# Extreme events: Ecosystems offer cost-effective protection

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Decision-makers around the world are increasingly interested in using ecosystem solutions such as mangroves, coral reefs, sand dunes and forests on steep slopes to help buffer the impacts from hazard events and

protect populations. But what evidence exists to show the efficacy of nature-based solutions over man-made protective measures to reduce the impacts of the increasing numbers of hazard events humanity faces due to climate change?

An international, multi-disciplinary team of 28 researchers has examined nearly 20 years' worth of peer-reviewed studies on the impacts of ecosystem-based disaster risk reduction (DRR) efforts to, for the first time, summarize the state of knowledge of ecosystem services and functions for DRR. The team reviewed 529 English-language articles to catalog the extent of knowledge on, and confidence in, ecosystems in reducing disaster risk.

"This is the most extensive and up-to-date assessment of the role nature-based solutions can play for reducing impacts of natural hazards" affirms Dr. Jaroslav Mysiak, director of the research division 'Risk assessment and adaptation strategies' at the CMCC Foundation—Euro-Mediterranean Center on Climate Change. "It complements the recently released European Environment Agency's report in the context of climate change and resilience".

As reported in the article published by the journal *Nature Sustainability*, researchers assessed the state of knowledge on the role ecosystems play in reducing the disaster risk: from the management of wildfires to the mitigation of flooding in urban areas through the implementation of green design, from the use of vegetation on steep slopes to cost-effectively reduce mountain hazards—such as mudslides and avalanches—to the management of stormwater.

Their review of existing research reveals that persistent droughts, land degradation and desertification are often slow-onset processes in drylands that, over time, may well lead to disaster. Importantly, they found ample evidence of how ecosystem-based approaches in areas

susceptible to drought can reduce the impacts of climate change.

The main author of the article Karen Sudmeier, Senior Adviser, Disaster Risk Reduction, United Nations Environment Programme writes in a blog post: "Two decades of research analyzed over six years left us with a number of questions: we know there is evidence that most ecosystems reduce the impacts of hazard events in a cost-effective manner. Now we need to disseminate this evidence in the language that decision-makers speak: how much, how high, how wide? We also need to focus our attention on performance standards, green design blueprints, ecological engineering standard operating procedures and the specs that will provide the ultimate evidence base to draw attention and investment to nature's solutions to increasing numbers of hazard events worldwide. Our research in this growing field has only just begun."

**More information:** K. Sudmeier-Rieux et al, Scientific evidence for ecosystem-based disaster risk reduction, *Nature Sustainability* (2021). DOI: 10.1038/s41893-021-00732-4

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