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Method for Calculating Potential Direct Loss of Water Shortages by Water Use Type and Deducing Optimal Applications

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In recent years, Korea has witnessed a surge in both drought and heat waves during the spring and summer seasons. In contrast to other natural disasters such as floods, drought is challenging to quantify, and the damage from water shortage tends to develop gradually but persist for an extended period. Due to the challenging task of quantifying potential losses associated with drought, which are associated with diverse forms of damage, there is a need for research to estimate the damages caused by water shortages. Currently, in Korea, official records do not exist for data pertaining to damage or recovery costs categorized by the stage of each drought (only information about individuals experiencing damage and the duration of drought is documented and maintained). Furthermore, identifying the effects of support for damages during water shortages or determining the suitable extent of support is challenging. This difficulty arises from variations in damage assessment standards across different administrative districts and a limited number of relevant cases. Therefore, it is essential to quantify the potential losses from water shortages by deducing the primary influencing factors necessary for calculating such losses.

Thus, this study aimed to develop a method for calculating potential direct losses associated with water shortages categorized by water use type (household, industrial, agricultural). Additionally, the study aimed to derive optimal strategies for each water use type by analyzing the changes in potential direct losses according to different stages of water shortage scenarios.

First, cases of major water shortage in the past and pertinent damage data were investigated to establish the process for calculating potential direct losses, and influencing factors were deduced for each water use type to select items for benefit calculation and specific details.

This study proposed a methodology and calculation equation according to the process for each water use type and thus designed a “tool box” capable of calculating potential direct losses by inputting influencing factors related to damages in affected areas.

The anticipated outcomes from calculating potential direct losses due to water shortages are expected to contribute to establishing a system that strengthens the competency of water shortage response. This system would include an analysis of water shortage damage reduction scenarios based on basin and water-use types and optimal water supply scenarios (involving a switch between various water use types) in consideration of social and economic aspects.

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