VIEWpoint 新观点

Flood footprint assessment: a new approach for impacts and recovery

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Explainer | Accessible research from Climate Science for Service Partnership (CSSP) China, for decision-makers No.11

Focus

For investment in flood risk management options, it is crucial to identify the 'blind spots' in critical infrastructure and vulnerable sectors in economic supply chains and social networks. The Flood Footprint Model enables measurement of the indirect economic impact of natural disasters and allows for different post-flood economic recovery plans to be explored by policy-makers. It focuses on post-disaster demand and supply imbalances, the distribution of remaining resources and the role of producer and consumer adaptive behaviour.

Importance

Many studies pay close attention to the social and economic impacts of natural hazards, such as floods, and are often focused primarily on direct losses (short-term physical impacts on natural resources, people, capital stock, and other tangible assets). However, these are only a fraction of the total loss. Indirect loss refers to the economic impact and/or loss resulting from flood-induced losses, delays, disruption of economic activities and the costs of reconstruction.

Direct economic loss due to a natural disaster is often estimated by government authorities or insurance companies through first-hand data surveys and interviews, or it is calculated using disaster models based on physical properties (e.g. infrastructure). There are four main approaches to estimating the indirect economic losses of a natural disaster: post-disaster economic surveying; econometric modelling "(these are both from primary data sources); input-output (IO) and computable general equilibrium models. In particular the IO-based Adaptive Regional Input-Output (ARIO) model is one of the most significant contributions in the area of natural disaster impact assessment (Hallegatte, 2008)

Approach

The concept of a 'flood footprint' (first proposed by Mendoza-Tinoco et al. (2017)), belonging to the ARIO class of models is applied to characterise the total (direct and indirect) economic impact of a flood. The idea is extended to include the role of consumer and producer flexibility and adaptability, and the role of alternative options in starting and maintaining the recovery process.

Two assumptions are made: one is that foreign relations are stable in the pre-disaster situation; and the other is that imports, as external resources, are allowed during the post-flood recovery period.

Next steps

This study offers a broader perspective to disaster risk analysis and management and offers several post-flood economic recovery plans to policymakers by simulating various recovery conditions in the aftermath of a flood, such as alternative labour (workforce) or infrastructure recovery plans. However, since there is as yet little statistical data about how sectors and economic systems recover after a disaster, critical testing of the model is still difficult.

More specific information on novel recovery methods and impacts needs to be collected and more effort needs to be put into future research. Because sudden-onset catastrophes seldom come alone and are rarely confined to single regions, the model will be continually improved and applied to single/multiple disaster events in single/multiple regions.

References

Zhao Zeng et al., 2019 DOI:10.1016/j.jhydrol.2019.124204

Hallegatte 2008 DOI:10.1111/j.1539-6924.2008.01046.x

Mendoza-Tinoco 2017 DOI:10.1016/j.jclepro.2017.09.016

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