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A multi-disciplinary approach for the integrated assessment of multiple risks in delta areas.

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The assessment of climate change related risks is notoriously difficult due to the complex and uncertain combinations of hazardous events that might happen, the multiplicity of physical processes involved, the continuous changes and interactions of environmental and socio-economic systems.
One important challenge lies in predicting and modelling cascades of natural and man –made hazard events which can be triggered by climate change, encompassing different spatial and temporal scales. Another regard the potentially difficult integration of environmental, social and economic disciplines in the multi-risk concept. Finally, the effective interaction between scientists and stakeholders is essential to ensure that multi-risk knowledge is translated into efficient adaptation and management strategies.
The assessment is even more complex at the scale of deltaic systems which are particularly vulnerable to global environmental changes, due to the fragile equilibrium between the presence of valuable natural ecosystems and relevant economic activities. Improving our capacity to assess the combined effects of multiple hazards (e.g. sea-level rise, storm surges, reduction in sediment load, local subsidence, saltwater intrusion) is therefore essential to identify timely opportunities for adaptation.
A holistic multi-risk approach is here proposed to integrate terminology, metrics and methodologies from different research fields (i.e. environmental, social and economic sciences) thus creating shared knowledge areas to advance multi risk assessment and management in delta regions.
A first testing of the approach, including the application of Bayesian network analysis for the assessment of impacts of climate change on key natural systems (e.g. wetlands, protected areas, beaches) and socio-economic activities (e.g. agriculture, tourism), is applied in the Po river delta in Northern Italy. The approach is based on a bottom-up process involving local stakeholders early in different stages of the multi-risk assessment process (i.e. identification of objectives, collection of data, definition of risk thresholds and indicators). The results of the assessment will allow the development of multi-risk scenarios enabling the evaluation and prioritization of risk management and adaptation options under changing climate conditions.