

WATER RESOURCES SCIENTIFIC DATA SHARING IN CHINA

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ABSTRACT

Sharing scientific data about water resources is an indispensable component of national fundamental data-sharing construction and the science and technology innovation system. To implement data sharing about water resources, which covers a broad extent and a great variety of data, is a difficult task because of the technical complexity and, more critically, non-technical factors, such as data policy, standards, and sharing circumstances. In this paper, the status of water resources scientific data sharing is analyzed at home and abroad, and some concepts are presented regarding these analyses. Using data from the Scientific Data Sharing Project, the authors study the system of data sharing about water resources and propose technological standards and managing and servicing systems of data sharing of water resources for the public as well as for the scientific research sectors of the nation.

Keywords: Water resources, Scientific data, Water resources scientific data sharing, Sharing standard, China

1 INTRODUCTION

Scientific data about water resources are original data, produced during water control and preparation, water use and protection and the processed water resources data sets needed by science and technology. Water resources scientific data cover many types, such as hydrology, water resources, water environment, floods and drought, water irrigation, hydraulic engineering, etc, and are important scientific data which acts on building the national economy and macro-economic decision-making.

Conserving the water resources scientific data sharing (WSDS) system is a data-sharing system based on scientific sorting and applications software engineering, using water resources scientific data, supported by information technology.

Currently, accumulating and acquiring these data in China depends mainly on government investment, including data provided by government departments to maintain the system, science and technology plans and activities, research from academies and universities, and CODATA.

2 THE STATUS OF WSDS

Scientific data about water resources are an important part of the fundamental scientific data resources of the nation. They play an irreplaceable role in socio-economic life and perform an important function in national

macroscopic policy making, science and technology innovation, and national water and food security. In particular, as an important part of fundamental national data, water resources data are indispensable to research in resources, environment, zoology, agriculture etc. Today, research in many hot spots of science in the world, such as global warming, desertification, and sustainable development, needs water resources data. Therefore, water resources data play an important role in Chinese technological advancement and innovation.

However, for a long time the ability to share the data was a struggle, and the work of data sharing did not develop because China had no rules for information sharing, there were no mechanisms for data sharing although the government had made enough investments in data sharing. In scientific research and education in particular, scientists could not acquire historical hydrology data, which are very valuable for scientific research and technological advancement, thus negatively influencing innovation in water resources research.

Since the 1980's, hydrology database system building has been researched in China, in order to change the lack of progress in processing, storage, and service of hydrology information, the majority of hydrology data have been stored digitally. However, because of weaknesses in standardization, lack of funding, policy restrictions, shortage of hardware and software to share data interregionally, and lack of a network information release platform and service system, the data sharing ability is very underdeveloped, and a serious information barrier exists.

Although the water resources department has accumulated many kinds of data, it cannot aid in building our national economy or help scientists and the public because of the above problems. The weakest link or "bottleneck" is lack of a system for sharing data and a service mechanism. Although during the past several decades, we have made great efforts to solve the data sharing problem and have made some achievements, there is still a need for WSDS to come in line with national development, social progress, and scientific research.

3 THE PROBLEM IN WSDS

3.1 Sharing mechanism

In China, the main problem with scientific data sharing is the insufficiency of data sharing service management. Chinese water resources data researchers have already built scientifically rigorous management mechanisms for collection, reorganization, and publication, but they do not have relevant mechanisms for sharing services and data collection. In the past, the data were managed by the government, river basin organizations, and provincial management departments and were seen as individual assets causing a serious data barrier. With no national management and no sharing policy, the barrier has existed for more than twenty years.

The system of data collection and sharing management has not been built into the plans of science and technology projects. Because of the lack of a good system using data exchange standards, criteria, quality control, and an information service, a production checking approach has been adopted, even though this data system is a key project of science database building in China. The data are managed by organizations involved in science and technology data service and not by organizations that collect data. The scientific data are owned by the scientists and research institutes, so it is difficult to share them. Now, many projects have decreasing standards of research and design, owing to the lack of enough representational scientific data. Also, advances in the construction quality of the national economy and technological innovation abilities are badly restricted.

There is a lack of operating policy on scientific data sharing, such as the management methods of the water resources scientific data sharing service, the lack of support by the sharing service, and the ambiguity of function, the data are gathered and collected repeatedly by data management departments. Because the sharing service has no importance, there is no expert institution engaged in data sharing and no consensus about sharing services.

3.2 Sharing standards

The basic task of a sharing system for WSDS is to share technical criteria of data production, collection, quality control, data class, and service. Similar to books that have not been classified, even if they are laid out in order on the bookshelf, our data cannot be easily retrieved and shared by using codes. Therefore, accelerating research on the WSDS system and establishing technical standards for data classification coding, metadata, data collection, and data quality control are the basic tasks of WSDS. It is an difficult job to build a database using data that belongs to scientists and companies.

3.3 Sharing atmosphere

The people who hold water resources data do not believe in data sharing. They prefer to conceal their data rather than to share it. Furthermore, because data receivers disrespect intellectual property rights, data providers do not want to provide the data after their property rights have been disregarded. Therefore, one of the pivotal factors in establishing a sharing policy and management regulation is to construct a sustainable scientific data sharing platform and build an atmosphere of sharing, especially within government and science.

4 THE WSDS SYSTEM

The goal of WSDS is to build policies and technical standards for WSDS aimed at the basic data of hydrology and water resources and the scientific data produced in research. Based on a water conservancy web platform, by reconstructing the existing data resources and building service mechanisms for water resources data checking and sharing, WSDS will provide comprehensive sharing services for public and scientific research and the national economy.

The service system of WSDS is, supported by corresponding policy rules, sharing technique criteria, and sharing service institutes, reconstructing the scientific data resources of water resources in China. The website portal of the water resources data sharing service has been developed, and the sharing service system has been established for public and science research. The service system of WSDS is illustrated in Figure 1.

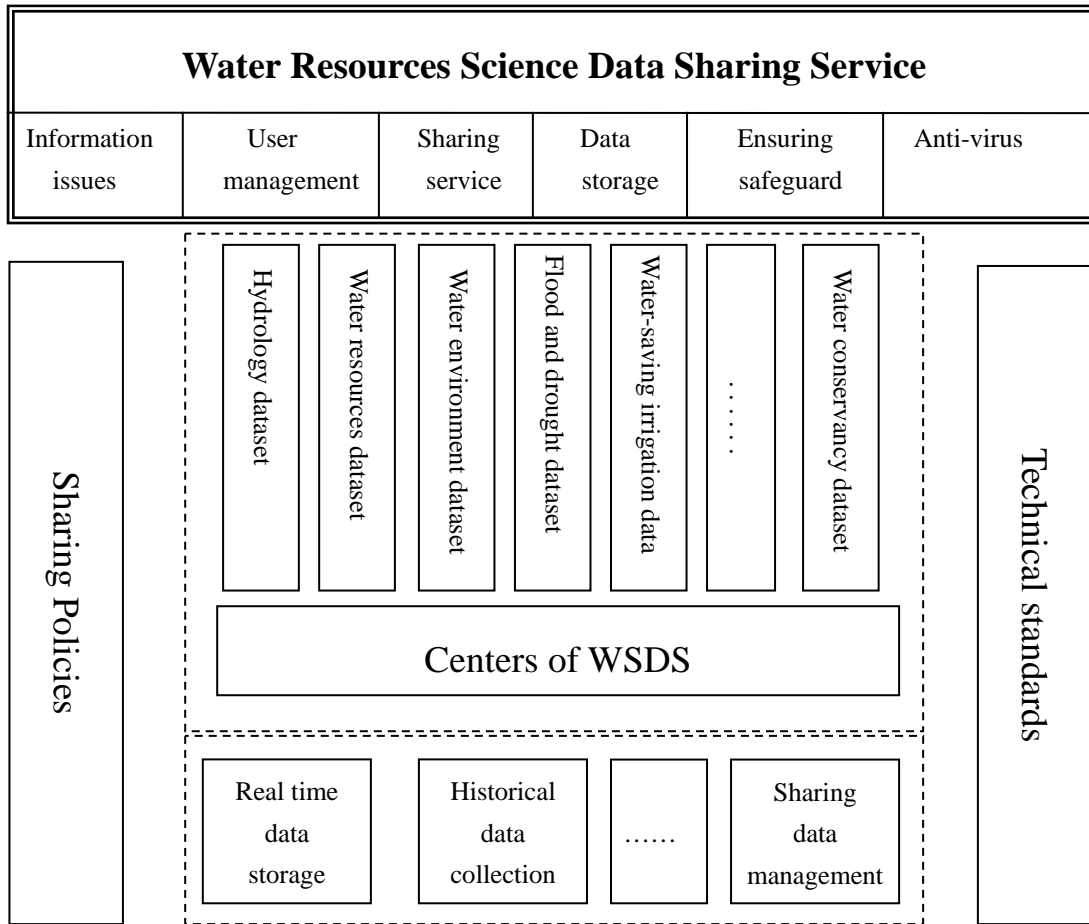


Figure 1. The service system structure of WSDS

(1) The policies of WSDS are legal guarantees to realize data sharing for society, including a management system for data collection, the internal management system for the sharing service, the promised system for the sharing service, the organization of the sharing service, the funding system, and so on. To realize the changeover from data collection to data sharing, countries and sectors should set up systems to regulate the sharing rules for data collection and force data-producing sectors to share data.

The sharing policies should also include criteria for user gradation and data laws regulating classification. The management of data donators should be developed to encourage scientists to share their data. Data acquisition should be built to include use limits, stipulations for sharing new data, the production and benefit of using data, and credit management for users to ensure the sustainable development of WSDS by policy.

(2) The technical criteria of WSDS are the technical guarantees that will realize data sharing about water resources. Currently, the subject of water resources in China does not have the subject, data, or information standards, which blocks the storage, integration, and exchange of information. It resembles a library without a code for classification that cannot meet the needs of readers. Technical criteria for WSDS should include classified codes for water resources data, metadata criteria, data collection format, checking and acceptance criteria, and quality control.

(3) As the core of the sharing service, the data will be produced and integrated by technical sharing criteria.

Storage of scientific data will use a dedicated management mode, combined with distribution and convergence and the corresponding metadata. Taking metadata querying for a guide, the data sharing service system is based on a network. There is a large quantity of water resources scientific data, which are widely distributed. New data should be managed regularly, and the existing data should be rebuilt because the workload is so large and the number of requests so high. However, changing mechanisms and increasing sharing need time.

(4) The network platform construction of WSDS was developed based on the water network platform, and the system of information release, data storage, and information security was designed to interface with all types of users.

As the website portal for WSDS, the water resources data sharing network offers an alternation service platform for the public and provides general querying and previewing of water resources data. According to the system of user gradation and data classification, sharing services, such as downloading data online, mailing data, and customizing special demands online have been realized.

5 CONCLUSIONS

At present, the effect of WSDS is low, sharing standards are non-existent, and enabled data resources in China are few. Therefore, the development of modern water resources and science and technological innovation are severely restricted, and sector advancement is blocked. Researching policies, standards, and techniques of WSDS is a fundamental task for the field of hydroinformatics. The research of key techniques and system structures for WSDS could provide support for information sharing among the water resources sector and other sectors and also for interdisciplinary scientific research. At the same time, only by establishing effective sharing mechanisms for water resources data gradation and classification and establishing scientific sharing technique standards for WSDS will the data barrier between different sectors constructed by policy and legal restrictions be broken. Thus, the changeover from data collection to data sharing should come into existence.

6 REFERENCES

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