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Mapping an alternative community river: The case of the Ciliwung

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ABSTRACT

Dense, self-built settlements along riverbanks within Asian cities are often excluded from the planning realm, which ensures governments lack knowledge of how particular communities function. The magnitude of land area and population, dynamic local economies, organic policy making processes, and scarcity and consistency of data challenge research on flood impacts and possible solutions in Asian cities. Resultantly, a deeper understanding of alternative and more dynamic forms of environmental management is necessary. The focus of this paper is to analyze the usefulness and challenges of participatory mapping in relation to urban floods, particularly community mapping and crowd-sourced mapping. This analysis is based on the assumption of participatory mapping discourse that participatory mapping increases communities' negotiation power to improve their livelihood. This paper employs participant observation and ethnographic interviews within the Ciliwung River corridor in Jakarta. Specifically it focuses on activists and residents in river communities in relation to participatory community mapping exercises conducted since 2012 and a new crowd-sourced flood mapping system launched in December 2014. Participatory community mapping and crowd-sourced flood mapping, as two forms of community-based mapping approaches to floods, are viewed as potential tools to overcome urban flood hazards while raising disaster awareness among city residents. Community mapping is a method of visualizing a neighborhood's communal memories and embedded power relations, while a crowd-sourced flood map visualizes vulnerabilities and may become a tool for information sharing for the betterment of the spatially and socially fragmented city.

1. Introduction

Around the world, flooding has become the major form of environmental disaster in terms of numbers as well as costs related to the damages (CRED, 2006). As urban areas are historically situated along water bodies, they are increasingly becoming more exposed to flood risks because of externally generated environmental challenges that affect changes to water level fluctuations. At the same time, cities are imposing heightened environmental threats on water bodies and their surroundings as a result of development pressures (Douglass, 2013; Marcotullio, 2007). Although there have been discussions on how climate change affects the vulnerability of urban settlements and on the necessity of infrastructure expansion to control water fluctuation, urban development-driven degradation of river watersheds on its own have proven to be significant causes of increasing urban flood risks (Few, 2003; Parker, 1999; Thi, Gunawardhana, & Kazama, 2012). Watersheds of rivers in Asian urban regions are facing both management and governance challenges, with negotiable development penetration into protected forest and green areas. In turn cities become more vulnerable to flood threats due to reduced water retention upstream – which contributes to increased sedimentation – and increased run-off as a result of hardening of embankments (Douglass, 2013; Texier, 2008). Infrastructures and services in many urban areas in the region are inadequate, leading to degradation of water quality by both domestic and industrial pollutants (Steinberg, 2007). Instead of being a natural and environmental resource to support the livelihoods of city residents, rivers have often become liabilities for the city. Their banks, meanwhile, become highly contested and environmentally risky areas that are subjected to claims by various interest groups, from government bodies to human settlements.

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The challenges in rectifying such environmental conditions through conventional governance and management approaches in this region are multilayered. Firstly, although laws and regulations are in place, the implementation bureaucracy is often sectoral, corrupt and lacking coordination. Since the effective management of riverbanks and watersheds is largely a question of land use, land politics and development permits contribute to land use changes that exacerbate ecological problems. Concrete-covered areas prevent water penetration to the soil, bringing larger water level fluctuations between dry and rainy days or seasons (Sheppard, 2006; Texier, 2008). Secondly, the rapid growth of mega-urban regions, and negotiability of land use beyond the master plan, leads to an absence of data on developments for necessary impact assessment. While green area reduction can be registered through satellite images, the detailed information pertaining to this change is lacking. Additionally, remote sensing technologies are less reliable in densely populated urban areas such as Jakarta, in which riverbanks become places where marginalized households reside (Ninsalam & Rekittke, 2016; Shaad, Ninsalam, Padawangi, & Burlando, 2016).

Although historically maps were tools wielded for the benefit of those in power, used to determine the division of land; the development of technology has allowed maps to be co-created by decentralized groups rather than solely relying on trained experts who are distanced from the mapped communities. The term 'participatory mapping' has been popularized in recent years, marking a distinction between grassroots' perspectives and official arrangements of functions of land according to the governments and elites (Panek, 2015). Other terms that have been used include critical cartography, collaborative mapping, bottom-up GIS, participatory GIS, and public participation GIS or PPGIS (Dana, 2010; Panek, 2015). Scholars and community planners touted participatory mapping as an alternative approach to navigating the lack of grounded data in the official realm as well as governance and management problems in urban planning.

While the benefits of participatory mapping have been mentioned in several scholarly publications, the use of participatory mapping in cases of environmental disasters such as floods is a topic of more recent scholarship. Indicatively, participatory mapping can be a promising source of more detailed spatial analysis on the impacts of floods on livelihoods and public facilities. In addition, community mapping may lead to more reliable information on self-made flood response practices in densely populated self-built neighborhoods with relatively insufficient infrastructure services. This paper addresses the following research question: How can community-based mapping contribute to urban flood disaster governance? Consequently, the paper examines the notions of community participation and empowerment through bottom-up mapping, in addition to the role of community mapping as a tool for better visualizing and supporting community disaster resilience.

2. Theory: participatory mapping

Mapping is one of the first steps toward a spatial understanding of existing problems (Luansang, Boonmahathanakorn, & Domingo-Price, 2012). Inherent to the visual presentation of the map is the tagging of survey information with geographical identifiers. Maps have long been the tool of the urban planner to spatially represent social information in order to identify any necessary urban intervention. As opposed to top-down plans that start with maps as devices to be executed, self-built neighborhoods start with construction before the map. Kostof (1992) calls these neighborhoods "unplanned" parts of the city, which exist alongside the "planned" areas. However, communities by way of resource allocation and communal agreements might well be planning these self-built neighborhoods, although they are not necessarily mapped on paper in advance.

Literature on participatory development highlights the role of community mapping as a tool to empower communities. Planners become facilitators who enable community members to organize and visualize local information, and to a certain extent local knowledge (Archer, Luansang, & Boomahathanakorn, 2012; Kienberger, 2014), such as settlement profiles, household demographics, and vacant land (Patel, Baptist, & D'Cruz, 2012). Community maps are identified as tools to enable citizens to become part of the city, and to negotiate with city and national governments to propose their perspective, to argue against land dispossession and make suggestions for future developments (McCreary & Lamb, 2014; Reyes-García et al., 2012).

The challenges of participatory mapping are at least five-fold. First, although computerized approaches are now widely replacing manual tabulation of survey information for maps, the large volume of data is a challenge on its own to be managed, stored, and presented, both in terms of software and hardware (Patel et al., 2012). Second, since participatory mapping is often undertaken in places where the local and/or national governments are lacking capacity, there tends to be lack of trust in publishing the data out of fear of data misuse. This fear is particularly escalated for those living in environmentally vulnerable areas such as those at relatively higher risk of flooding, landslides or other climate change-related disasters. Communities were suspicious that the data collected might be used to justify eviction rather than in identifying alternative solutions (Patel et al., 2012). Cadag and Gaillard (2012) claimed that participatory mapping of flooding facilitated the integration of scientific and local knowledge within disaster risk reduction (DRR). From their experience marginalized populations – such as residents in Masantol, Philippines – who were illiterate in or had limited grasp of scientific concepts could discuss disaster risk reduction with scientists who had limited knowledge of the local context. Nevertheless, Archer et al. (2012) observe that unless discussions are undertaken within an atmosphere of learning – in which knowledge exchange result in the advancement of each others' knowledge – such exercises only promote the data collection of the scientists, and the resulting map will not be as informative for the community.

Third, convincing both the community and the government of the usefulness of community mapping may be challenging for those who strongly subscribe to mainstream approaches of top-down planning, or simply do not care about realities on the ground (Makau, Dobson, & Samia, 2012). Although scholars may see the benefit of community mapping for communities for organization and local knowledge, residents may not see the immediate need for it, particularly in light of the time and effort expended for mapping exercises that is not guaranteed to influence policy-making. Fourth, community mapping reiterates the problem of participatory approaches in general, risking the replication of unequal voices and injustices at the neighborhood level. The decision on what is to be mapped depends greatly on who participates in the mapping process and whose voices are more dominant than others.

Fifth, while the maps and categorized information generated from participatory mapping have the potential to aid governments in seeing what they have been unable to quantify the level of responsibility that is placed on communities to repeat this exercise perpetuates urban inequality, as disadvantaged communities must continue to devote extra time and energy to be heard and to justify their existence as urban citizens (Elinoff, 2012, 2014). In the context of cities such as Jakarta where capitalist development dominates the urban landscape and affordable housing is scarce, this exercise of justifying one's existence differentiates residents from those who can afford privately developed housing.