



Impacts of climate change on prioritizing conservation areas of hydrological ecosystem services

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Ecosystem services (ESs) including hydrological services play important roles in our daily life and provide a lot of benefits for human beings from ecological systems. The systems and their services may be threatened by climate change from global to local scales. We herein developed a systematic approach to assess the impacts of climate change on the hydrological ecosystem services, such as water yield, nutrient (nitrogen and phosphorous) retention, and soil retention in a watershed in Northern Taiwan. We first used an ecosystem service evaluation model, InVEST, to estimate the amount and spatial patterns of annual and monthly hydrological ecosystem services under historical weather data, and different climate change scenarios based on five GMSs. The monthly and annual spatiotemporal variations of the ESs were analyzed in this study. Finally, the multiple estimated ESs were considered as the protection conservation targets and regarded as the input data of the systematic conservation planning software, Zonation, to systematically prioritize reserve areas of the ESs under the climate change scenarios. The ES estimation results indicated that the increasing rainfall in wet season leads to the higher water yield and results in the higher sediment and nutrient export indirectly. The Zonation successfully fielded conservation priorities of the ESs. The conservation priorities of the ESs significantly varied spatially and monthly under the climate change scenarios. The ESs results also indicated that the areas where ESs values and conservation priorities with low resilience under climate change should be considered as high priority protected area to ensure the hydrological services in future. Our proposed approach is a novel systematic approach which can be applied to assess impacts of climate change on spatiotemporal variations of ESs as well as prioritize protected area of the ESs under various climate change scenarios.

Keyword: climate change, ecosystem service, conservation planning, spatial analysis.