The Study of Utilization of RIMGIS for the Efficient Management of Dynamic Changes Data in River

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ABSTRACT

The Four Major River Project has drawn public attention to rivers. And dramatic changes in river environments and rapid advancement in information technology have increased the demand for continuously and systematically managed and supplied information on dynamically changing rivers. Especially, because the maintenance of information on dynamic changes in river topography over time, like river topography under water, can be used as basic data for establishing river development policies and predicting flood, it is necessary to conduct a continuous study to develop systematically and comprehensively in order to maintain and manage rivers. Consequently, this paper is intended to come up with an improved idea for a system for maintenance of rivers related to dynamical changes in rivers. And it built a standardized river DB and then applied its related functions to the RIMGIS to make efficient use of data on dynamic changes in rivers and increase the usability of the task of river management.

Keywords : DB, RIMGIS, river maintenance, dynamic changes data

1. Introduction

It is necessary to support the task of continuous river management reflecting changing river environments through improving the functions of RIMGIS operated by the Hangang River Flood Control Center. There are plethora of studies on ideas for improving the RIMGIS system: A Study of Improvement of the Usability of RIMGIS in Connection with State and Local Rivers (MCT, 1998), Development of Web-based river management geographic information system, Korea Spatial Information Society (Hyosok Chae et al., 2005), Improving the Functions of a System for Administrative Support for River Tasks (MLTM, 2008), Development of a river maintenance management technology related with national river management data (Myunghee Jo et al., 2012), and so on. And continuous efforts have made to

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improve the usability of the systems including the Guideline for Drawing up the RIMGIS Construction DB (MCT, 2001) and the User Guideline (MLTM, 2008).

This paper tries to implement the advanced system reflecting data on dynamic changes in rivers by linking and providing the technology suitable for building the database of data related to dynamic changes in rivers and for improving the system for river maintenance.-

2. The Management of dynamic changes in river

2.1 The current state of the RIMGIS

The RIMGIS, as a web-based system for river management geographic information, operated by the Han-gang River Flood Control Center, was developed to provide information to the public and give administrative task support to workers in charge of rivers by standardizing and computerizing river information.

The system provides the public with a variety of kinds of information on rivers; it provides the guideline for river information computerization, the results of basic river plans, the map of flood danger, river management register, and information on occupation permission in order to give efficient support for river tasks to river managers.

But, it has yet to provide data related to dynamic changes in rivers. The system is built in a 2D linear form that is not suitable for providing data on dynamic changes.

FIGURE 1. Main interface of RIMGIS

2.2 The current river maintenance system

The investigation and analysis of the current river maintenance system revealed that it recognizes the importance of the tasks of maintenance related to dynamic river changes like river-bed changes but does not have an independent process of task performance constructed. Because it does include a computerized process of making plans for river check and inputting the result of check, it is difficult to systematically save and manage river-related data necessary for drawing up a plan for river check.

It was found that because it does not have its own functions of hydraulic and hydrologic analysis based on the result of river check and the acquired data on river topography, the results of investigation is very low in usability.

TABLE 1. Disclosure of Problems with the River maintenance system

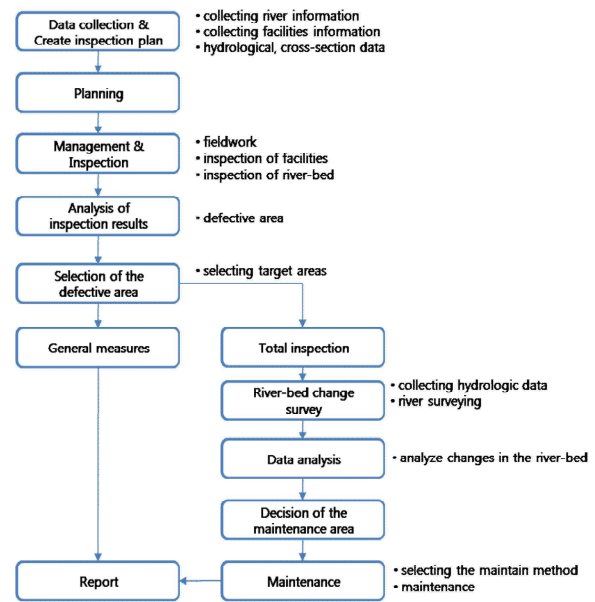| No.	Contents
1	-Absence of systematic management system about related to river report -Need to improve the river terrain data stored and provides method
2	-Need to acquire basic data for analysis
3	-Apply advanced surveying methods and River surveying regularly
4	-Requires its own hydrologic analysis

FIGURE 2. Current river maintenance system

2.3 The Current State of the Construction of Data on Dynamic Changes in Rivers

This paper selected related DB items and considered the connectivity between them in order to provide such functions as the making of river check plans, inquiry, an analysis of river changes, and the building of river topography data on the RIMGIS.

It corrected and improved data already constructed on the RIMGIS, and derived new database related to dynamic changes in rivers like comprehensive check, vertical and horizontal information, and raw data on river survey.

TABLE 1. Items of constructed test DB

No.	Table ID	Table name	Improvements
1	RM_RMP -	River projects information	RIMGIS Improvement
2	RW_DEM_FILE	DEM file	New build
3	TOTAL_RM_CHECK	Total inspection	New build
4	CROSSPOINTInfo	Cross point information	RIMGIS Improvement
5	SurveyRawData	Survey raw data	New build
6	RS_CROSS_VERTICAL	Termination information	New build
7	RS_CROSS_SECTION_2D RS_CROSS_SECTION_2D_S RS_CROSS_SECTION_3D RS_CROSS_SECTION_3D_S RS_CROSS_SECTION_META	Cross section information	RIMGIS Improvement
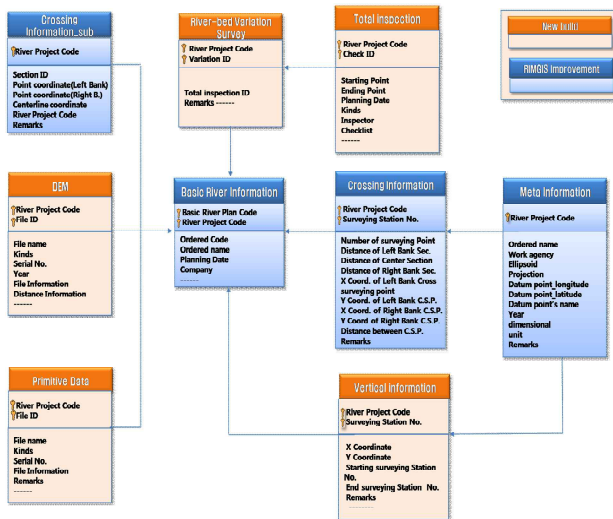
**FIGURE 3. ERD(Entity Relationship Diagram) for Management of River-bed Variation Related Data**

3. Coming up with an idea for using the RIMGIS

This paper is intended to save river-related data and develop the functions of comparing and analyzing the saved information. Especially, it is intended to increase the usability of the results of research by making functions such as the making a plan for river check, monitoring, and an analysis of the results of investigation on the RIMGIS that needs improving through constructing data related to dynamic changes in rivers like topographic data. The idea for improving the river maintenance system that was come up with by this paper is as follows.
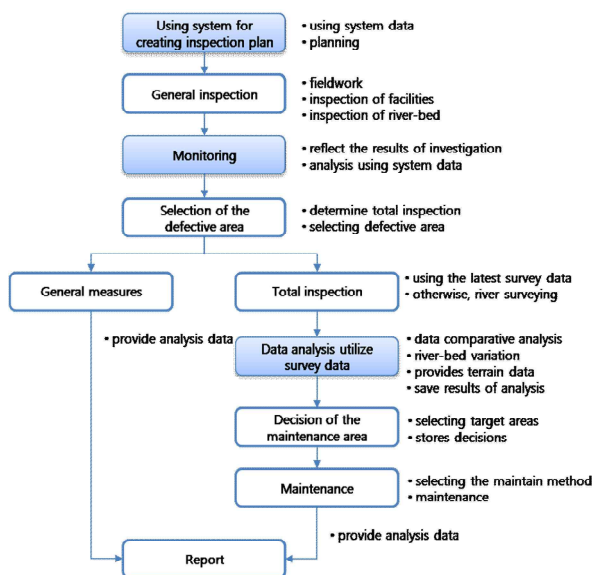

FIGURE 4. The improved River maintenance system

In an attempt to come up with an idea for improving a river maintenance system, this paper developed the functions to analyze river investigation data. The functions of inquiry about river changes and an analysis of the amount of river changes using the already developed river DEM are expected to be used as basic data for supporting the decision making by worker in charge. And it performed the technological development for items including management of river check plans, monitoring of vertical and horizontal rivers, an analysis of the amount of river changes, inquiry about DEM meta-data, and so forth. The detailed functions and developed screens are as follows.
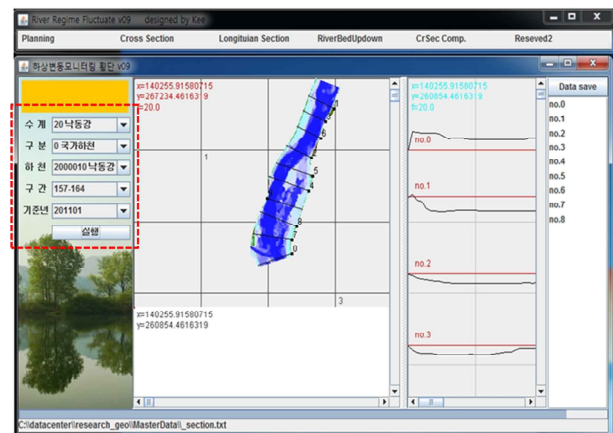
FIGURE 5. Cross & Longitudinal section monitoring screen
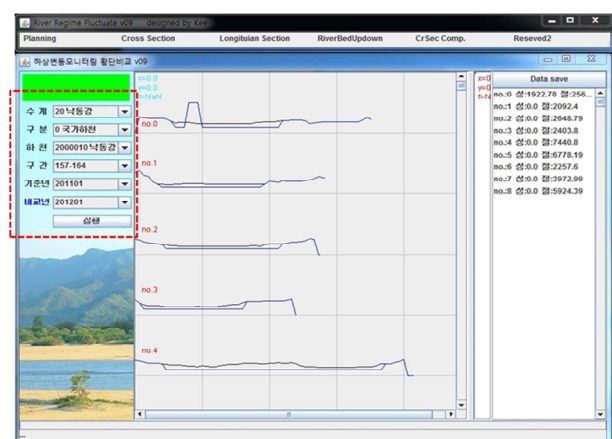
FIGURE 6. Analysis of River-bed variation screen

TABLE 3. Development of technology for River-bed change monitoring

No.	Primary function	Secondary function	Explanation
1	Inspection planning		- Inspection planning - Select the target of the check
2	River-bed change monitoring	Monitoring(interval)	- DEM-based - Monitoring of the selected interval
		Monitoring(section)	- DEM-based - Monitoring of the selected section
3	River-bed change analysis	Data generation	- Select DEM - Data generation & store about cross-section
		River-bed variation	- DEM-based - Variation calculated of the selected section
		River-bed variation(section)	- CAD-based - Cross-section comparison -Variation calculate
4	Data source	Longitudinal data	- Using the data extracted from the DEM
		Cross-section data	- Using the data extracted from the DEM - Provide data

4. Conclusions

The paper is intended to come up with an improved river maintenance system that can reflect dynamically changing river environments over time by making an investigation into the current river maintenance system related dynamic changes in rivers and conducting an analysis of problems. In particular, it conducted the verification for making practical use of the results of research by constructing the database related to river topography like river DEM, data on vertical and horizontal survey, and the like, and doing the test on its applicability to the RIMGIS, a web-based system.

It is expected that if the system is used to perform the task of river maintenance, it will be possible to acquire and analyze data related to dynamic changes in rivers to which constant and congruous standards are applied, and to increase the usability of data: providing an enormous amount of stored data on river topography for other tasks.

Acknowledgments

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