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Vulnerability Assessment of Natural Disasters for Small and Mid-Sized Streams due to Climate Change and Stream Improvement

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Vulnerability assessment plays an important role in drawing up climate change adaptation plans. Although there are some studies on broad vulnerability assessment in Korea, there have been very few studies to develop and apply locally focused and specific sector-oriented climate change vulnerability indicators. Especially, there has seldom been any study to investigate the effect of an adaptation project on assessing the vulnerability status to climate change for fundamental local governments. In order to relieve adverse effects of climate change, Korean government has performed the project of the Major Four Rivers (Han, Geum, Nakdong and Yeongsan river) Restoration since 2008. It is expected that water level in main stream of 4 rivers will be dropped through this project, but flood effect will be mainly occurred in small and mid-sized streams which flows in main stream. Hence, we examined how much the project of the major four rivers restoration relieves natural disasters. Conceptual framework of vulnerability-resilience index to climate change for the Korean fundamental local governments is defined as a function of climate exposure, sensitivity, and adaptive capacity. Then, statistical data on scores of proxy variables assumed to comprise climate change vulnerability for local governments are collected. Proxy variables and estimated temporary weights of them are selected by surveying a panel of experts using Delphi method, and final weights are determined by modified Entropy method. Developed vulnerability-resilience index was applied to Korean fundamental local governments and it is calculated under each scenario as follows. (1) Before the major four rivers restoration, (2) 100 years after represented climate change condition without the major four rivers restoration, (3) After the major four rivers restoration without representing climate change (this means present climate condition) and (4) After the major four rivers restoration and 100 years after represented climate change condition. In the results of calculated vulnerability-resilience index of each scenario, it can be noticed that vulnerability of watersheds which are located near main stream of four rivers is alleviated, but because of climate change, vulnerability is getting high in most watersheds. Also, considering future climate change and river restoration, vulnerability of several watersheds is relieved by river restoration.

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