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Prediction and Evaluation of Hydro-Ecology, Functions, and Sustainability of A Wetland Under Climate Change

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Wetlands have many functions and are very important to human life and ecosystems. To quantitatively preserve and manage wetlands, it is necessary to analyze the hydro-ecological changes and evaluate its function and sustainability. In this paper, we predicted the plant habitat according to the change of wetland hydrology and have proposed measures to effectively manage wetlands by evaluating future wetland functions and sustainability. In this study, we selected Binae wetland which is the riverine wetland in Namhan river basin. And then, we defined the Inundated Exceedance Probability(IEP) which is the probability of inundation of riverine wetland and analyzed in three aspects. (1) Based on the IEP, we analyzed the water level, inundation area, inundated depth, and inundation period considering climate change and predicted future plant habitat environment. (2) To evaluate the wetland functions, we proposed Modified Hydrogeomorphic method(Modified HGM). And we evaluated future wetland functions considering the change of hydro-ecological environment due to climate change. (3) To evaluated sustainability of Binae wetland, we proposed Wetland Sustainability Index(WSI) considering water environment change, weather and climate, plant and animal environment factors. As the study results, emergent and submerged plants are expected to maintain or increase their status because future(2040∼2099) inundation period and areas are similar to or better than in the past(2000∼2017). But in the near future(2018∼2039), the average water level, inundated depth, inundation area decreased conpared to the past. It can be seen that the inundation period also decreases. Especially, it is considered that the area where the inundation period and area decreased can be changed from emegent or submerged plants to shrubs & woody plants. And, because wetland function and sustainability are both high, so they will continue to be maintained. However, Binae wetland has a poor future environment in hydrological function and sustainability of fish. So it is necessary to manage in its aspects. It is expected that methodology presented in this study will be a basic data to predict the plant habitat environment and evaluate its function and sustainability.

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