



Designing a spatial decision-support system to improve urban resilience to floods

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Since Hurricane Katrina (2005), the scientific-political-urban attention is focusing on urban resilience to floods. To prevent the recurrence of such a deadly and costly event (\$ 82 billion, Serre et al, 2014), experts began to question pre- and post- disaster management. Until now, managers and urban planners have been working on flood risk, according to the paradigm of prevention. However, following Katrina, a new approach was gradually integrated and the concept of resilience applied to urban areas (Serre, 2011). The resilience concept, used in ecology and defined by Holling (1973), refers to the ability of a system to keep its own variables despite changes and analyses the capacity of an (eco)system to tolerate disturbances without changing its state. To link it with flood risk management, this concept takes more into account water and would lead to technical, architectural, social, urban and political innovation (Serre et al, 2016). However, despite 12 years after Katrina, very few concrete actions have been made (Barroca and Serre, 2013).

Based on this argument, and several abortive studies, we wish to re-address the operationalization of resilience by redefining its objectives and expectations. While in Europe some studies have been done to build up vulnerability indicators (Barroca et al, 2006; Opach et al, 2016; Wiréhn et al, 2016), few still talk about resilience. When some do (Folke et al, 2010; Lhomme et al, 2011; Nguyen et al, 2013; Suarez et al, 2016), they mainly speak about technical resilience without integrating social resilience. Our objective is thus to imagine a system facilitating the understanding of this concept, its integration in management and development policies. We started on the methodology of information systems, organized system for collection, organization, storage and communication of information, and more precisely on observatories, information systems using the methodology of observation. These last years, we assist to an increase of these observatories (Dolique, 2013), observatories which are focused on different fields as, risk observation (PACA regional risks observatory), environmental observation (Environmental virtual observatory), ecological observation (National ecological observatory), etc. Usually, an observatory focuses either on a scale (generally national or regional) or on a fact (risks, environment, energy, economy, etc)

Our objective is to develop an observatory tested on the territory of Avignon, to design a tool for analyzing resilience according to indicators which would measure technical resilience (urban and suburban networks), urban resilience (buildings and critical infrastructures) and social resilience (knowledge of risk, memory of the disaster, perception of vulnerability). Our tool would be designed with the help of our socio-economic partner which is the city of Avignon, and would provide a clearer picture of the resilience for managers and inhabitants. It would be participatory and social insofar as, following the assessment of the existing resilience thanks to the indicators, it would be make the territory more resilient thanks to expert advices and participatory workshops for the inhabitants and managers.