

EGU21-2449, updated on 24 Sep 2021

<https://doi.org/10.5194/egusphere-egu21-2449>

EGU General Assembly 2021

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Modelling population displacement: both climate change and population growth heighten displacement risk due to river floods.

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Disaster displacements create hardships, particularly for socio-economically vulnerable groups. Displaced people face heightened risks to their well-being, including their physical and mental health and personal security. Assisting displaced people is an important part of any humanitarian response to disasters.

Among weather-related disasters, river flooding is responsible for a large part of population displacement. River flood risk is expected to increase due to climate change and its effects on the hydrological cycle. At the same time, socioeconomic development scenarios indicate substantial increases of population in many regions that experience flood-induced displacement.

We have modelled projected changes to flood-driven population displacement in the 21st Century with the CLIMADA (CLIMate ADaptation) platform, in collaboration with the Internal Displacement Monitoring Centre.

We show that both climate and population change are projected to lead to an increase of relative global flood displacement risk by roughly 350% by the end of the century. If we keep the population fixed at present levels, we find a roughly 150% increase in relative global flood displacement risk by the end of the century, or a 50% increase of risk per degree of global warming. We model displacement probabilities as a function of population density, flood depth and flood fraction.

Although the resolution of the global model is limited, the effect of climate change is robust across greenhouse gas concentration scenarios, climate models and hydrological models. Our work potentially enables the creation of a displacement early warning system.