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Using participatory geographic approaches for urban flood risk in Santiago de Chile: Insights from a governance analysis

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ABSTRACT

Studies based on information acquired by participative geographic approaches have sought to cope with emergency situations and disasters such as floods. However, the impact of these approaches to flood risk governance systems in order to understand these types of events as a complete risk cycle is still not clear. This paper focuses on analysing the governance possibilities of using participative geographic information like volunteered and public participatory geographic information for flood risk reduction in the case of Santiago de Chile, a city which regularly experiences urban floods during rainy seasons. Based on in-depth interviews and document analysis, our study indicates that a relevant part of the current information used for flood risk reduction efforts is provided to local and regional authorities by the affected population. Though, local actors are not recognized by central agencies as valid agents for the production of official information. Moreover, there are neither instances of communication or deliberation with the community, which reduces the capacity of local actors to discuss possible solutions. Participative geographic instruments are seen as potential mechanisms to strengthen work relations among local actors and authorities, by enhancing new logics for producing and sharing information. The impacts for the current risk governance system though can be diverse depending on the participants' level of commitment of participants and the political relations between actors and agencies. Considered as merely data acquisition and analysis mechanisms, participative instruments reproduce the existing hierarchical top-down structures. Furthermore, local-based approaches can enhance local work, support local diagnostics and increase the decision capacity of citizens.

1. Introduction

Urban floods are considered as one of the most challenging risks affecting urban areas due to the increasing demographic changes in exposed zones and more frequent extreme climatic events (Wilby and Keenan, 2012). In cities like Santiago de Chile, floods have been particularly threatening, leading to considerable damages to roads, public infrastructure and houses (Ebert et al., 2010; Rojas et al., 2014). It is expected that these hazards increase in the future due to the increment of extreme hydrological events such as intense rainfalls and high temperatures (Cortés et al., 2012; Falvey and Garreaud, 2009).

Threats related to urban floods bring several challenges to governance systems for understanding the main impacts of rainfalls in urban areas and developing effective mitigation, preparation, response and recovery plans. While until recent years literature on flooding has focused on response infrastructure to face this type of events, the increasing costs and damage of floods have driven the discussion to a more holistic and long-term vision of the problem (Scott et al., 2013). This has posed several challenges for flood risk reduction systems to create new forms of risk communication and to develop tools for visualizing risk information (Maidl and Buchecker, 2015), but also to establish networks among authorities and local actors for including their experience and knowledge within decision-making processes. Experiences like citizen observatories have sought to respond to such challenges, by enabling two-way communication processes between citizens and decision makers for a better observation and understanding of the environment (Wehn and Evers, 2015; Liu et al., 2014). Projects like WeSenseIt in European countries (Lanfranchi et al., 2014) and AGORA in Brazil (Horita et al., 2014) have used new digital technologies to enhance the

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involvement of users in data collection and engage the community in decision-making processes related to water and flood management.

Several participatory efforts have emerged from Geography aiming at including citizen groups and local actors in geographic data collection and analysis (Dunn, 2007; Crooks et al., 2013; Goodchild, 2007). In particular, many advances have been achieved for analysing emergency and disaster responses to urban floods using user-generated geodata (de Albuquerque et al., 2015; Dorn et al., 2014; Herfort et al., 2015; Starbird et al., 2010). Nevertheless, only a scarce number of studies has analysed how these tools can be used within a complete risk cycle, namely at a mitigation, preparedness, response and recovery level (Horita et al., 2013; Klonner et al., 2016; Levental, 2012). The impacts that these tools present for supporting or transforming risk governance processes and structures for collecting, sharing and using information are still unclear. At this level, the question emerges whether participatory geographic instruments have an impact on governance processes and structures, either changing or perpetuating current relations and mechanisms for collecting and analysing geodata for the different risk phases.

Based on in-depth interviews, institutional documents analysis and the creation of codes for data analysis, the study seeks to analyse the opportunities and limitations of participative geographic approaches for supporting flood risk governance in Santiago de Chile. It firstly examines Santiago's flood risk governance system, focusing particularly on the structures and processes related to flood risk reduction in Santiago. To achieve this, actors and entities involved in the production, circulation and application of information are identified, together with the main mechanisms and instruments for addressing such tasks. Quilicura and La Florida communes are considered for conducting interviews with local actors and agencies as they are areas of the city commonly affected by urban floods during rain seasons. After that, the article explores the current tensions within Santiago's flood risk governance system, and the implications of using different approaches of participative instruments for supporting information processes at every flood risk stage. Particularly, Haklay's typology of participation (Haklay, 2013) is considered together with Elwood and Mitchell's distinction among strategies and tactics (Elwood and Mitchell, 2013) in order to discuss the scope and limitations of participatory mechanisms for Santiago's flood risk governance system.

2. Participatory geographic efforts for risk reduction governance

The notion of governance emerges as an alternative to traditional approaches of management and governability. It is defined as structures or the variety of political agencies and non-governmental entities designed to address policy-making problems, but also as processes or interactions among structures leading to expected outcomes (Pierre and Peters, 2000). In this sense, governance of risk could be defined as the structure and processes for leading collective decision-making – including both government and non-government actors – for coping with risk situations threatening a certain group of the population (Renn, 2008). This can be additionally supported by the notion of governance of information, which refers to the structures that focus on the searching, finding, creation, use and exchange of information (Kooper et al., 2011). Both concepts go beyond the notions of management and government since governance encompasses social, political and communicative processing, including decision making structures, alignment processes and communication tools (Weill and Ross, 2004; Kooper et al., 2011; Renn, 2008).

Unlike governance processes and structures in private industry, governance of information in risk contexts is not exclusively focused on governmental agencies and private companies, but it also includes the population exposed to hazards and social organizations related to the topic. In this sense, public involvement in risk governance processes has been considered as a fundamental challenge for achieving efficient, effective and fair governance systems (Renn, 2008).

Over the last years, a wide range of participatory approaches developed within Geography and Geographic Information Science have been developed to connect citizens with authorities in the production and sharing of geoinformation. According to Haklay (2013), this participation is not immovable. Rather, it depends on the technical skills and expertise that participants show in the topic of study. The author states that, a first level of participation – known as crowdsourcing – focuses on the provision of geo-localized data by the use of applications from Internet-enabled devices such as smartphones equipped with global positioning systems (Kamel Boulos et al., 2011). Here, cognitive engagement is considered minimal and the main goal is the generation of real-time information of a specific event or issue and relying on information shared by people in Web platforms like Twitter, Flickr and Foursquare. This logic of data collection has been also framed within the notion of ambient geospatial information (AGI), which refers to mechanisms for collecting data from messages with information related to the location of the user, like GPS-based coordinates or location references provided by user's profile (Crooks et al., 2013).

A next level is based on the cognitive ability of the participants, who receive a brief training for data collection and simple interpretation activities. This "distributed intelligence level" includes volunteered geographic information (VGI) approaches, which have been related to geographical features and locations collected through the capacity of users to access and to add information to servers' databases (Goodchild, 2007). Unlike AGI, VGI can be defined as the result of a widespread engagement of a large amount of citizens in the creation of information related to geographical features and locations, which has been possible due to the capacity of users to access and to add geoinformation to servers' databases (Sieber and Haklay, 2015).

In a further stage (participatory science) participants are actively involved in the definition of the problem, the collection of data and the analysis (Haklay, 2013). This stage includes Participatory GIS (PGIS), Public Participatory GIS (PPGIS) and Community-Integrated GIS that enhance the collective production and use of geographic information in cases where local actors are aware of the main problems that affect the community (Dunn, 2007). Finally, a level of extreme citizen science referred to by Haklay is based on a complete collaborative process in which participants work – both with and without scientists as facilitators – on the definition of the problem, the data collection methods and the analysis. At this stage, participants have the possibility of working both with and without scientists as facilitators, which settles a heterogeneous group of actors carrying out the whole process to achieve a certain goal.

Geographic participatory efforts have been also associated with political possibilities of making knowledge public and creating new spaces of civic participation (Elwood and Mitchell, 2013; Georgiadou et al., 2014; Meier, 2011). According to Elwood and Mitchell (2013), participation can be framed within instances for creating new strategies and new tactics. Based on de Certeau's theoretical framework, the first level refers to the "politics from within" or "gaining access to existing structures of deliberative democracy", while tactics are related with the "politics from outside" or "an alternative realm for a citizen voice" (Elwood and Mitchell, 2013Elwood and Mitchell, 2013, 279). Hence, the authors