

Global climate change: Underestimated impact of sea-level rise on habitat loss?

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Global climate change is expected to cause sea-level rise of approximately 1-2 meters within this century and studies are beginning to project the consequences for humans and global biodiversity. While the direct consequences of sea-level rise due to flooding and inundation ('primary effects') are beginning to be assessed, no studies have yet considered the possible secondary effects from sea-level rise due to the relocation of human refugees into the hinterland. Researchers from the Konrad Lorenz Institute of Ethology of the University of Veterinary Medicine, Vienna, with lead author Florian Wetzel and senior researcher Dustin Penn, collaborated with scientists from the Ecoinformatics and Biodiversity Group of Aarhus University, Denmark to assess and project the potential secondary impacts of sea-level rise on habitat availability and the distribution of mammals. They found that in more populated regions secondary effects can lead to an equal or even higher loss of habitat than primary displacement effects.

Florian Wetzel, Helmut Beissmann and Dustin Penn from the Konrad Lorenz Institute of [Ethology](#) of the University of Veterinary Medicine, Vienna and W. Daniel Kissling from the Ecoinformatics and Biodiversity Group of Aarhus University, Denmark, examined the potential [ecological consequences](#) of sea-level rise on habitat availability on more than 1200 islands in the Southeast Asian and Pacific region. Most models predict a sea-level rise around one meter in this century, which is the lowest scenario they considered, though the team also looked at 3 to 6 metre scenarios, as they are possible in this or the next century.

The researchers assessed the potential consequences of human displacement on habitat availability and distributions of selected [mammal species](#). Depending upon the sea-level rise scenario, between 3 and 32 percent of the coastal zone of these islands could be lost from primary

effects, and consequently around 8 to 52 million people could become flood refugees. To assess secondary effects, the authors made the simplifying assumption that inundated urban and intensive agricultural areas will be relocated with an equal area of habitat loss in the hinterland. Their projections show that such secondary effects can have dramatic impacts on the distribution of animals. Secondary range loss effects may equal or even exceed primary effects for at least 10-18 percent of the sample [mammals](#) in a moderate scenario and for 22-46 percent in a maximum scenario. In other words, for at least 20 percent of the examined species, secondary effects can be at least as important as, or more severe than primary habitat loss effects from sea-level rise.

"Our findings suggest that to accurately identify ecologically vulnerable regions and species, it is crucial to consider secondary effects of sea-level rise," argues Florian Wetzel. The researchers also found enormous variability among regions in their vulnerability to sea-level rise, which is largely due to differences in primary versus secondary effects: species in Oceania are more vulnerable to primary effects, whereas those in the Indo-Malaysian islands - which may be affected by 7 to 48 million sea-level rise [refugees](#) - are more at risk from secondary effects. "We are aware that we are dealing with projections, and that this is a controversial topic, but we are convinced that assessments of sea-level rise should incorporate such secondary effects, or else risk underestimating the consequences of [global climate change](#) on biodiversity and ecosystems" says Dustin Penn.

More information: The paper "Future climate change driven sea-level rise: secondary consequences from human displacement for island biodiversity" by Florian T. Wetzel, W. Daniel Kissling, Helmut Beissmann und Dustin J. Penn is published in the current issue of the journal *Global Change Biology* ([doi](#):

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