Mapping global inundation exposure under climate change

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Changes in extent and location of inundation have major socioeconomic and environmental consequences; however, the fate of wetlands and floodplains under climate change is poorly understood at large scales. A global understanding of projected changes in inundation is necessary to inform large-scale risk assessments and to focus conservation and climate mitigation efforts on regions with either increasing or decreasing inundation exposure as they indicate growing flood or drought risks.

Our globally applicable method produces downscaled global inundation maps at an unprecedented high resolution based on discharge simulations from a global hydrological model. This allows us to forecast long-term changes to wetland and floodplain extents based on modelled future discharge which can be used to assess resultant changes in inundation exposure. We demonstrate the results of our model for Africa under a business-as-usual development pathway for the year 2050. The spatial relationship of changes in seasonal and annual inundation with rural and urban populations and agriculture highlights critical regions with increased exposure to flood and/or drought under climate change. These inundation change maps can also be applied to conservation efforts, as demonstrated through the use of our results in determining sites of concern for migratory birds in the African-Eurasian flyway.

Different populations, agricultural regions, and ecological systems have specific vulnerabilities and hydrological requirements and will face varying risks as climate changes. Our globally consistent assessment of present and future inundation extents can highlight hotspots of increased exposure, providing crucial information for risk assessments and mitigation strategies.