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A framework for analysing cross-border climate change impacts, responses and their propagation

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Most studies of climate change impacts, adaptation and vulnerability confine their attention to impacts and responses within the same geographical region. However, cross-border climate change impacts that occur remotely from the location of their initial impact can severely disrupt societies and livelihoods (Benzie et al., 2019; Carter et al., under review). In this paper we present a conceptual framework and accompanying terminology for describing and analysing such cross-border impacts. The conceptual framework distinguishes an initial impact that is caused by a climate trigger within a specific region. Downstream consequences of that impact propagate through an impact transmission system while adaptation responses to deal with the impact are propagated through a response transmission system.

The framework recognises and classifies differences in the types of climate trigger, categories of cross-border impacts, scales and dynamics of impact transmission, targets and dynamics of responses and the socio-economic and environmental context. We will demonstrate how the framework can be applied using historical examples of cross-border impacts (e.g. the severe 2011 floods that affected industrial production in Thailand, propagating through the global economy) as well as prospective cases (e.g. multiple cross-border risks and opportunities presented by Arctic sea ice decline).

We argue that the framework provides a simple, but flexible, structure to describe and analyse cross-border climate impacts and their consequences. It offers a foundation for consistent comparisons of different patterns of cross-border impacts in different sectors and geographies. It also aids understanding of adaptation strategies and their potential consequences. In particular, with systematic application of the framework it is possible to highlight gaps in our existing understanding of system dynamics, or gain new insights into particular leverage points within the system. These can be targeted in order to find ways of building resilience to climate change in the region of origin, along the impact transmission system and in the recipient region exposed to the propagated risk.

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References

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