Incorporating the insurance value of peri-urban ecosystem services into natural hazard policies and insurance products: Insights from Mexico

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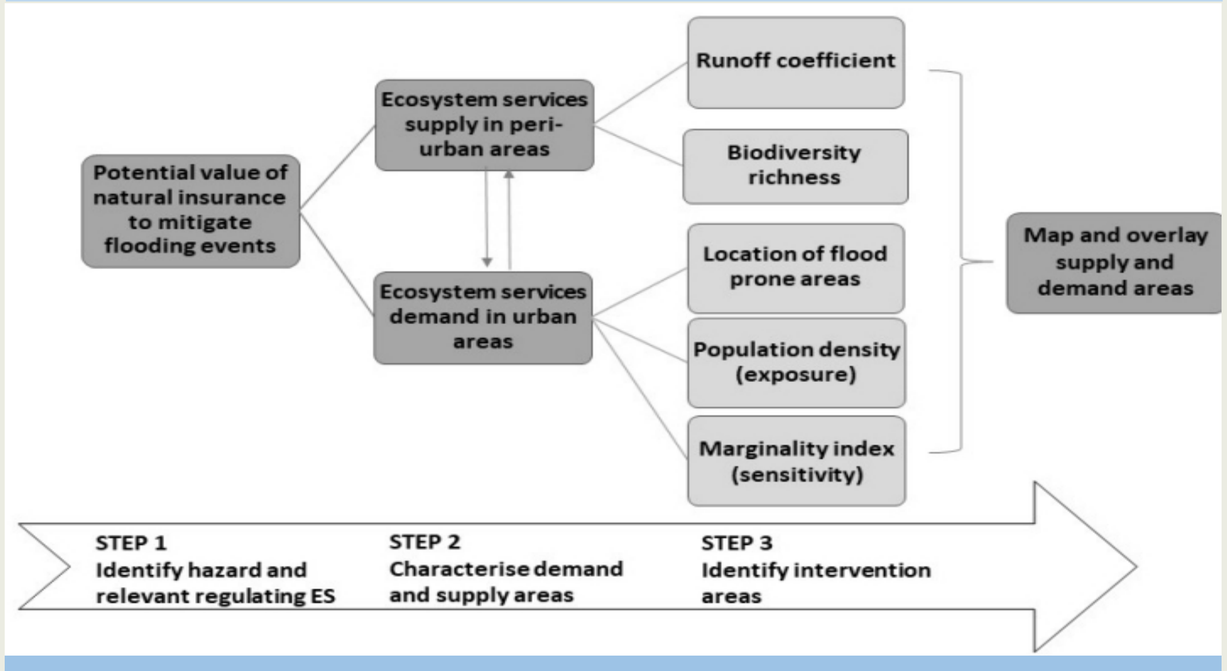
Context

Understanding how to adapt to increasing risk under climate change is essential for governments wishing to mitigate harms and manage insurance and disaster assistance costs. An approach that values the public good of hazard mitigation provisioned by natural ecosystems could also incentivise government, beneficiaries and insurance companies to share responsibility and funding for targeted conservation and restoration. To illuminate this concept of the insurance value of ecosystems, it is important to map the relationship between the area(s) that benefit from and provide regulating ecosystem services and to identify what determines the level of protection. In the case of flood control regulation that benefits at-risk urban areas, upstream or inland peri-urban areas are key.

Conceptual diagram of method



Results

Key results are the further development of a spatial database, maps (e.g. Figures 1-3) and insurance value estimates.

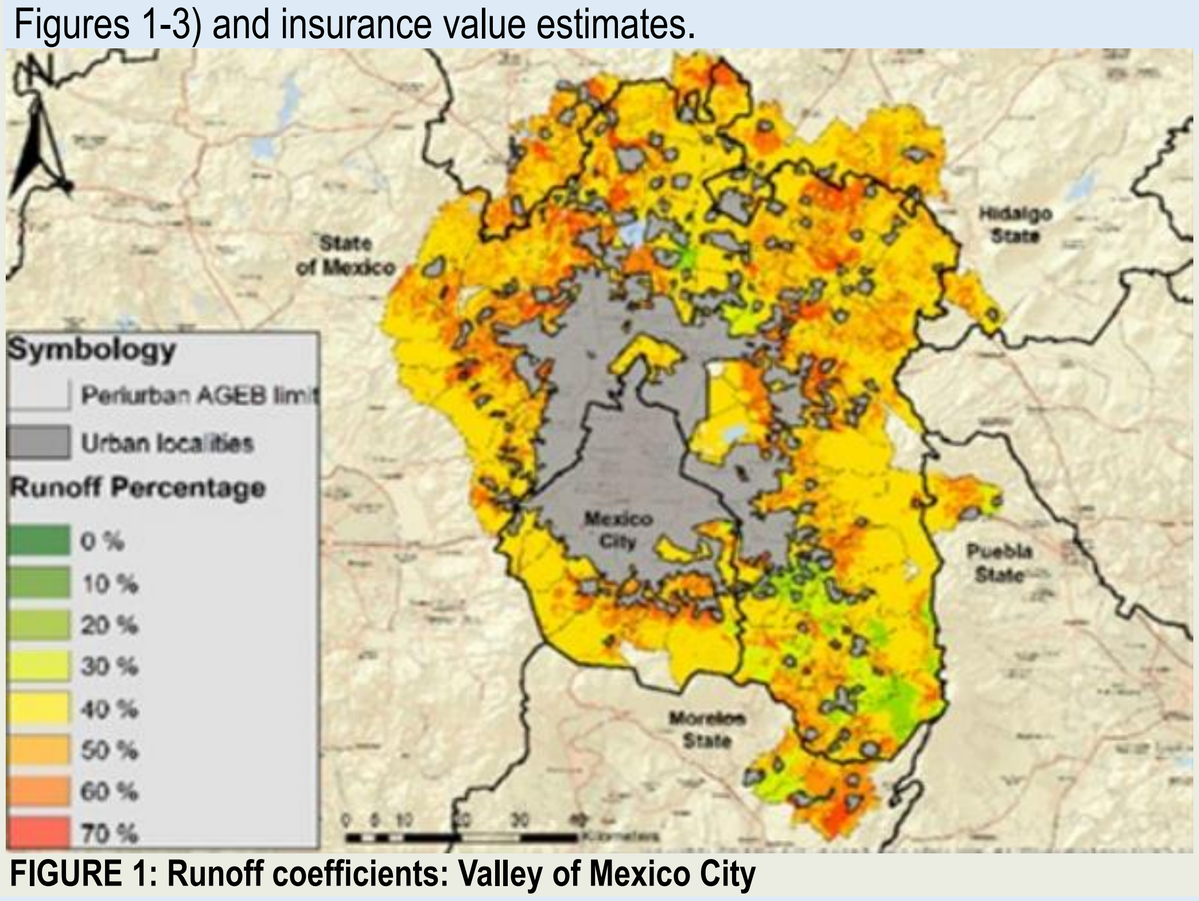


FIGURE 1: Runoff coefficients: Valley of Mexico City

Utilising econometric functions we estimate the costs of flooding events, of different flood depths, to different types of households, e.g. if 600 households were flooded to a depth of 30 cm in an area with a high marginality index (more deprived neighbourhoods), we estimate flood damages at 26.92 million pesos (US$1.41 million). We also estimate the value of specific interventions, e.g. if modelling indicates that native tree planting would reduce runoff coefficients and corresponding flood depth from 30 cm to 20 cm, estimates of the decrease in damage costs in an area with medium marginality index is 26.89 million pesos (US$1.41 million). Such estimates could be compared to the costs of maintaining or enhancing ecosystem service provision or to other options, e.g. flood defences, hazard insurance.

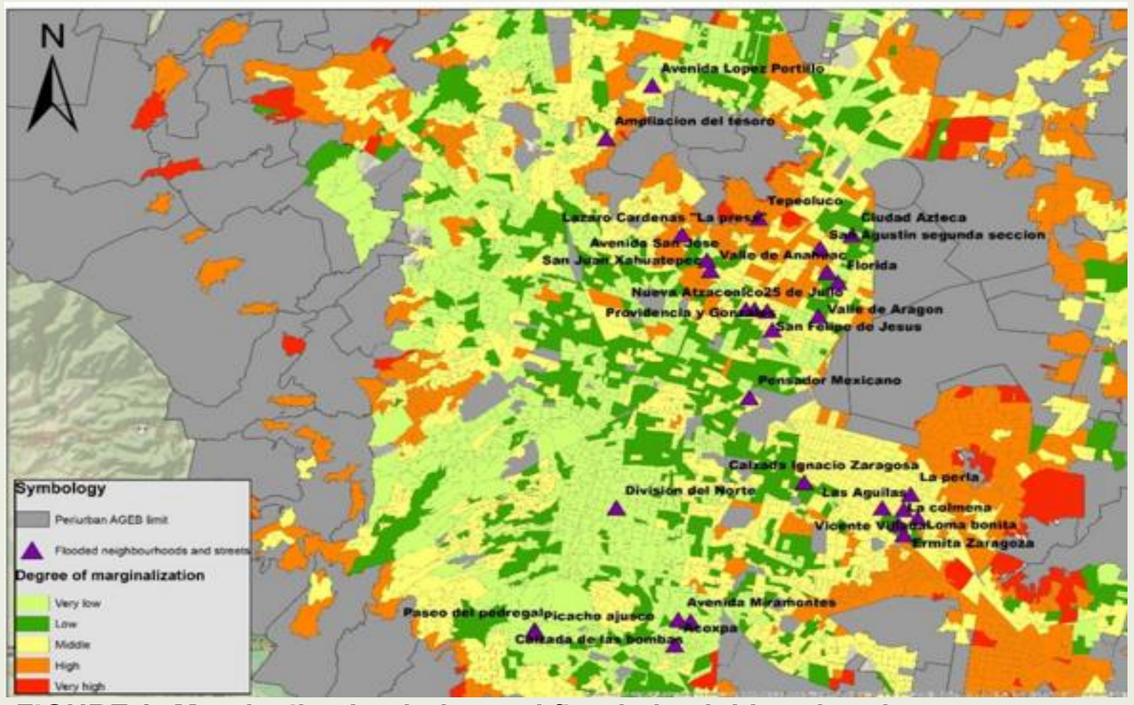


FIGURE 2: Marginalisation index and flooded neighbourhoods

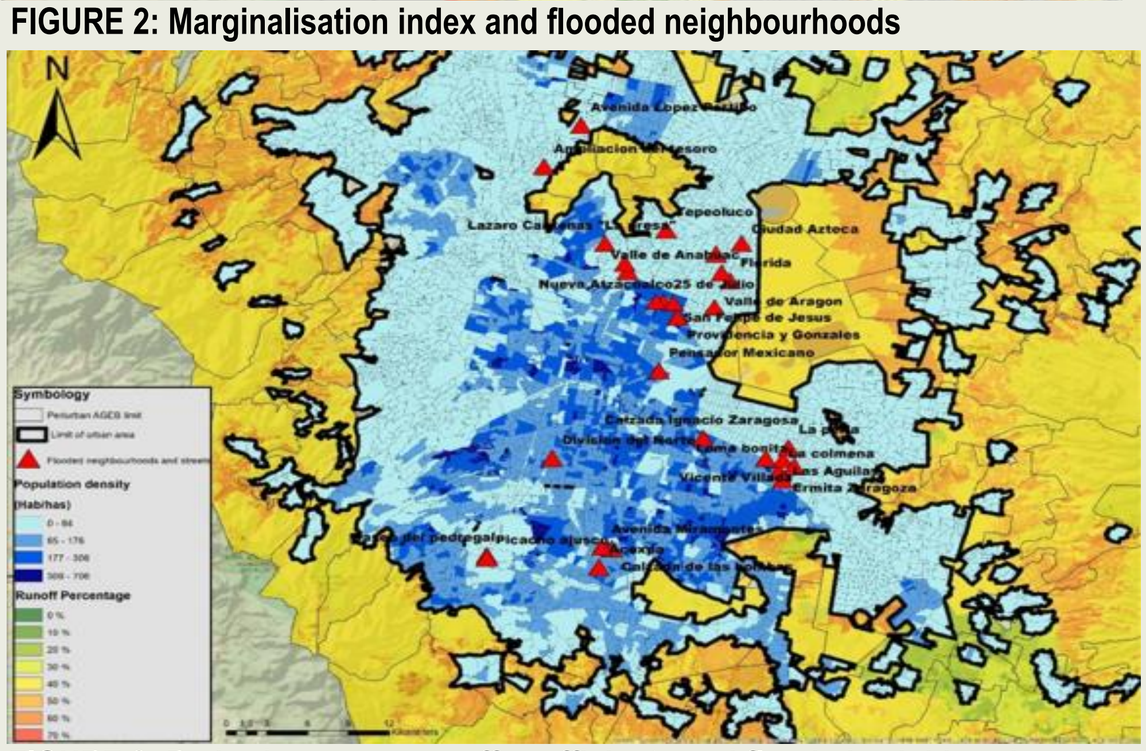


FIGURE 3: Peri-urban areas runoff coefficients and flooded neighbourhoods

Conclusions

Our spatial analysis shows how to link regulating ecosystem service restoration and conservation to provide solutions to increasing multiple risks under climate change. The framework developed and applied provides another step to inform risk management policies, better adaptation strategies and incentivise new hazard insurance schemes.

On a policy level, this requires long-term planning and funding to protect those aspects that provide insurance value and the identification of public-private partnerships including the design of insurance schemes to incentivise risk reduction, damage mitigation and to co-fund ecosystem service restoration following hazard damage. Mexico has developed some institutional capacity for risk management. Nevertheless, most official data is provided at the state level scale and does not adequately cover urban areas. The inclusion of the insurance value into insurance schemes and risk management information tools, with spatial analysis, would strengthen Mexico's capacity to mitigate risks.

New policy that connects urban communities to their catchments could provide impetus to minimise land-use change in peri-urban areas as a hedge against multiple risks. Urban residents are affected more often and by more severe flood events and thus might be ready to adopt solutions that protect them against these losses. By connecting benefiting to providing areas there is a possibility to develop insurance schemes that pay to reduce risk. Maintaining or enhancing the insurance value currently provided as a public good will involve land management and there is opportunity to engage ejido communities to conserve those aspects of their lands that underpin this insurance value. A co-benefit is that such investment would also enhance in situ resilience critical to these vulnerable communities. Lessons learned in the operationalisation of insurance value in policy and insurance practice could be transferred to other vulnerable communities worldwide.

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