one of the rainiest regions in the country.

3. Historical disasters in the Wakayama prefecture

3.1 The Arida-River disaster of 1953

On July 1953, there have been a lot of landslides and the formation of subsequent landslide dams in upper-stream of the Arida-River. The landslides occurred in upper-stream of the Arida-River is shown in Tab.1 and Fig. 1.

Table.1 The data of landslide in Arida-River

Number of landslides	2,272
Total area of landslides	3,840,000m ²
Total volume of collapsed soil	20,900,000m ³
Number of blocked river	8



Fig.1 Landslide in Arida-River

The so-called natural dam was broken down by the Typhoon No.13's rainfall on the 25th of September, 1953. And this event has derived severe loss and damages to the lower-stream of the valley. This catastrophe brought 615 casualties, 431 people missing, 8,600 housings completely destroyed or washed away and the total of over 262,000 residents were known to be affected by the disaster.

3.2 The disaster caused by the Typhoon TALAS of 2011

The Typhoon TALAS has recorded a remarkable amount of rainfall. In the TALAS, widespread of continuous rainfall of more than 1000mm through the period from the 29th of August to 4th of September was observed and the Ohsugi rain gauging station eventually estimated a record-breaking rainfall figure of 1998mm. This typhoon caused large-scale deep-seated landslides and stimulated the occurrence of debris flow in the southern part of the prefecture.



Fig.2 Deep landslide in Iya

The damage of the disasters brought total of 37 casualties and missing as well as collapsing of 59 housings units. The disaster damages are shown in Fig.2 and Fig.3.

4 Countermeasures against sediment-related disasters

There are approximately 18,500 places or sites that are exposed to the danger of sediment-related disasters in the prefecture. The prefectural government is operating countermeasures against sediment-related disasters in which underscores protection of human lives as its primary objective.



Fig.3 Debris flows in Nachi-River

4.1 'Structural' measures

The prefectural government is constructing facilities for sediment-related disasters prevention that prioritizes hazardous ratings on disastrous potential and the importance of asset to be conserved against the disasters.

4.2 'Non-Structural' measures

The prefectural government is implementing various programs in order to reduce disaster impacts efficiently.

4.2.1 The information on 'places' influenced by disasters and 'time'

The prefectural government publicly notifies the information on dangerous spots for sediment-related disasters through the website to the residents and is observing rainfall information collected by their rainfall gauging stations in real-time and concurrently provides rainfall information through not only the website but also digital TV broadcast and mobile phone SMS (mailing) services. Moreover the prefectural government, in cooperation with the local meteorological observatory, has been issuing 'sediment-related disaster warning information' since 2007 on behalf of promoting warning and evacuation activities by municipalities and residents. Furthermore, based on a lesson from 2011 catastrophe, a criterion of sediment-related disaster warning information is also publicly informed through the local digital data broadcasting system in order to acknowledge the public with more easily understandable information.

4.2.2 Training and advocacy to enhance residents' awareness on disaster prevention

The prefectural government is operating warning and evacuation trainings in which municipalities and residents participate during the national sediment-related disaster prevention month and is holding seminars in order to provide appropriate knowledge about sediment-related disaster prevention.

5 Conclusion

It is forecasted that the disasters due to the influence of climate change will cause more severe damage. In order to protect the residents' lives from the disaster events, it is necessary that the prefectural government promotes the present programs and implements countermeasures.

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