

Social vulnerability in the flood-prone anthropogenic landscape of Northern Italy

Giulia Roder (1), Giulia Sofia (1), Zhifeng Wu (2), and Paolo Tarolli (1)

(1) Department of Land, Environment, Agriculture and Forestry, University of Padova, Legnaro (PD), Italy
(giulia.roder@phd.unipd.it), (2) School of Geographical Sciences, Guangzhou University, Guangzhou 510006, China

The practices for reducing the impacts of floods are becoming more and more advanced, centred to the communities and reached out to vulnerable populations. Vulnerable individuals are characterised by different social and economic attributes that can alter their capacity to cope with disaster events. The Social Vulnerability Index (Cutter et al. 2003) provides an empirical basis to compare social variances in different spatial scenarios and environmental threats. This methodology has been readjusted to the flood-prone anthropogenic landscape of Northern Italy adapted to the societal and historical construction of this area. In fact, the fifteen census variables used have been contextualised by examining the economic crisis, the modification of the labour force, the gendered life expectancy, the immigration among much more. At a general consideration, the unstable economic status, the population growth, age, and ethnicity are the major social attributes affecting the residents of the floodplain. The cluster analysis performed by the calculation of univariate LISA ratifies the spatial distribution of the index (Moran's I of 0.39 showing a positive correlation) finding the main high-high clusters in the Western and the outlet of the Po River basin. This basin includes one-third of the Italian population and this anthropogenic footprint has consistently modified the basin natural and geological environment (Carminati and Martinelli 2002) to the point that the hydraulic system will be dramatically altered in the future (Dankers and Feyen 2008).

The spatial identification and the inclusion of vulnerable people into the risk management planning process have been widely discussed in the Sendai Framework for Disaster Risk Reduction. For this reason, we analysed the flood risk resulting from the combination of high vulnerable areas with the highest flood hazard scenario. The hazard map, finalised in May 2015, has been provided by ISPRA Institute with a three-class flood probability distribution. Within the floodplain, it has been found that only 22 municipalities are located in a high-risk location: Lombardia (10; 12.5 %), Piemonte (9; 2.7 %) and Veneto (3; 10.7 %) region. These regions are the most economically competitive regions within the North of Italy with elevated levels of human-landscape interactions. Low scores of susceptibility coupled with high flood exposure areas (i.e. the Polesine region) need to be taken into account in flood reduction policies. For this reason, smallest areas can be used as macro-scale analysis with a municipality-scale subdivision to examine the societal characteristics of the community and their locations. This would benefit practitioners and managers to produce rapid flood emergency evaluations and focused land plans. Undeniably, social vulnerability and risk maps are only a part of the efforts needed to reduce the risk posed by environmental hazards. In fact, there is the need of a multi-stakeholder participation at all levels, from managers to politicians to plan, finance and finalise those actions aiming at empowering the most vulnerable people that live in flood-prone regions. Also, there is a need to stimulate researchers to contribute qualitatively to quantitative researches as documented by the EU Flood Directive 2007/60/EC.

References:

Carminati, E., and G. Martinelli, 2002: Subsidence rates in the Po Plain, northern Italy: The relative impact of natural and anthropogenic causation. *Eng. Geol.*, 66, 241–255, doi:10.1016/S0013-7952(02)00031-5.

Cutter, S., B. Boruff, and W. Shirley, 2003: Social vulnerability to environmental hazards. *Soc. Sci. Q.*, 84, 242–261, doi:10.1111/1540-6237.8402002.

Dankers, R., and L. Feyen, 2008: Climate change impact on flood hazard in Europe: An assessment based on high-resolution climate simulations. *J. Geophys. Res. Atmos.*, 113, 1–17, doi:10.1029/2007JD009719.

ISPRA (Istituto Superiore per la Protezione e la Ricerca Ambientale), 2015: Geoportale ISPRA Ambiente. Accesso alla cartografia. <http://geoportale.isprambiente.it>. (Italian)

The European Parliament and the Council of the European Union. Directive 2007/60/EC of the European Parliament and the Council of 23 October 2007 on the assessment and management of flood risks. Off. J. Eur. Union 2007, L288–27