



Fragmented landscapes of water supply in suburban Hanoi



Lucía Wright-Contreras^{a, b, *}, Hug March^c, Sophie Schramm^d

^a Technische Universität Darmstadt, El-Lissitzky-Str. 1, 64287 Darmstadt, Germany

^b Universitat Internacional de Catalunya, Carrer Inmaculada, 22, 08017 Barcelona, Catalonia, Spain

^c Internet Interdisciplinary Institute (IN3), Universitat Oberta de Catalunya, Av. Carl Friedrich Gauss, 5, 08860 Castelldefels, Spain

^d Universität Kassel, Institut für Urbane Entwicklungen, Gottschalkstr. 22, 34127 Kassel, Germany

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ABSTRACT

Facing the challenges of city planning in the frame of rapid urbanization in the Global South, this study addresses the relationship between the urban development of Hanoi, Vietnam, and water supply including users' perception of water accessibility and satisfaction of coverage, quality, and cost. Because sociospatial disparities are particularly pronounced in suburban areas, these spaces epitomize unequal water access and uneven water quality. Based on the premise that (sub)urban water flows embody and mirror development dynamics and urbanization patterns, the objective is to analyze access to water splintered within the suburban typologies of Hanoi. We analyze the current state of domestic water availability and quality throughout suburban areas and specifically between a new urban area and a periurban village in Hanoi. Through the debates of splintering urbanism and periurban water supply, this paper discusses the differences in water service provision in suburban Hanoi. At the same time, the article considers suburban areas as spaces which reflect a broader spectrum of water supply solutions. Lastly, it informs on how to alleviate the pressure of the increasing demand of water in urbanizing areas by supporting sustainable urban water cycles to improve distributional justice and social equity.

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1. Introduction

Environmental injustices, socioeconomic inequalities, and sociospatial fragmentations are intensifying in scale globally. Societies now face the challenges of rapid urbanization as the urban poverty rate may reach 45 to 50 percent by 2020 (Davis, 2004) and the world's population is expected to double by 2050 (UN DESA, 2008). Rapid urbanization in the Global South is magnifying existing issues such as urban sprawl, urban poverty, rising inequality and environmental degradation, among others (Zhang, 2016). Particularly suburban landscapes transform rapidly, as two thirds of the total inhabitants in the world are projected to populate urban areas by 2030 (UN Habitat, 2012) and the effects of socio-economic polarization are most evident in these spaces. In the Asian context, the concept of 'suburban' refers to the transitional areas between the rural and the urban which share a mixture of different urban typologies (see Tràn et al., 2012; other authors use

the concept of 'periurbanization,' see Winarso, Hudalah, & Firman, 2015). These subjoined areas may benefit from higher accessibility to the urban core, but suffer from the complexity of issues that suburbanization entails, including access to basic services, such as water and sanitation. In Hanoi, suburban areas include *new urban areas* and *periurban villages*, the former mirroring the upscaling competition of the city in a global economy (see 'extended metropolitan region;' Ginsburg & Koppel, 1991), and the latter characterized by a conflicted interface with higher marginalization and lower access to services (Allen, 2010). As water infrastructures in Hanoi are highly differentiated in suburban areas, this research will unveil the current splintered infrastructure systems of centralized piped water schemes, privately owned wells, and additional solutions that users implement to make up for obtaining safe drinking water.

This paper frames the research of water supply in Hanoi within the challenges of urbanization and rapidly transforming urban and rural landscapes, contributing to the debates between water supply and (sub)urbanization of Global South cities (Adams & Zulu, 2015; Allen, 2003; Allen, Dávila, & Hofmann, 2006b; Díaz-Caravantes & Wilder, 2014; Gandy, 2008; Hofmann, 2013; Marston, 2014; Mehta & Karpouzoglou, 2015; Van Ewijk & Ehrhardt, 2016). We

* Corresponding author. Technische Universität Darmstadt, El-Lissitzky-Str. 1, 64287 Darmstadt, Germany.

E-mail addresses: wright@stadt.tu-darmstadt.de (L. Wright-Contreras), hmarch@uoc.edu (H. March), s.schramm@iwar.tu-darmstadt.de (S. Schramm).

ask the question, how is access to water supply splintered between the different suburban typologies of Hanoi? To carry out this study, we analyze the local development of infrastructures, as well as water accessibility and satisfaction of coverage, quality, and cost perceived by residents of different areas in Hanoi, focusing primarily on new urban areas and periurban villages.

The article draws on qualitative and quantitative data from interviews and documentation provided by institutions directly or indirectly linked to water supply in Hanoi. These include the National University of Civil Engineering (NUCE), Hanoi University of Science and Technology (HUST), Hanoi Water Company (HAWACO), Vietnam's General Company of Construction and Export (VINACONEX), Ministry of Construction (MOC), Ministry of Agriculture and Rural Development (MARD), National Target Program (NTP3) of MARD and UN Habitat Vietnam. Additionally, informal interviews and conversations were carried out in the 37th WEDC (Water, Engineering and Development Center) Conference in Hanoi. More specifically, the present study of water supply in Hanoi focuses on: 1) the analysis of users' perception on accessibility, and satisfaction of coverage, quality and cost of water, through 100 questionnaires carried out through cluster sampling of the local population in 10 districts during August and September of 2014, conducted across Hanoi in the suburban districts of Đống Đa, Hai Bà Trưng, Thanh Trì, Hà Đông, Nam Từ Liêm, Hoàng Mai, Long Biên, Gia Lâm; the inner-city district of Hoàn Kiếm; and the rural district of Hoài Đức; and 2) the analysis of water quality which compares piped water and groundwater in two contrasting areas: the new urban area of Linh Đàm, in the urban district of Hoàng Mai, and the periurban village of Triều Khúc, in the rural district of Thanh Trì. The first analysis is based on a survey using 10 questions to obtain information on: a) water accessibility, b) users' knowledge of the source of water, c) type of water supply system and distribution company, d) satisfaction of coverage, e) satisfaction of quality, f) comparison of water supply coverage and quality with neighboring areas, g) cost of water per month, h) family income per month, i) appreciation of cost of water in relation to income, and j) community organization. The second analysis on water quality weighs environmental hazards in Hanoi's piped water and groundwater. These analyses help understand the contrasts between the different urban typologies of Hanoi's suburban areas and water supply schemes. On one hand, the semistructured interviews with local and international organizations, government offices, water-related enterprises, financial organizations, and academic institutions in Vietnam inform the institutional challenges of water provision. On the other hand, the empirical analysis of water supply in suburban areas illustrates direct field research and observations.

The paper is structured as follows. In section two, the article presents an overview of recent scholarship on periurban water access and quality linked to the debate of splintering urbanism. In section three, water infrastructure development in Vietnam and (sub)urbanization in Hanoi is contextualized. The fourth section presents a comparative review based on first-hand information of users' perception of water, discussing accessibility, and satisfaction of coverage, quality and cost of water in Hanoi (100 cluster samples in 10 districts), as well as piped water and groundwater quality (8 water samples in 2 districts). Lastly, the discussion identifies suburban areas as spaces of opportunity in which sustainable urban water cycles can be developed.

2. Splintering of Hanoi's suburban waterscapes

Within Hanoi's continuous expansion, city planners and authorities are under massive pressure to adequately deliver services adequately to urban dwellers and meet the demand of the growing population and rapidly urbanizing suburban areas. Two typologies

characterize these spaces. On one hand, so-called *new urban areas*, which house a growing business class as well as resettled former villagers (Labbé & Musil, 2014, p. 1156) and sometimes become "islands of wealth" (Monstadt & Schramm, 2013, p. 90). Here, local infrastructure networks operate as "satellite systems" (Monstadt & Schramm, 2013), exclusively catering to the residents of these estates. On the other hand, *periurban villages* in adjacent areas that remain excluded from external service provision are often stuck in an interface of "sustained poverty, poor infrastructure and a lack of institutional frameworks and governmental support" (Norström, 2007, p. 5). The contrasts between these two typologies can be explained through the concept of 'splintering urbanism' (see Graham & Marvin, 2001), which defines the fragmented growth of cities and the unequal access to services, such as water supply. This concept encompasses the complex, uneven, and intertwined economic, cultural and socio-technical processes behind the production and functioning of urban infrastructures and fragmented urban growth. Briefly, the concept of splintering urbanism aims to shed light on the social disparities and territorial imbalances found in cities around the world (Graham & Marvin, 2001, p. 56). It is through this examination of "space, technology, infrastructure networks and social power" that new (and much needed) mindsets on urban development will be brought forward (Graham & Marvin, 2001, pp. 53–54).

The effects of splintered urbanism are highly visible in cities of the Global South. While the benefits of developing estates equipped with their own water supply systems may be a step towards modernization, the patches of settlements all around suffer from the lack of connectivity to the central water network system and to their neighboring decentralized systems. The concept of 'periurban' areas, or periurbanization, emerges as a critical concept to understand what happens on the fringes of urban areas, in this case concerning water supply. Although there is no clear definition of 'periurban', the discussion amongst scholars tackles the spatially and politically undefined areas. Van Ewijk and Ehrhardt (2016, p. 2) state that: "It is not the proximity to towns, but the linkages and flow of goods, finance, labor and services between rural and urban centers that defines periurban." The challenges which these areas display are rooted in several causes, including the cost of water, which is the driver for most users in poorer areas to seek alternative sources. In most cases, informal practices are not taken into consideration by "formal systems" (Allen, 2003, p. 341). In this case, discussion arises between "policy-driven" and "needs-driven" approaches (Allen et al., 2006b), calling for a more sustainable program of water management. Scholars have specifically focused on urban water provision in these settings. Díaz-Caravantes and Wilder (2014), and Mehta and Karpouzoglou (2015), use the concept of 'periurban waterscape' to show the interconnected social, economic, cultural and political processes embedded in water supply in those areas between the city and the rural areas. In other words, the concept of 'waterscape' encompasses "social, natural, material and discursive processes" (Mehta & Karpouzoglou, 2015, p. 166). Allen (2003) refers to those spaces as "periurban interfaces" and also discusses the main challenges they present concerning water services. Water provision in periurban interfaces has been analyzed by Mehta and Karpouzoglou (2015) in the case of Delhi. Along similar lines, Adams and Zulu (2015) use the concept of 'periurban water supply' in the context of Sub-Saharan Africa. Allen et al. (2006b) specifically focus on the "periurban water poor" lacking adequate water services and water provision in "periurban interfaces" (Allen, 2003; Hofmann, 2013; Mehta & Karpouzoglou, 2015). Periurban waterscapes are implicitly mirrors of power relations (Gandy, 2008) and income inequalities (Mehta & Karpouzoglou, 2015). This gives a distinct importance to the study of water access and water quality in periurban areas, as it is

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