Towards mOre Resilient Cities (ToRC)

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EXTENDED ABSTRACT

According to the recent OECD's Environmental Outlook to 2050 the number of severe floods and droughts has increased worldwide. There are enough evidence and studies that support that climate change is affecting the frequency of extreme events (e.g. rainfall) and consequently the probability of flooding as reported in the IPCC (Intergovernmental Panel for Climate Change)(Barker, 2007). Cities in Asia are pointed as the most likely to be affected. Recent data from the Centre for Research on the Epidemiology of Disasters show that floods accounted for over 40% of what it terms weather-related disasters in the period between 1980 and 2009. Developing increased flood resilient cities has proved a major challenge in both developing and developed countries. The need for earlier actions to reduce the effects of climate change (Minister & Review, 2007) and the room for improving cooperation in tackling flooding (Pitt, 2008) are the two pillar principles. A global framework, taking into account various expertise fields is thus necessary.

In this paper four areas leading to flood resilience are highlighted (Figure 1): (a) drainage systems design and modelling, (b) emergency logistics, (c) city development and (d) geographic information systems (GIS). These four areas are discussed in the following sections. The benefits and difficulties of the proposed global framework are presented in the paper.

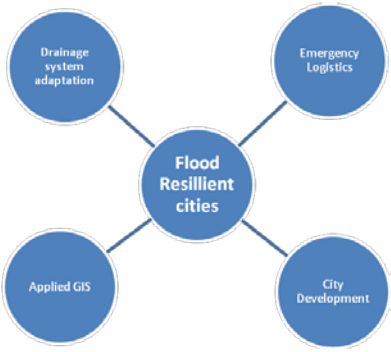

Figure 1. – Structure of the Towards more Flood Resilient Cities (ToRC) workshop

Modelling floods accurately can add to the Prevention, Preparedness, Response and Recover (PPRR) concept by allowing understanding the flood event and answering simple questions such as: (i) how flood propagates with time, (ii) what are the magnitude and

duration of the flood events. The use of different approaches and different equations allows considering a wide pallet of models from which to choose from. The most accurate but computationally expensive model may turn out not to be the best option. The most efficient model should be selected, i.e. a model fit for purpose. For example, Ponce et al. (1978) investigated thoroughly the range of applicability of kinematics and diffusion models. By calculating the propagation celerity and logarithmic decrement corresponding to both models, they were able to define the range of applicability for the two models.

In recent years, an increasing discussion on integrated disaster planning and management has taken place, as an efficient and necessary approach to find solutions for complex disaster management (Simonovic, 2011). Integrated disaster management should be considered an iterative process of decision making divided into four phases: prevention (long-term planning), preparedness (before the disaster), response (during the disaster), and recovery (after the disaster). The implementations of such process will most definitely involve a paradigm shift in both literature and current practices; most papers on disaster management deal with only one of the four phases, while new computational capacities and the enhancement of modelling tools allow the integration of all phases.

The need to move towards more flood and drought resilient cities is a challenge that is gradually gaining more relevance. A global framework approach should be developed in advance, which should be flexible and that can easily accommodate time as variable. Flood Prevention, Preparedness, Response and Recovery cannot be addressed without the consideration of the four capital areas comprised in the proposed city flood resilience global framework (see Figure 1).

This global framework also needs to take into consideration major drivers such as population growth, urban development, societal needs, new technologies and climate change. Uncertainty must be added to these drives and propagated through state-of-the-art flood models. Only then, credible confidence intervals can be incorporated into forecasts and future projections. Emergency logistics need a solid understanding of the flood behaviour in order to provide and propose guidance lines for different players using a proper GIS interface, yet providing enough flexible solutions.

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