

Research Trends and Results

Construction of a Sound Water Cycle in River Basins

-- Efforts for Proper Use and Conservation of Ground Water --

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1. Introduction

In view of the forecasted increase in draught risk due to climate change, the rise in water demand due to the global increase in population, and intensifying competition in the water business, attention is being paid to "sound water cycles" to keep in place the roles of water in human activities and environmental conservation.

Amongst the various factors that play into a water cycle, concern is being raised about uncontrolled development of ground water since it is characterized as private rights incidental to land and not well managed as river water. In addition, since ground water is a good and inexpensive water resource as seen in the recent increase in preference for mineral water, efforts are required to ensure proper use and conservation of ground water.

2. Ground water management

Ground water is generally characterized by good quality, little change in water temperature and no need for large storage, intake or supply facilities owing to intake from wells. Japan has many alluvial plains and fans where gravel layers containing much ground water have developed, so ground water has been widely used since ancient times and supported the life of people.

Meanwhile, there has not been great progress in the management of ground water because there are two opposing concepts, i.e., the "concept of water as a public resource," which would require that ground water be regulated by public law since it constitutes the foundation of the environmental function of land including surrounding areas, and the "concept of water as a private asset," by which ground water belongs to private property since the land owner may construct a well to use water for private purposes.

In recent years, however, in view of the necessity to prevent uncontrolled development of ground water and promote sustainable use of ground water, in the municipalities where ground water use is advanced, such as Kumamoto City (Kumamoto Pref.) and Ono City (Fukui Pref.), recognition of ground water as public property is being developed through continued environmental education and information dissemination. And, ground water management has been strengthened and/or upgraded.

3. Outline of the study

(1) Field survey on ground water management and systematic organization of advanced

cases

Using questionnaire surveys for prefectures and municipalities, we want to grasp the status of ground water management in the country and identify issues, and examine measures for strengthening / upgrading ground water management for the areas where ground water management is advanced, such as Kumamoto City and Ono city. We intend to organize and summarize methods and concepts of ground water management systematically as reference for other local governments.

(2) Cross-sectional organization of the cases of ground water flow analysis

Ground water flow analysis is an important tool that visually clarifies, as shown in the table below, the ground water flow characteristics of the relevant region based on surface water and ground water flow models, and serves as basic information for the governance of ground water, including hydrologic processes such as rainfall and surface runoff, underground penetration, flow of ground water into rivers, leakage of river water into the underground, and pumping. However, the accuracy of the analysis is low due to insufficient data on the pumping discharge of ground water, nature of the soil, etc. It is, therefore, necessary to take into account such inaccuracies in order to properly handle analysis results. For these reasons, we intend to collect data on the cases of ground water flow analysis conducted by MLIT across the country and cross-sectionally organize the accuracy etc.

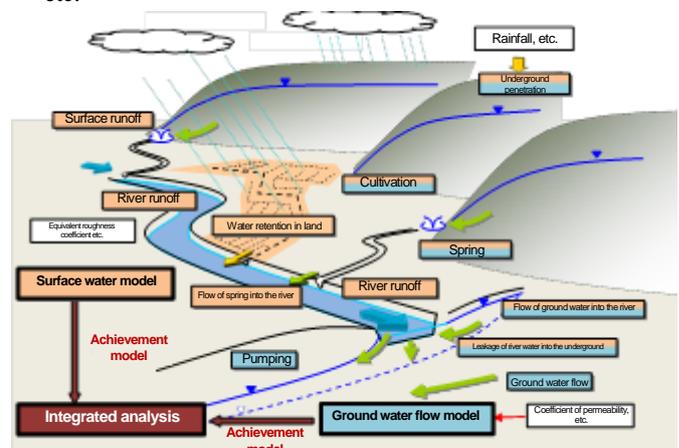


Figure: Conceptual Diagram of Ground Water Flow Analysis