1-1-2014

Postnatural urbanism in Jakarta: geosocial intelligence and the future of urban resilience

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Abstract

As cities evolve to become increasingly complex systems of people and interconnected infrastructure, the impacts of both extreme and long-term environmental change are significantly heightened. Understanding the resilience of urban systems and communities in an integrated manner is key to ensure the future sustainability of cities, which face considerable climatic, economic, and sociodemographic challenges in the 21st century. As Southeast Asia's most populous and most dense metropolitan conurbation, and the second largest urban footprint in the world, Jakarta's residents are exposed to rapid transformations of urban structures and systems.

Disciplines

Engineering | Physical Sciences and Mathematics

Publication Details

Turpin, E., Holderness, T., Wickramasuriya Denagamage, R. & Dean, S. (2014). Postnatural urbanism in Jakarta: geosocial intelligence and the future of urban resilience. Unnatural Futures Conference (pp. 36-37). Hobart, Australia: University of Tasmania.

Postnatural Urbanism in Jakarta: GeoSocial Intelligence and the Future of Urban Resilience

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As cities evolve to become increasingly complex systems of people and interconnected infrastructure, the impacts of both extreme and long-term environmental change are significantly heightened. Understanding the resilience of urban systems and communities in an integrated manner is key to ensure the future sustainability of cities, which face considerable climatic, economic, and sociodemographic challenges in the 21st century. As Southeast Asia's most populous and most dense metropolitan conurbation, and the second largest urban footprint in the world, Jakarta's residents are exposed to rapid transformations of urban structures and systems. [1] Recent trends in weather intensification, sea level rise, extreme pollution, severe land subsidence, and river and coastal inundation make Jakarta an exemplary form of postnatural urbanism and therefore a key site for researching and responding to the 21st century challenges of urban resilience. [2] Moreover, the combination of Jakarta's progressive municipal government, active civil society organizations, and increasing foreign capital investment all suggest a unique potential for both transforming and improving the lives of residents through a technologically-sophisticated, scientifically-innovative, and publicly accessible networked GeoSocial Intelligence framework. [3] As part of the SMART Infrastructure Facility's Urban Livability, Sustainability, and Resilience Research Group, Dr. Etienne Turpin and Dr. Tomas Holderness have developed the project PetaJakarta.org, with co-investigators Sara Dean, anexact office Director of Design, and Dr. Rohan Wickramasuriya, SMART GIS Research Fellow, assisted by Dr. Matthew Berryman, SMART IT Architect. [4] The overall aim of this open source city pilot project in Jakarta is to advance our capacity to understand the resilience of cities to both extreme weather events and long-term infrastructure transformation. To this end, we have developed the open source data collection software CogniCity, which allows us to harness the power of social media by gathering, sorting, and displaying information about flooding, inundation, and critical water infrastructure in Jakarta, Indonesia. Because Jakarta's citizens are well-known for their love of social media, [5] and because the city has been dramatically effected by increasingly severe and costly flood events in recent years, [6] PetaJakarta.org can channel the strength of local habits to address an urgent problem while also creating a valuable pilot study for the development of our GeoSocial Intelligence framework for future data gathering and analysis. Such a robust framework for simultaneously studying and facilitating urban resilience can be re-deployed by municipal governments and citizen-led groups in other metropolitan areas with high concentrations of social media users (i.e. the majority of megacities in Asia). With these future deployments in mind, CogniCity is designed as an open source platform that can be amended and reconfigured to easily address other urgent

issues (waste or sewage removal, transport and traffic congestion, weather emergencies, elections and governance, etc.), in other languages, within different urban systems. Ultimately, this pilot study demonstrates how innovative techniques for data collection can utilize the existing public enthusiasm for social media and extensive mobile communication networks to understand and improve urban resilience in relation to flood management, weather-related emergencies, and emergency response. While addressing the problem of flooding in Jakarta is urgent, the methodological problems facing megacity researchers today extend well beyond both Jakarta's geography and the specificity of flooding and inundation. [7] In fact, how to better utilize the extensive network of personal mobile communication devices and social media platforms to improve urban resilience is a critical area of research. [8] Such research demands attention to the question of the legacy of technological responses to social and environmental issues; [9] it also forces researchers, activists, and scholars to reckon with the problem of postnatural urban systems in relation to climate adaptation, democratic practice, and the participatory co-management of civic infrastructure. [10]

In this presentation, we will argue that although the proliferation of social media might first appear as so much noise for civil and information system engineers, with the proper open source software innovations for gathering, sorting, and analyzing data, this noise can be transformed into critical information for both understanding and promoting urban resilience and democratic practices. [11] By connecting network models of urban infrastructure to crowd-sourced and social media-based data collection, and then making this information and analysis available through a public, web-based platform, our project links innovative areas of information science research and multiplies the potential of each by producing an innovative, open source framework for citizen-participation in the co-monitoring and co-management of urban systems. [12] We believe such a framework is urgently needed to help shape the future of climate adaptation and community resilience in the postnatural cities Southeast and South Asia, and we look forward to presenting the findings from our recent pilot study, as well as some speculative remarks about negotiating the unnatural future of cities, at the Unnatural Futures conference.

Dr. Etienne Turpin is Vice Chancellor's Research Fellow and director of the Urban Livability, Sustainability and Resilience Research Group at the SMART Infrastructure Facility, where his research examines the impact of megacity infrastructure transformations on community resilience and climate adaptation. Dr. Turpin's expertise in coordinating large scale urban research projects with multiple stakeholders to produce integrative assessments of megacity resilience is complimented by his previous research in the Department of Theory and Policy Studies, Ontario Institute for Studies in Education of the University of Toronto, where he received his Ph.D. (Philosophy).

Dr. Tomas Holderness is a Geomatics Research Fellow at the SMART Infrastructure Facility, University of Wollongong, where his research focuses on the use of geospatial analysis, Earth observation, and network modeling techniques applied to urban infrastructure resilience and Earth systems engineering. Prior to this research Dr. Holderness' PhD thesis analysed long time series thermal Earth observation data to quantify intra-urban spatio-temporal temperature dynamics in Greater London.