Research Trends and Results

Upgrading Maintenance Technology to Support Dam's Long Life

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Keywords: support dam's long life, maintenance, comprehensive dam inspection, database

1. Introduction

Dams have the functions of flood control, water utilization, etc. and constitute important social capital. Many dams have been constructed to date in Japan. The MLIT controls about 120 dams at present, and started managing about 10% of them more than 50 years ago and about 50% more than 30 years ago. For the dams under the control of the MLIT, a "Comprehensive Dam Inspection Guidelines" [1] was established in 2013 in order to promote more effective and efficient maintenance on a long-term perspective. Based on this procedure, each dam is subject to comprehensive inspection at an interval of about 30 years and the support plan for dam's long life are being formulated.

Given the situation, it is desirable to upgrade maintenance technology in order to maintain the safety and functions of dams for a long time.

2. Efforts to upgrade dam maintenance technology

In order to maintain the required functions of dams under the direct control of the MLIT, daily inspections have been conducted by dam administrators and periodic surveillance have been conducted by professionals in principle every 3 years, in accordance with the inspection and maintenance requirements provided for in operating rules, etc. of each dam. Based on the results of these inspections, dams have been maintained in place with repairs as required. Information concerning maintenance including inspection, measurement, and repair histories has been accumulated by each dam administrator in the form of paper data or electronic information.

In order to upgrade dam maintenance technology, it is necessary to detect the age-related deterioration characteristics of dam structures and establish soundness evaluation methods. In order to study these issues, it is necessary to organize the accumulated management data on each dam into a database of unified format that would facilitate comparisons of the electronic data. Moreover, sharing the integrated database among dam administrators will enable the examination of facility repair and replacement from a broad perspective with reference to cases of other dams. (See figure.)

Therefore, the Large-scale Hydraulic Structure Division is working to create a dam maintenance database. Data on each dam will be registered in this database. We have built a prototype system in which collected dam data owned by MLIT have been registered. Registration items are as follows.

Registration data: (i) Basic information (specifications and basic drawing of the dam), (ii) Observation data (history of earthquakes, floods, etc.), (iii) Inspection data (daily inspections, extraordinary inspections, various measurement values, etc.), (iv) Surveillance results, (v) Repair / Replacement information, (vi) Maintenance plans.

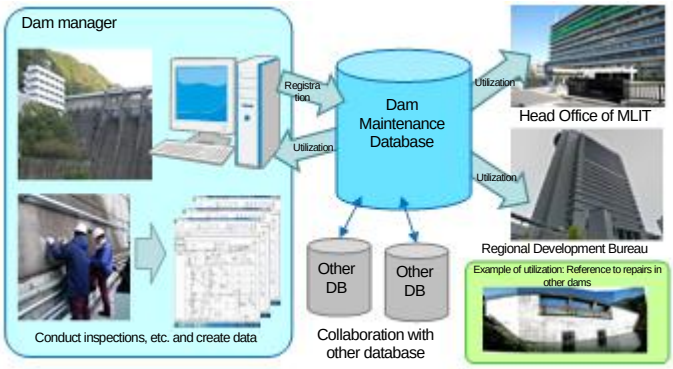

Figure: Image of Dam Maintenance Database Utilization

3. Future schedule

We will take the opinions of dam administrators about the database, and plan to improve the convenience of the database system. Furthermore, through comparative studies and trend analyses using various management data that we have registered in the database, we will continue to clarify the age-related deterioration characteristics and examine soundness evaluation methods for dam structures.

[Reference]

1) River Environment Division, Water and Disaster Management Bureau, MLIT: "Comprehensive Dam Inspection Guidelines / Commentary", October 2013