# Urban Water Management

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## A Critical Handbook

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WaterPower Research Group
Trier University

# CONTENT

01

# WHY THIS HANDBOOK?

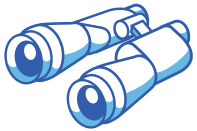
The exclusion of large parts of the urban population from safe and affordable water supply services is often perceived as the outcome of a lack of financial support and technological deficiencies. However, the extension of pipes and water meters, the construction of dams, and the growing financial investments in the water sector have not solved the current water crises. This handbook is an attempt to show the limits of these technical and managerial solutions by providing different understandings of why some social groups continue to be excluded from having access to water.

Critical questions such as who controls water, how prices are set up, who receives subsidies, and who makes decisions about water infrastructure investments form the basis for a new thinking on water distribution in cities. In order to explore such questions, this handbook provides a set of concepts and methods from which to start describing and explaining the complexities of water inequalities in cities.

Inspired by ideas from our research in the field of urban political ecology (UPE), this handbook suggests that securing access to water is subject not only to hydrological (e.g. water shortages) and technological conditions (e.g. infrastructure), but also to social and political factors (e.g. money, norms, discourses, labor relations). The concept of urban waterscape is introduced

to demonstrate how the flows of water in cities are best understood as interconnected biophysical and social–political processes. Key elements of the urban waterscape are identified and illustrated to help tracing the political, historical and geographical contexts in which water inequalities are (re)produced. For this purpose, the handbook is structured along four themes:

Toolkit



Methodological Approaches

Practices

Alternatives

Each theme provides a variety of conceptual tools and practical examples to make sense of how the urban waterscape is formed, shaped and contested by multiple actors (international organizations, state, companies, households, domestic vendors) with different power relations, visions and understandings of how water should be provided, by whom, at which price and under which conditions. These issues are illustrated by a selection of case studies in Accra (Ghana) and Medellín (Colombia). Additionally, a Waterscape Library with further reading is provided at the end of the handbook.

By offering a variety of examples, this handbook explores the diversity of water practices, struggles and alternatives taking place in areas highly affected by water inequalities. This is an attempt not only to foster understandings of the urban from a Southern perspective and to encourage new forms of knowledge exchange between Africa and Latin America, but also to explore different ways in which research and practice conducted in Europe can learn and expand upon current water debates taking place in the Global South.

## For whom is this handbook?

The handbook aims at offering some intellectual resources to practitioners, students, academics, policy makers and civil society organizations interested in exploring the socially relevant aspects of urban water research. It is designed to facilitate the communication of concepts widely used in the social disciplines to technical experts (engineers, urban planners, architects, etc.) and to provide multiple methods that can be used both by scholars and practitioners to research key urban water problems, concerns and questions. By encouraging dialog between

the technical and social disciplines, this handbook aims at advancing critical perspectives on water access not only within the academia, but also in the fields of policy and practice. Also, it is expected to engage wider audiences to enrich contemporary debates around major water issues and to explore new ways of understanding why water inequalities still persist in many cities despite a range of technical and managerial responses.

## How else can this handbook be used?

### Card Game

19 cards have been created to explore possible alter–natives to construct equal and just urban waterscapes. These alternatives need to ensure that everybody has access to safe, sufficient and affordable water and to consider that water is a universal human right. Users of the game are invited to imagine and discover alternatives in a participatory setting. Alternatives are the outcome of a combination of elements contained in the toolkit, methodological approaches and practices. By exploring and integrating new alternatives into the handbook, users are encouraged to formulate 'concrete actions' to reduce water inequalities.


### Collective Cartography

This handbook invites users to create a collective urban waterscape for better understanding at how water inequalities in cities are (re)produced, and to imagine possible scenarios to secure universal access. To trace how water flows through the urban waterscape, select different cards provided by the handbook in the following way:

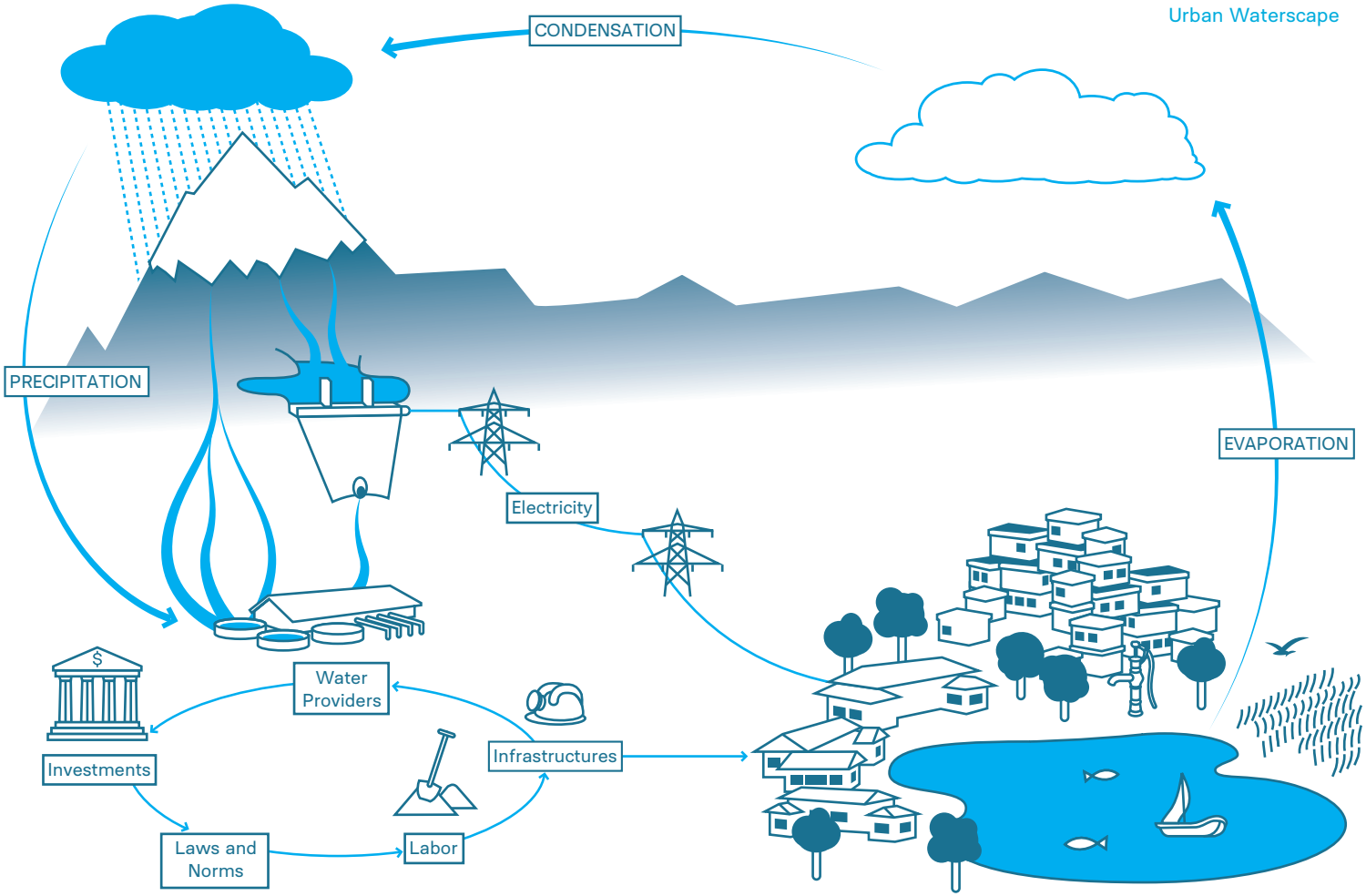
→ IDENTIFY
a water problem occurring at any particular scale (e.g. neighborhood, city)

→ ANALYSE
the different causes of the water problem (Use the toolkit cards)

→ CAPTURE
the complex dynamics that contribute to uneven distribu–tion of water (Use the methodological approaches cards)

→ COMPARE
with other case studies taking place in different parts of the world (Use the practices cards)

→ IMAGINE
possible alternatives to reduce water inequalities (Use the alternatives cards)

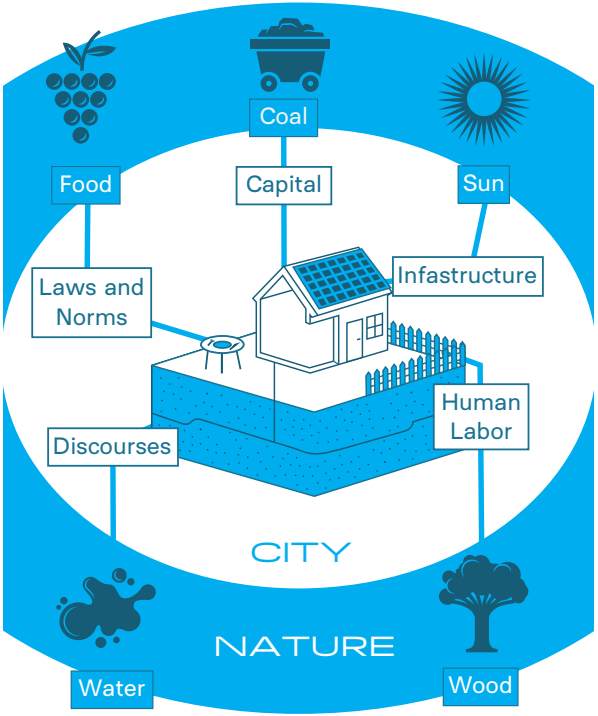

CONDENSATION
PRECIPITATION
EVAPORATION
Electricity
Water Providers
Investments
Infrastructures
Laws and Norms
Labor

# WHAT IS URBAN POLITICAL ECOLOGY AND WHY IS IT NEEDED

UPE emerged in the late 1990s as research program inspired by the field of political ecology (PE), whose origins can be traced from early 1970s. As an area of critical research, PE challenges dominant interpretations of the causes of environmental degradation (e.g. urban growth is one of the main drivers of water scarcity) by claiming that environmental problems are inherent political problems. Water inequalities, for example, are perceived as an outcome of uneven power relations between different social groups, rather than the physical scarcity of water. However, much research in PE has been focused on rural and agricultural contexts while cities have been largely excluded from these studies. Urban political ecologists applied PE to urban studies by conceptualizing urbanization as a political and ecological process. This means that urbanization (as a process) is not the end of nature, but rather its transformation, and the city (as a site) is one of the products of this socio-natural transformation. However, the urbanization of nature is never neutral, instead it is a highly political and contested process. In the field of water provision, UPE traces how the urbanization of water – a process through which nature (water) becomes urbanized (potable water) – constitutes a highly uneven process by benefiting wealthy and powerful groups, while excluding the poor and marginal ones.

# [A] — RETHINK THE CITY-NATURE DUALISM

Cities have been traditionally perceived as anti–urban or unnatural. They have been considered as pure social spaces separated from nature and as sources of envi–ronmental problems. An UPE framework challenges this prevailing city–nature dualism by showing that cities are not self–contained systems opposite to nature. Cities are centers of demand for natural resources. They are strongly reliant on the transformation of resources (water, minerals) and environments (forests, wetlands) to sustain contemporary urban life.



# [B] — REINTERPRET THE URBAN WATER CRISES

Dominant narratives tend to explain the water crises as a consequence of growing urban populations and technical and managerial deficiencies. UPE challenges these mainstream interpretations by framing uneven water distribution not as a technical and design problem, but a political one. Some of the dominant narratives that UPE challenges are:



## [B1] — Overpopulation

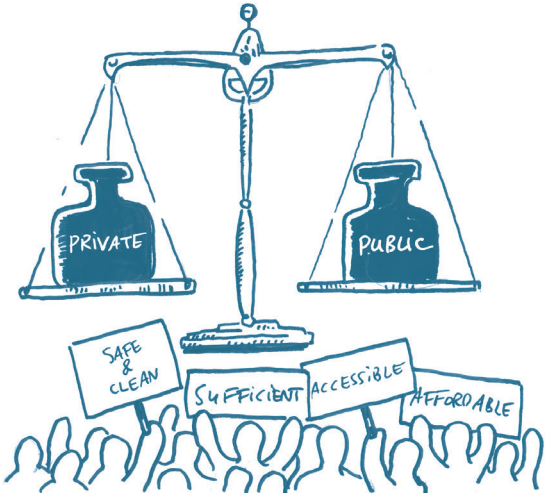
Thomas Malthus (1798) claimed that the earth cannot sustain too many people and that resources will run out unless the rapid population growth is brought under control. Blaming overpopulation has been often mobilized to explain the current water crises.

# [B2] — Investments in infrastructure

It is often claimed that technical and design solutions are required to ensure universal access to water. But, a long history of international involvement and investment in cities has not necessarily demonstrated that more pipes, dams, storage tanks and meters equate to safe, sufficient and affordable access to water. Additionally, these infrastructure investments happen predominantly in urban areas, which, again, deepens and reinforces the inequality between the rural and the urban.


# [B3] — Ownership

Supporters of the private sector claim that private ownership is crucial to deliver water services to the urban poor. On the contrary, promoters of the public sector argue that stated–own companies can perform better than their private counterparts and that it is unethical to profit from water. However, neither public nor private utility companies have been able to secure universal access to water services.



# KEY QUESTIONS

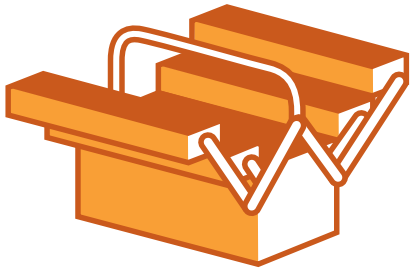
Rather than discussing water inequalities in cities from the perspective of overpopulation, lack of infrastructure, inadequate financial investments or ownership (private or public), UPE suggest that attention needs to be paid to the following questions:

→ Who are the main actors involved in the control and distribution of water resources and infrastructure in a city?

→ What kinds of strategies and practices (e.g., legal, discursive and technical) do they deploy to secure access to and control over water resources?

→ Who are the winners and losers from owning, mobili–zing and controlling water?

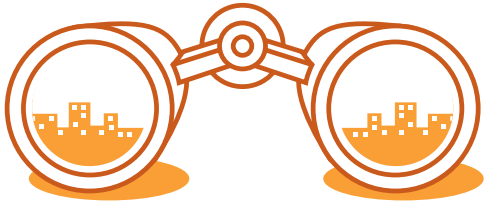
02



# TOOLKIT

# TOOLKIT

This theme provides multiple and diverse tools to analyze urban waterscapes. It suggests a variety of reference points to unpack how the flows of water through and within cities are connected not only to biophysical components and dynamics, but also to socio-political processes. This toolkit represents a productive basis to start expanding, challenging and recasting narrow financial and technical explanations of the current water problems. Most importantly, this set of tools is not universal and does not follow any particular order. Tools can be evaluated, adjusted and expanded from city to city and according to specific case studies. This flexibility is important to encourage telling different stories about water inequalities, to think differently about how people interact with water and to imagine possible alternatives to secure universal provision.



# LOOK BEYOND

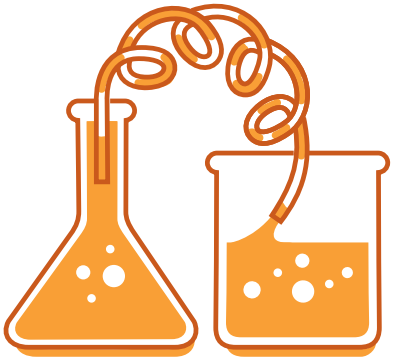
## Outside the City

Urban studies usually place a strong analytical focus on cities. However, cities are closely connected to their hinterlands for the provision of basic services and goods. Providing a city with potable water, for example, requires a set of processes that are not reducible to the boundaries of the city: water is abstracted from distant places to be stored, purified, commodified and distributed to individual households. Mobilizing water from the countryside to the city tends to affect particular social groups (e.g. farmers inhabiting areas of water abstraction) by fragmenting their territories and increasing relations of inequality. By failing to look outside the city, we miss the opportunity to explore how cities are highly dependent on the abstraction of natural resources and the transformation of remote places. Thus, urbanization should no longer be analyzed as a process that takes place within the limits of the city, but also extends to the countryside.

# POLITICIZE

## The Politics of Infrastructures

The process of bringing water into the city would be impossible to conceive without the development of urban infrastructure networks. Whilst infrastructures (e.g. dams, canals, pipes, storage tanks, meters, taps) might appear as simple technical artifacts that organize the continuous flow of water through the city, they can be also understood as technologies that embody power relations by enabling or disabling particular social groups to secure access to water on a daily basis. Thus, infrastructures are not just perceived as static, neutral and given objects, but as socio-technical configurations. Infrastructures support the flows of water, and also money, private interests, regulatory regimes, technological innovation, historical legacies of infrastructure provision and cultural imaginaries. A more-than-technical understanding of infrastructures is useful to trace how these physical elements become deeply political in ways that generate and maintain social struggles, (re)produce new types of consumers and sustain social inequalities in cities.



EXPAND

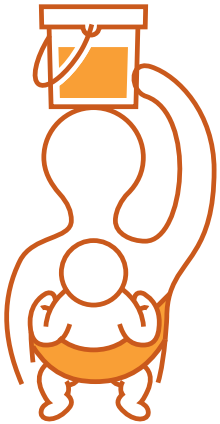
# Materialities of Water

Water is commonly represented as H2O in technical de–bates. However, water is more complex than a chemical formula, it is a hybrid product that results from both ecological and social interactions. Water is a flowing resource that moves through multiple channels (rivers, lakes, infrastructural networks) and takes multiple forms. It is non–substitutable, heavy and expensive to transport. Water is also characterized by multiple meanings and values. While for some social groups water is consi–dered a profitable commodity, for others it is a human right that should not be denied to anyone. Water is not homogenous, but heterogeneous. Cities support the flows of different types of water (e.g. rain/ground/surface water, pure/unsafe, tap/sachet water) and their particular characteristics influence the relations between people in distinct ways. For example, some kinds of water are more prone to contestations while others support new forms of solidarity and cooperation. The materialities of water offer an important perspective for understanding why water is difficult to control and commodify compared to other basic public services such as electricity, gas and solid waste collection.

# INTERROGATE

## Socially Produced Scarcity

Many cities around the world are facing water scarcity even though they are located in areas of privileged hydrological conditions. The water that flows through their hydrological cycles is sufficient to guarantee water supply services to the whole urban populations. However, as soon as water flows through the city, it is discursively presented as a 'scarce' resource. The crisis of scarcity in many cities is not naturally produced, but embedded in socio-political decisions. Often these decisions support the interests of particular social groups instead of the common interest. This manufactured scarcity is often mobilized to justify economic, technical and legal interventions. Turning water into a scarce resource becomes a strategy to legitimize the construction of large-scale hydraulic projects (e.g. dams, desalination plants), support market solutions (e.g. increase water prices) and criminalize informal practices.

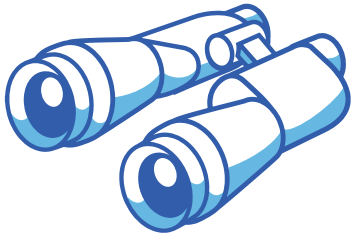


# DIFFERENTIATE

## Uneven Geographies of Race, Class, Gender and Ethnicity

Access to water is mediated by social categories such as race (white and non–white), class (rich and poor), gender (men and women) and ethnicity (indigenous and non–indigenous). Women, for example, are disproportionately affected by daily water problems as they spend more time looking for different water sources under the expenses of employment and free time. They are often criminalized for using 'illegal' and informal methods to secure water (e.g. taping into legal water pipes) when tankers fail to deliver water on scheduled days. Women are also forced to pay more for water when wells or boreholes are controlled by local men. Children usually are not sent to school because of hygienic conditions or because they have to work alongside their mothers to collect water, while men are rarely involved in domestic water collection jobs.

03



# METHODOLOGICAL APPROACHES

# METHODOLOGICAL APPROACHES

How can urban waterscapes be studied? How can we trace the flows of water through and within cities? What are the most appropriate methods to investigate the causes of water inequalities? It is hard to imagine that the origins of the water crises can be explained by events confined to the present time (e.g. inefficient utility companies) or to a single scale (e.g. illegal water connections in informal settlements contribute to water scarcity). The uneven distribution of water in cities is by no means new. It is a process that is historically rooted by decisions made in the past. Additionally, water inequalities have been highly influenced by decisions made at a variety of scales (e.g. high water prices in consequence of international loans). Urban waterscapes are not just produced locally or are isolated from any historical event. A productive way to trace how water flows through the urban waterscape requires moving across scales of time (past and present) and space (global, national, city, local, household). A mix of qualitative and quantitative methods is helpful in capturing the complex dynamics that shape access to water in cities.

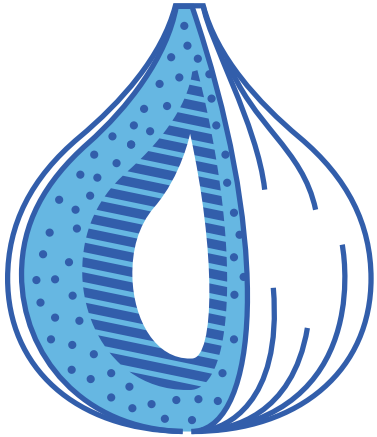
→ Historical Analysis
→ Multi–scale Analysis
→ Ethnographic Research

# HISTORICIZE

## Historical Analysis

History is crucial to understanding how the relationships between people and water have changed over time. The emergence and persistence of water inequalities in cities can be explained by key historical decisions about infrastructure choices, water regulations or financial investments or by past conflicts connected to access to land, rights, migration and citizenship. A historical analysis can be conducted by comparing and contrasting different periods of time (colonial/post–colonial, municipalization/ privatization, socialism/post–socialism) to interrogate what changes, what remains, what disappears and what are the particular outcomes of those changes. It is im–portant to ask which new social actors are involved in the water sector, how values and meanings of water change and why infrastructures became universally available for particular social groups (colonial elites) and not for others (native population). Framing current water inequalities historically can be a very useful starting point to trace why technological solutions and financial investments are not enough to solve the world's water problems.

Suggested methods:
→ Archive research & Cartographic material
→ Oral histories
→ Photographs, newspaper collections and magazines
→ Utility company reports



# ARTICULATE

## Multi-Scale Analysis

Mainstream discourses tend to explain that the exclu–sion of low–income households from access to safe and reliable water is connected to land tenure status, poverty or financial shortages. However, it is hard to imagine that explanations to the problem of lack of access to water in poor areas can be narrowly confined to a single scale (neighbourhood or household scale). Water inequalities are significantly informed by decisions made at multiple scales. Multi–scalar approaches enable understanding how local processes (increment in water tariffs) are in–fluenced by wider dynamics occurring at the global scale (World Bank structural adjustment programs), national scale (state interventions in water distribution), city scale (commercial strategies of water companies) and local scale (water scarcity produced by domestic vendors). Applying a multi–scale perspective requires identifying a variety of actors and how their strategies to gain access to and control over water are shaped and influenced by particular local, national and international contexts.

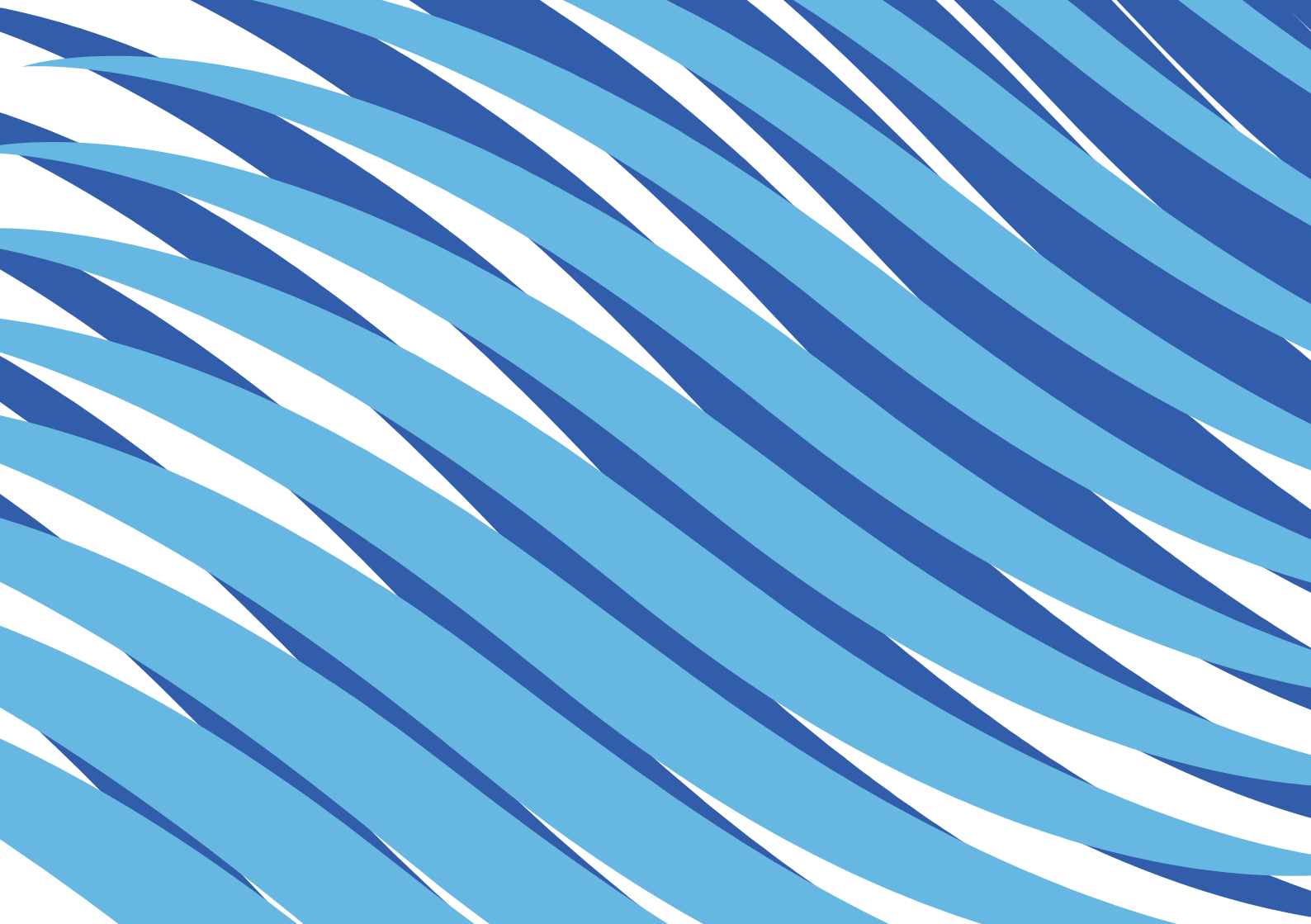
Suggested methods:
→ In–depth and semi–structured interviews
→ Analyze policy documents & Review of local press
→ Household surveys
→ Attendance at public events and forums
→ Geographical Information Systems (GIS)

# ASK 'N' LISTEN

## Ethnographic Research

Ethnographic approaches can open and expand debates about water inequalities by tracing how inhabitants of low-income neighborhoods secure access to water on a daily basis and how such practices offer potentials to identify alternative models of water supply provision that are more affordable and accessible. For low-income inhabitants, water becomes accessible through a constant process of improvisation. They mobilize not only physical infrastructures such as pipes, buckets, storage tanks and wells, but also friends, politicians, local plumbers, domestic vendors and engineers. They use different types of water for different domestic activities (rainwater for cleaning and garden irrigation, groundwater for bathing and laundry, and sachet water for drinking and coking). They attach different cultural and symbolic meanings to defend water access (human right, public good). Additionally, being attentive at how water is distributed at home or in a community can also facilitate identifying divides along race, class, gender and ethnicity.

Suggested methods:
→ Focus group discussions
→ Participatory mapping workshops
→ Video-based methods (production of documentary films)
→ Direct observation
→ In-depth interviews



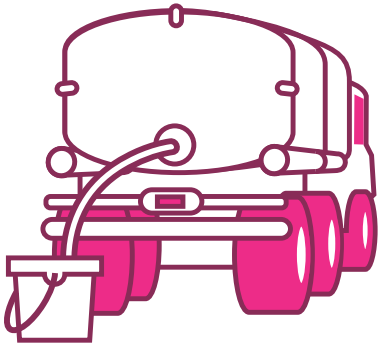
# 04

# PRACTICES

# PRACTICES

This theme provides a variety of practices from Accra (Ghana) and Medellín (Colombia) that reflect on how power is negotiated and contested between different social groups to secure access to and control over water. These practices illustrate what is happening 'on the ground' by describing and analyzing in detail where and how water flows, at which price and with which infrastructures. Some of these practices are based on place-based struggles and efforts to achieve affordable and safe access to water. Others highlight heterogeneous and differentiated forms of water provision that permit the wealthy groups to have abundant access to water while the poor rely on interrupted and expensive services. Practices are continuously changing and shaped by issues of land tenure status, rights, technology, ecology, geography and history. They offer a productive way to analyze the uneven configuration of urban waterscapes.

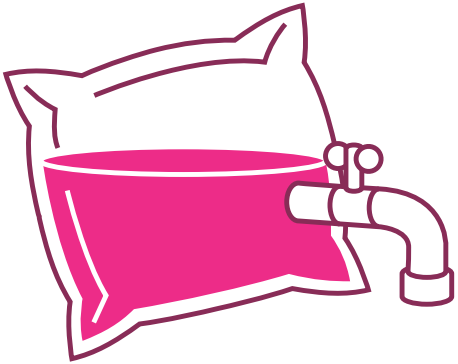

→ Heterogeneous Providers
→ Incremental Infrastructure
→ Neighborhood Solidarities
→ Self-Repair
→ Valuing Ecosystems and their Services
→ Land and Water Nexus



# FOLLOW

## Heterogeneous Providers

Water services in many cities around the world are often provided by water companies through integrated and standardized infrastructure networks and under strong state regulation. In Accra, only about half of the population is supplied by the water network, while the rest strongly relies on domestic vendors and mobile providers. Following trucks across the city provides an opportunity to explore how water is distributed outside the networked infrastructure and to interrogate where trucks get water, which kinds of water they deliver, to whom they bring it and at which price. There are more than 1000 trucks operating around the city of Accra to secure a 7/24 water service. Different types of trucks (small tricycles, poly-tank-trucks) deliver different kinds of water (groundwater and portable water obtained from the pipe) depending on the location. Water prices fluctuate depending on demand, seasons, type of user and kind of water. Groundwater, for example, tends to be cheaper than piped water and private households tend to pay more than water retailers.



# IN THE MAKING

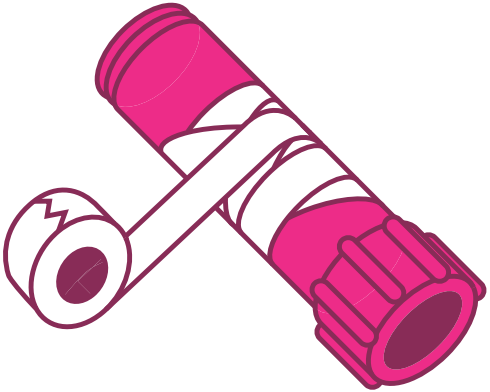
## Incremental Infrastructure

The rapidly expanding peri–urban areas of Accra do not have access to (reliable) connection to the formal centralized infrastructure. Interestingly, it is not mainly poor households that settle in these areas, but also middle and higher–income households that tend to construct single–family houses. New real state developments and high–density poor settlements co–exist in the peripheries of Accra. Looking at access to water from the periphery is particularly interesting as infrastructures are built incrementally by the inhabitants themselves. Rather than being fixed, infrastructures are subject to constant improvisation, transformation and adjustment. They are negotiated and contested by different actors with power relations based on socio–economic status. While high–income inhabitants have the ability to mobilize water tankers, low income–households rely on self–supply systems that provide ground or rainwater. Water consumption also differs broadly. Newly developed estates for example strongly depend on high amounts of water to secure the functioning of household appliances (e.g. washing machines, swimming pools). Sometimes these new estates have a direct water pipeline to water treatment plants. At the same time, poor neighborhoods suffer from acute shortages affecting their everyday activities.

SHARE

## Neighbourhood Solidarities

The water company in Medellín can restrict households from access to water when failing to pay their bills in a period of two to seven months. In these cases, the company installs a tricked valve to temporally restrict the flow of water into the house until debts are paid. In these cases, solidarity among family members, friends and neighbors is key to secure the continuous flow of water into the household and to cover basic needs. Strategies include giving buckets of water without any costs, sharing facilities such as kitchens and toilets, extending rubber hoses from one house to another. Other informal arrangements include sharing bills between households or charging per bucket of water. Moving temporarily to the house of a family member also represents a different form of solidarity. Here, basic personal and domestic needs are covered such as showering, cooking and laundry while money is collected through family efforts to pay back bills in order to avoid accumulation of more debt. Solidarity efforts are essential to restore access to water provided by the company and to avoid being categorized as 'bad' citizen for not paying the water bills on time.



# MAINTAIN

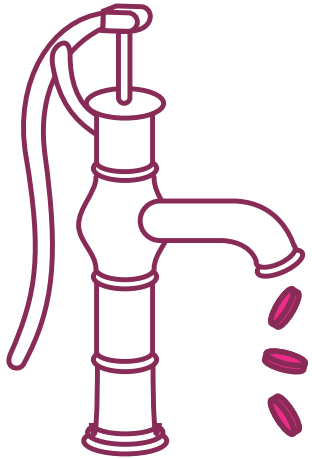
## Self-Repair

Infrastructures are important to sustain the flow of water within and through cities. However, they tend to remain unnoticed and invisible. But what happens when they break down? In the informal settlements of Medellín, water disruptions are normal and infrastructures are in a constant process of repair and maintenance. By law, the water company cannot provide water in informal settlements. To secure access, inhabitants build their own infrastructure with simple and accessible technologies, while operating on principles of equity, solidarity, and affordability. The management of these infrastructure systems is handled by a fontanero (a person who is paid on a weekly basis by the community). This person's tasks include repairing tubes from fissures and cracks, fixing blockages and ensuring that every single house has access to a sufficient amount of water. Constant maintenance is needed to secure a 24-hour water service. When a new resident moves into the area, access to water is arranged through the fontanero, who charges a small fee for installment and maintenance of the system, but not for the amount of water being consumed. The costs for self-repair and maintenance depend on the ability to pay of the households served.

# ECOLOGIZE

## Valuing Ecosystems and their Services

Wetlands provide diverse services and benefits for human well–being. Healthy aquatic ecosystems can support pollution control, reduce nutrient loads and prevent flooding. In Accra, wetlands used to protect the coast against erosion, stabilize shorelines, improve water quality and provide fish for inland fishery. However, wetlands are also contested sites that reflect multiple interests between different resource users and actors. Fishermen and farmers depend on access to different natural resources provided by wetlands to sustain their livelihoods (fish, fresh water). For the real estate sector, the land surrounding wetlands has become very attractive for urbanization purposes. For international traders, wetlands are dump sites for electronic waste (refrigerators, computers). To protect ecosystems and their functions the government has supported the designation of wetlands under the Ramsar convention.



# EXPLORE

## Land and Groundwater Nexus

Looking at the relationship between land and ground–water provides an interesting way to explore the dyna–mics of water provision in the peripheries of Accra. In the absence of centralized infrastructures, groundwater represents one of the main sources of water supply in peri–urban areas. The way in which groundwater is ac–cessed, privatized and commodified can tell us different stories about land ownership and forms of neighborhood organization. The right to use and abstract groundwater, for example is de jure not connected to land owner–ship. Nonetheless, given that access to groundwater is privately controlled by the owner of the well or borehole, groundwater has become a de facto private resource of the owner of the land and the borehole. Owners of wells and boreholes play a key role in securing water access to low–income households because they sell water mostly at the lowest price or they give water as a donation to their neighbors in buckets. However, inhabitants of the peripheries have to select different types of water to cover their daily needs. Groundwater is commonly used for domestic and construction activities, while sachet water (water packed in small plastic bags) is consumed for drinking, as it is associated with perceptions of purity and safety.

05

# ALTERNATIVES

# Alternatives

This theme introduces several alternatives that have been mobilized at the neighborhood, city, national and global scale to secure universal access to water in Accra and Medellín. Although these alternatives have their limitations, they represent important efforts to provide affordable and accessible water services to low–income populations. They range from legal and constitutional instruments, municipal programs, everyday negotiati–ons, community forms of organization and internatio–nal rights frameworks. Some of them emerge from the efforts made by the urban poor to secure access to water while others are the result of social movement struggles to challenge water inequalities. This handbook invites users to imagine, propose and create alternatives based on a combination of elements contained in the toolkit, methodological approaches and practices. By exploring and integrating new alternatives into the handbook, users are encouraged to formulate 'concrete actions' to secure universal access to water.

→ The Human Right to Water
→ Politicize Disconnection
→ Collective Off–grid
→ Selling Pure Water
→ Propose an Alternative

# DEMAND

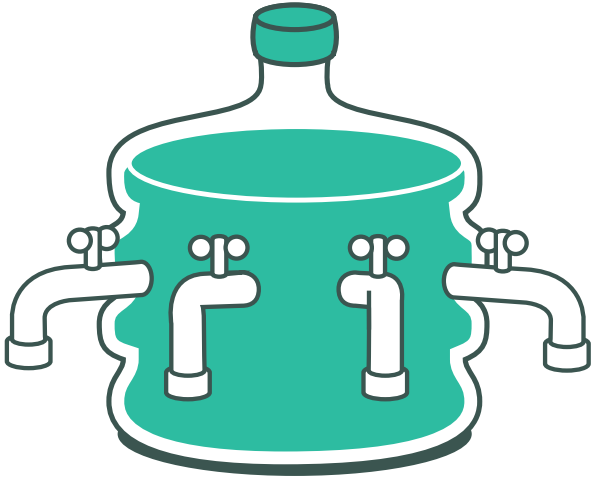
## The Human Right to Water

The United Nations declared the existence of the Human Right to Water in July 2010. This debate has reached an important dimension in Latin America and has taken different forms. For example, countries such as Bolivia, Ecuador and Uruguay have implemented constitutional changes to support the right to water and ban private sector provision. In Colombia, the right to water has not been recognized by the national government. Howe–ver, the city of Medellín has implemented a free water allowance program since 2010 in response to growing social pressure to reduce the number of disconnected households for non–payment. The program relies on providing a basic allocation of 2,5 m3/person/month free of charge to low–income households that are formally connected to the centralized network. The municipality finances the program by transferring the costs directly to the water company.

# MOBILIZE

## Politicize Disconnection

The Roundtable of Disconnection (Mesa de Desconectados) was formed in Medellín to demand concrete solutions to the problem of disconnection for non-payment. To make their claims heard, this community-based movement performs actions that range from providing legal support to low-income households to the involvement in educational campaigns, mass parades, festivals, theatre performances, protests and participation in municipal events. Legally, one of the most important victories of the movement was the approval of a legal mechanism that forbids the company to disconnect water services for non-payment to households inhabited by children. The movement has also drawn international attention by preparing a declaration, which was debated in the United Nations Human Rights Council to ask the Colombian State to meet its obligations with respect to access to drinking water and sanitation. Although this declaration imposes moral instead of legal obligations, it represents an important legal mechanism to pressure the state to meet people's demands.



# COOPERATE

## Collective Off-Grid

Medellín has a number of interesting alternatives to provide water supply services on a non–commercial basis. Many of these alternatives are located in the peripheries of the city where communities excluded from the centralized water network have been active in the construction of their own water supply systems. One of the most successful strategies is the ‘community aqueducts’. This form of collective off–grid has been essential to provide access to water in informal settlements. These aqueducts have been built with voluntary work and financial support of low–income inhabitants. Potable water is provided at affordable prices and it is distributed through a network of pipes to individual households. For decades, they have resisted privatization by refusing adopting market principles. Additionally, they have been active in pursuing alliances with trade unions and NGOs, and developing alternative ways to preserve water as a public good.

# BE CRITICAL

## Selling Pure Water

Within the last two decades an entirely new form of packaged water, namely ‘sachet water’ or ‘pure water’ developed in Ghana – has become now a new water business. Sachet water refers to water that is sold in sealed plastic sleeves at the amount of 500ml. It is al–most everywhere available and has become an important drinking water source although quality control is rather dubious. Interestingly sachet water is now common across all socio–economic strata. Therefore, one could argue, sachet water is an important component of water security in Ghana. On the other hand, it is more expensive than piped water – accordingly the financial burden for the urban poor is higher and yet sachet water is just an–other phenomenon of water inequalities. Is sachet water the manifestation of the ongoing water crisis or is it an alternative to overcome water insecurity?

# IMAGINE

## Propose an Alternative

This space invites users to complement this handbook by adding new alternatives based on own experiences or other cases studies taking place in different parts of the world. By combining elements of the toolkit, methodological approaches and practices, users can discover and imagine possible alternatives to construct equal and just urban waterscapes.

Are you interested in sharing your alternatives?
Please send them to ↗ waterpower@uni-trier.de or ↗ governance@uni-trier.de

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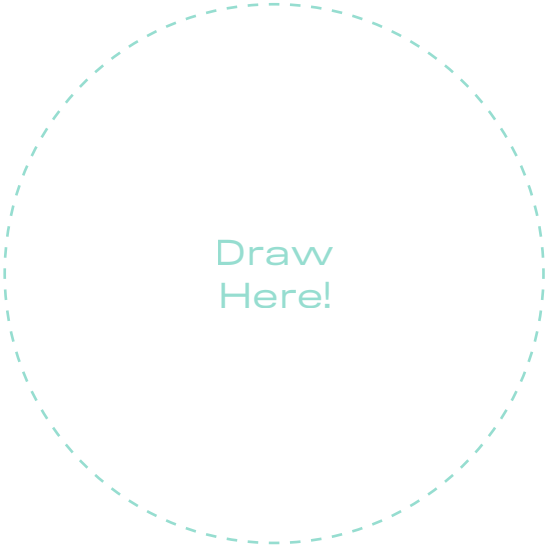


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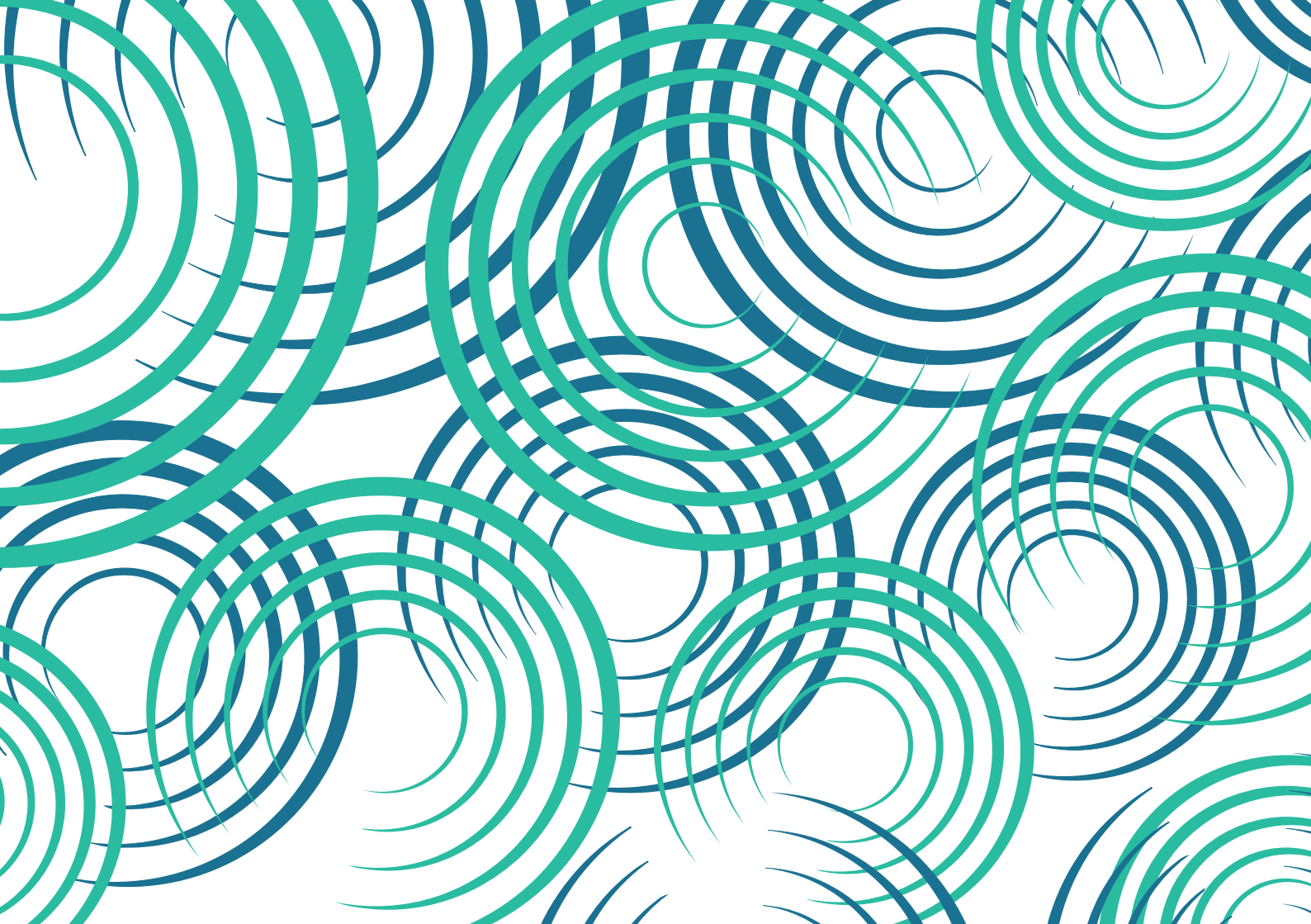

# 6 — WATERSCAPES LIBRARY

Reading List

## URBAN POLITICAL ECOLOGY


Gandy, M. 2014. The fabric of space: Water, modernity, and the urban imagination. Cambridge: MIT Press.

Graham, S.; Desai, R. and McFarlane, C. 2013. Water wars in Mumbai. Public Culture 25: 115–141.

Heynen, N.; Kaika, M. and Swyngedouw, E. (eds.) 2006. In the nature of cities: Urban political ecology and the politics of urban metabolism. London and New York: Routledge.

Kaika, M. 2005. City of flows: Modernity, nature, and the city. London and New York: Routledge.

Lawhon, M.; Ernstson, H. and Silver, J. 2014. Provincializing urban political ecology: Towards a situated UPE through African urbanism. Antipode 46(2): 497–516.

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## MATERIALITIES OF WATER


Anand, N. 2011. PRESSURE: The politechnics of water in Mumbai. Cultural Anthropology 26(4): 542–564.

Bartels, L.E.; Bruns, A. and Alba, R. 2018. The production of uneven access to land and water in peri–urban spaces: de facto privatization in greater Accra. Local Environment.


## WATER AND SCARCITY


Bruns, A. and Frick, F. 2014. The notion of the global water crisis and urban water realities in Accra – Perspectives from socio–hydrology. In: Bogardi, J.J.; Bhaduri, A.; Leentvaar, J. and S. Marx (Ed) The global water system in the Anthropocene. Challenges for science and governance. Springer.

Mehta, L. 2013. The limits to scarcity: Contesting the politics of allocation. London: Routledge.

## WATER AND GENDER

Bennett, V., Dávila-Poblete, S. and Rico, M.N. (eds.) 2005. Opposing currents: The politics of water and gender in Latin America. Pittsburgh: University of Pittsburgh Press.

Truelove, Y. 2011. Re-conceptualizing water inequality in Delhi, India through a feminist political ecology framework. Geoforum 42(2): 143–152.

Sultana, F., Mohanty, C.T. and S. Miraglia, S. 2013. Gender justice and public water for all: Insights from Dhaka, Bangladesh. Municipal Services Project (MSP) Occasional Paper No. 18: 1–24.

## HUMAN RIGHT TO WATER

Sultana, F. and Loftus, A. (eds.) 2012. The right to water: Politics, governance and social struggles. Abingdon: Earthscan.

Bakker, K. 2007. The commons versus the commodity: 'Alter'-globalization, privatization, and the human right to water in the global South. Antipode 39(3): 430–455.

## WATER AND INFRASTRUCTURE

Anand, N. 2017. Hydraulic city: Water and the infrastructures of citizenship in Mumbai. Durham: Duke University Press.

Björkman, L. 2015. Politics, contested waters: Embedded infrastructures of millennial Mumbai. Durham, NC: Duke University Press.

Coutard, O. and Rutherford, J. (eds.) 2016. Beyond the networked city: Infrastructure reconfigurations and urban change in the North and South. New York: Routledge.

Graham, S. and Marvin, S. 2001. Splintering urbanism. Networked infrastructures, technological mobilities and the urban condition. London: Routledge.

Lawhon, M., Nilsson, D., Silver, J., Ernstson, H. and Lwasa, S. 2017. Thinking through heterogeneous infrastructure configurations. Urban Studies 55(4): 720–732.

Von Schnitzler, A. 2016. Democracy's infrastructure: Techno–Politics and protest after apartheid. New Jersey: Princeton University Press.

## WATER AND ALTERNATIVES

McDonald, D.A. (eds). 2016. Making public in a privatized world. The struggle for essential services. London: Zed Books.

McDonald, D.A. and Ruiters, G. (eds.) 2012. Alternatives to privatization: Public options for essential services in the Global South. New York: Routledge.

### Recommended Journals

Annals of the Association of American Geographers
Antipode
City
Environment and Urbanization
Environment and Planning: A
Geoforum
Geographical Journal
Geography Compass
International Journal of Urban and Regional Research
Progress in Human Geography
Urban Geography
Urban Studies
Water Alternatives
WIREs Water

### Recommended Documentaries

H2Omx
↗ www.h2o.mx/

The Big Sell Out
↗ www.thebigsellout.org/index.html

Troubled Water
↗ vimeo.com/115894458

Women and Water
↗ vimeo.com/63227584

Notes from the Future. Cape Town Water Crises
↗ www.youtube.com/watch?v=zYDZ–ymbISg

H2O Films – List of Short and Long Documentaries
↗ waterfortheages.org/water–films/

# 7 — IMPRINT

This handbook was developed as part of a collaborative project with the research group WaterPower leaded by Prof. Dr. Antje Bruns at the Trier University. WaterPower is funded by the German Federal Ministry of Education and Research (BMBF) and focuses on experimenting novel ways on doing interdisciplinary research on urban water problems by taking as a case study the city of Accra, Ghana.

↗ www.waterpower.science

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CONTESTED URBAN WATERSCAPES

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Design, Layout & Illustration
Benn Zorn | aufsiemitgebrüll | Berlin
Font: Mueller Regular/Expanded/Extended by ZornType

ISSN (Print) 2510-0521
ISSN (Online) 2510-2222