

# **PAGER-O: using a pan-participatory approach to develop an earthquake scenario to co-identify risk, co-explore pathways to resilience, and motivate co-action in Weinan City, China**

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## **Introduction**

The project of PAGER-O (Pan-participatory Assessment and Governance of Earthquake Risks in the Ordos Area) is part of an UK-China collaboration programme “Increasing Resilience to Natural Hazards in Earthquake-Prone Regions in China (IRNHiC)” jointly funded by the National Natural Science Foundation of China (NSFC) and by the Natural Environment Research Council (NERC) and the Economic and Social Research Council (ESRC) of the UK. This project evolved from and substantially extended the reach and depth of a prior NERC/ESRC-funded international collaboration project: Earthquakes without Frontiers (EwF). The study areas of the EwF project are coincidentally very similar with the areas covered by the Silk-Roads.

Earthquake disaster reduction approach in China is essentially top-down. However, top-down management alone is not enough to increase society’s total resilience to earthquake. A governance model that builds on existing top-down approach and incorporates bottom-up engagement of grass-roots and the public is an effective pathway to the problem. The overall objective of the PAGER-O project was thus to (i) identify opportunities for establishing governance models that combine these two top-down and bottom-up approaches; and (ii) bridge the gap between scientific understanding of earthquake hazards and risks, and earthquake disaster risk reduction (DRR) practices, especially for grass roots and public usages, which is crucial to the combination of the two approaches. Focusing on Shaanxi province in the Ordos area, which is the starting place of the silk-roads, the project undertook a series of baseline and social science surveys and analysis on the multi-scale earthquake disaster awareness, resilience and risk at personal, household, community, and county-levels. Based on this understanding, the project systematically addressed the two gaps through developing a detailed earthquake scenario for Weinan city (Weinan scenario work) in the province.

## **Methods**

Weinan scenario work covered many disciplines and involved both researchers and various local stakeholders. We therefore used a pan-participation approach and various “on-site” collaboration processes as the project’s overarching methodology to facilitate incorporating various local knowledge and views, and bringing together quickly the expertise and understanding of a large variety of trans-disciplinary researchers and local practitioners in a face to face manner.

## **Results**

The PAGER-O project brought together a broad trans-disciplinary team of international and Chinese physical science, social science, policy and engineering researchers, and local stakeholders to co-identify earthquake risk, co-examine effective top-down vs. bottom-up linkages, co-explore pathways to resilience, and then, foster consensus, and motivate co-operative action for reducing earthquake risk. The project has produced over dozen technical SCI papers that have already been published, or are under review, documenting the findings of the project. These include papers on the scenario earthquake (which was based on the 1568 northeast Xi’an approximately magnitude 7 earthquake), on the likely damage and losses that would be incurred should this earthquake recur in the present day, the process of developing the scenario, and understanding on the human and social dimensions of the associated issues. Accompanying these technical papers, and with the understanding that DRR education should be the most practical, sustainable, and extensive linking direction between the top-down and bottom-up approaches, the project created two audience-specific earthquake scenario narratives using a combination of storytelling, technical information, and earthquake disaster reduction “tips” for the public to demonstrate how better scientific knowledge can improve DRR practices. One is designed specifically for government officials, the other for the general public. The two different narratives not only provide easily understood, science-based advice, but can also be used to stimulate further discussions about how to improve and better link top-down and bottom-up DRR approaches, and will be a useful resource for DRR education in communities, schools and other educational establishments. This combination of international, collaborative pan-participatory research, and the wide range of publications produced for different audiences provided a model for the research community in China addressing similar issues in earthquake DRR, and will, we hope, contribute substantially to increasing resilience to earthquake disasters in the study area and beyond. This trans-disciplinary international collaboration in the context of China context also produced plenty of informative experience for the international similar studies. The most obvious ones include the deep impacts of the powerful top-down administration system in the country and the broad influence from relatively low disaster literacy (and sometimes unclear) of the general public, which not only impacts substantially the whole implementation process of the research, but also determines greatly the difficulties and applicable prospects of the application products of the research.

## **Key words**

Pan-participatory approach; Earthquake scenario; Earthquake risk; Earthquake resilience; Governance; UK-China collaboration; Weinan city, China.