Study of Sediment Yield Characteristics in Cold Dry Area by Satellite Image Armenian Case Study of Sediment Control Using Japanese Method

Hiroshi OGAWA[1*], Takahiro ITOH[2], Hayk BAGHDASARYAN[3] and Cheng QIU[4]

[1] Nippon Koei Co., Ltd. (1-14-6 Kudan-shita, Chiyoda-ku, Tokyo 102-8539, Japan)
[2] Research and Development Center, Nippon Koei Co., Ltd. (2304 Inarihara, Tsukuba, Ibaraki 300-1259, Japan)
[3] Georisk CJSC (24a, Baghramyan ave., Yerevan ARMENIA)
[4] Hydro-soft Technology Institute Co. Ltd. (4-3-1 Toranomon, Minato-ku, Tokyo 105-5507, Japan)
[*]Corresponding author. E-mail: a4257@n-koei.co.jp

INTRODUCTION

Sediment control has been regarded as important in Japan, which experiences many sediment disasters. This aims to estimate the sediment yield in the river area based on topography, geology, and changing of riverbed. This is an effective analysis method against national land failure. In various areas which have different geographic, geologic, and climatic conditions, sediment yield was analyzed using optical satellite images.

As a result, it is confirmed that satellite analysis is effective for estimating sediment yield in the dry climate area.

ARMENIAN CASE STUDY

Armenia, a mountainous country, also has many sediment disasters. There is no concept of sediment control around the river area. In this country, the main sediment problems are slope failure and the filling of capital reservoir with sand. Estimation of sediment yield is important for disaster prevention. Armenia has a dry climate with few vegetation on the surface. Analysis of artificial satellite image is effective for determining the volume of sediment production.

Fig. 1 Study area of this session

ANALYSIS OF CHARACTERISTICS OF SEDIMENT YIELD

To efficiently assess the development conditions of sediment, yield, and riverbed in a wide study area, an image analysis method has been applied using three optical satellite images and then classified into the target river basin. The collapse characteristics of each district were investigated and the speed of sedimentation in the reservoir was verified. In this way, the amount of sediment yield in the target basin was estimated. The result shows that the correlation between the number of landslides and the sediment yield is poor.

CONCLUSION

In this study, the characteristics of sediment yield were analyzed using satellite technology. Armenian land surface has almost dry environment and the vegetation is unevenly distributed according to geology and soil.

Therefore, optical satellite image can be used to analyze sediment yield because it has strong contrast in a dry area.

In the Japanese case, field investigation of the tributary is important because of various conditions (riverbed slope, shape of river course, sediment supply). It is the same in this area. This study provides a rough estimate of the sediment yield at this stage. It is necessary to increase the accuracy of this estimation by field investigation. In the future, it will be possible to apply this to other areas using field investigation and satellite analysis. In Armenia, landslide countermeasure technology is advanced under the JICA projects. From now on, it is thought that wide-area sediment control will be the next theme.

ACKNOWLEDGMENT

Photo 1 Characteristics of vegetation on the land surface of Armenia.
Armenia has a dry climate compared with Japan, and its vegetation is unevenly distributed in the valley which is rich in groundwater.

Photo 2 Characteristics of river area topography. At this world, natural heritage site called "Garni Gorge", there is lack of development at the bottom valley plain and there is a large amount of sediment due to riverbank failure. There are many plants on the south facing detritus deposit.