
Bundling ecosystems services from forests and rice fields in Southeast Asia under climate and land-use change

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Abstract

Rice is the world's most common crop and provides food for almost half of the world's population. Human population growth and environmental impacts caused by land-use and climate change pose major threats to the sustainable production of rice in the future. Land-use intensification specifically impacts ecosystem services provided from rice fields, such as clean water for fishing. We applied the vegetation and hydrology model LPJmL to simulate future changes in crop production, water balance and in natural vegetation dynamics in 7 study areas in south-east Asia, and to quantify bundles and trade-offs of associated ecosystem services. On the Philippines and in Vietnam the projections indicate an increase in rice yield towards the end of the century under the current land use pattern. However, it turned out that land management strategies play a central role for potential changes in rice yields. Water provision for irrigated rice fields is likely to be maintained under intact forest cover in uphill areas. Under moderate climate change forests maintain the habitat structure required for pest control in rice fields, which helps to support rice production and could help to improve water quality and provide habitat for fish, an additional food source for local communities. However, under severe climate change conditions, maintenance of habitat structure may change and therewith the provision of the associated services.

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