Introduction to water issues: hydrosocial relations, examples from Colombia and beyond

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Module: Sociology, Places and Cultures of Sustainability

Today's programme

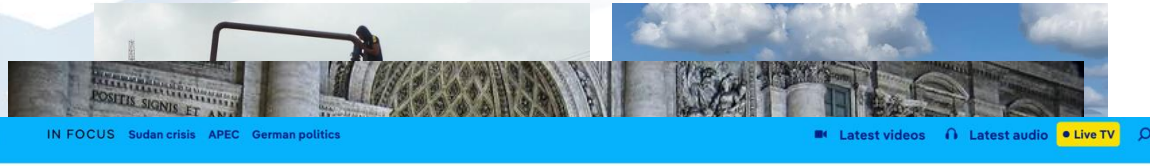
1. From water to hydrosocial relations
2. Researching hydrosocial relations
3. Some examples from Colombia and beyond

1. From water to hydrosocial relations

IRI THESys
Transformations of Human-Environment Systems

What is water?

What is water?



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CULTURE | ITALY

Climate activists blacken Trevi Fountain over Italy floods

05/21/2023

Activists poured charcoal into the waters of Rome's most famous fountain, calling for action against climate change. Rome's mayor condemned the "absurd attacks."

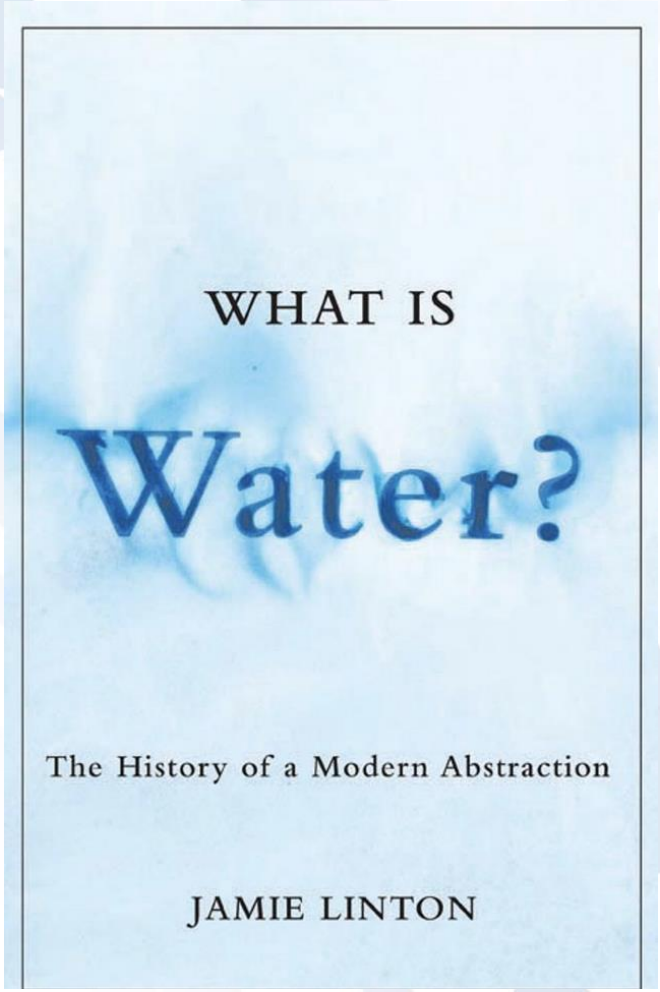
Activists were protesting over the recent deadly flooding in Italy

Image: Giulia Marrazzo/ZUMAPRESS/picture alliance

Climate activists in Italy blackened on Sunday Rome's famed **Trevi Fountain** (also known as Fontana Di Trevi) with charcoal, calling for an immediate halt to public subsidies to fossil fuels. They said the climate crisis is the reason for the latest flash floods in the country.

The **floods in the region of Emilia-Romagna** in the northeast of Italy have thus far killed 14 people, devastating much of the hit area.

Modern water management



Modern water management

Water is seen as a **resource** and a **symbol of progress** (for all) that can be **managed** through **engineering and hydrology** to support **societal development** and strengthen **state power**

Lanificio Conte - Sala Turbine, Schio, 2023. Foto: Alba R.

Linton, J., & Budds, J. (2014). The hydrosocial cycle: Defining and mobilizing a relational-dialectical approach to water. *Geoforum*, *57*, 170-180.

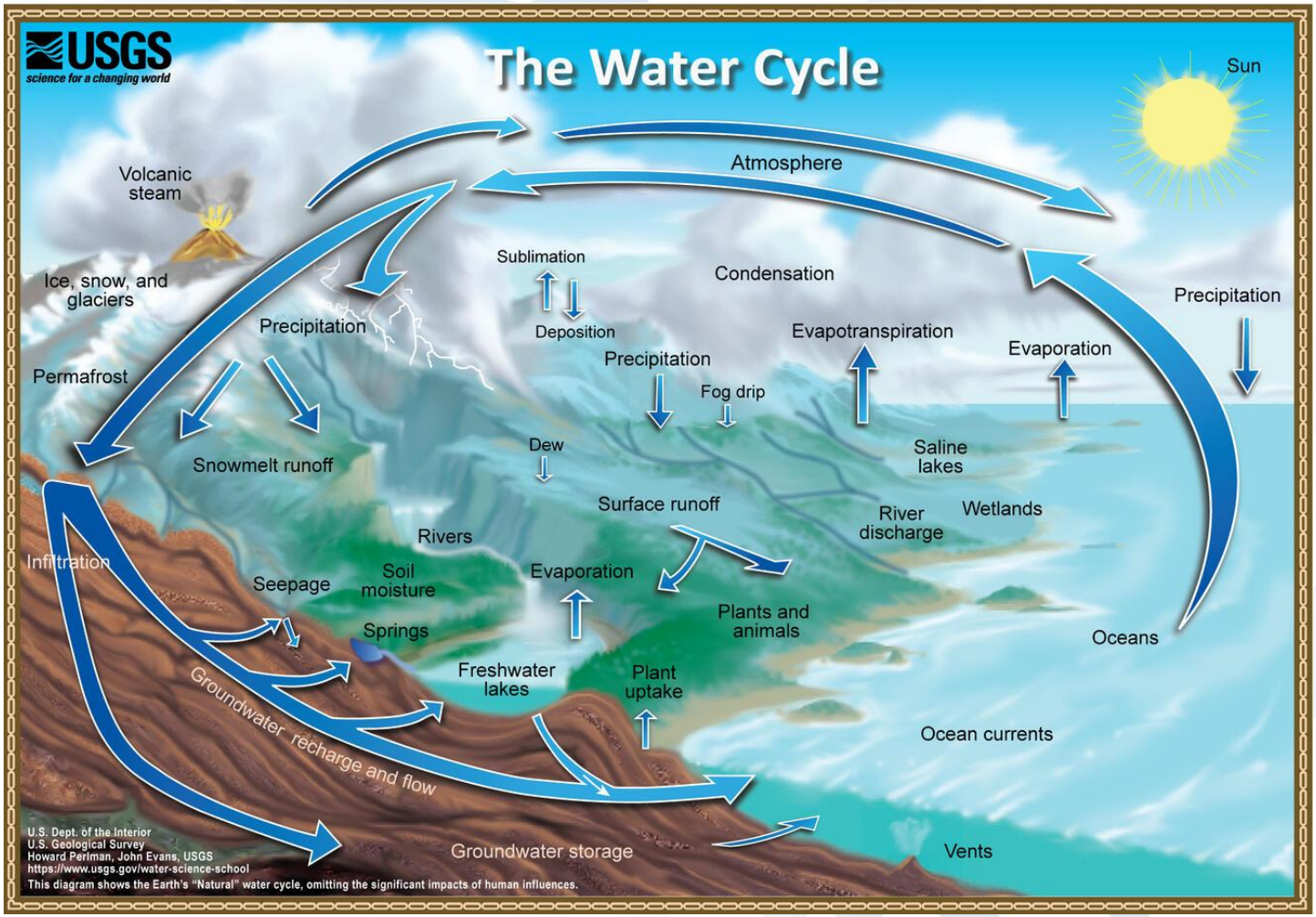
Modern water management

"A feature of modern water has been to divorce the world's various waters from their local, social, cultural, religious, and ecological contexts, and to reduce them to an identical, placeless substance, thus facilitating modern practices of water management and control" (Linton, 2022:n.a.)

Photo by COPAL on Unsplash

Linton, J. (2022). Waters in the plural: approaches and opportunities for more grounded research and management. Géocarrefour, 96(96/2).

Modern water management



Howard Perlman, USGS and John Evans, USGS

Modern water management - critiques

1. Modern water management is **not always a success story** for all
   - Examples: i) dam construction and operation displaces people

2. Focus on **engineering and hydrology** precludes other ways of understanding waters
   - Example: religious and cultural attachments

3. Over time **new interests and priorities** emerged:
   - Example: environmental conservation, social inequalities, climate change, human rights

4. New **actors** involved in water management:
   - Example: EU, UN, NGOs and civil society organizations

Linton, J. (2022). Waters in the plural: approaches and opportunities for more grounded research and management. Géocarrefour, 96(96/2).
Meehan, et al. *Water: A critical introduction*. John Wiley & Sons, 2023.

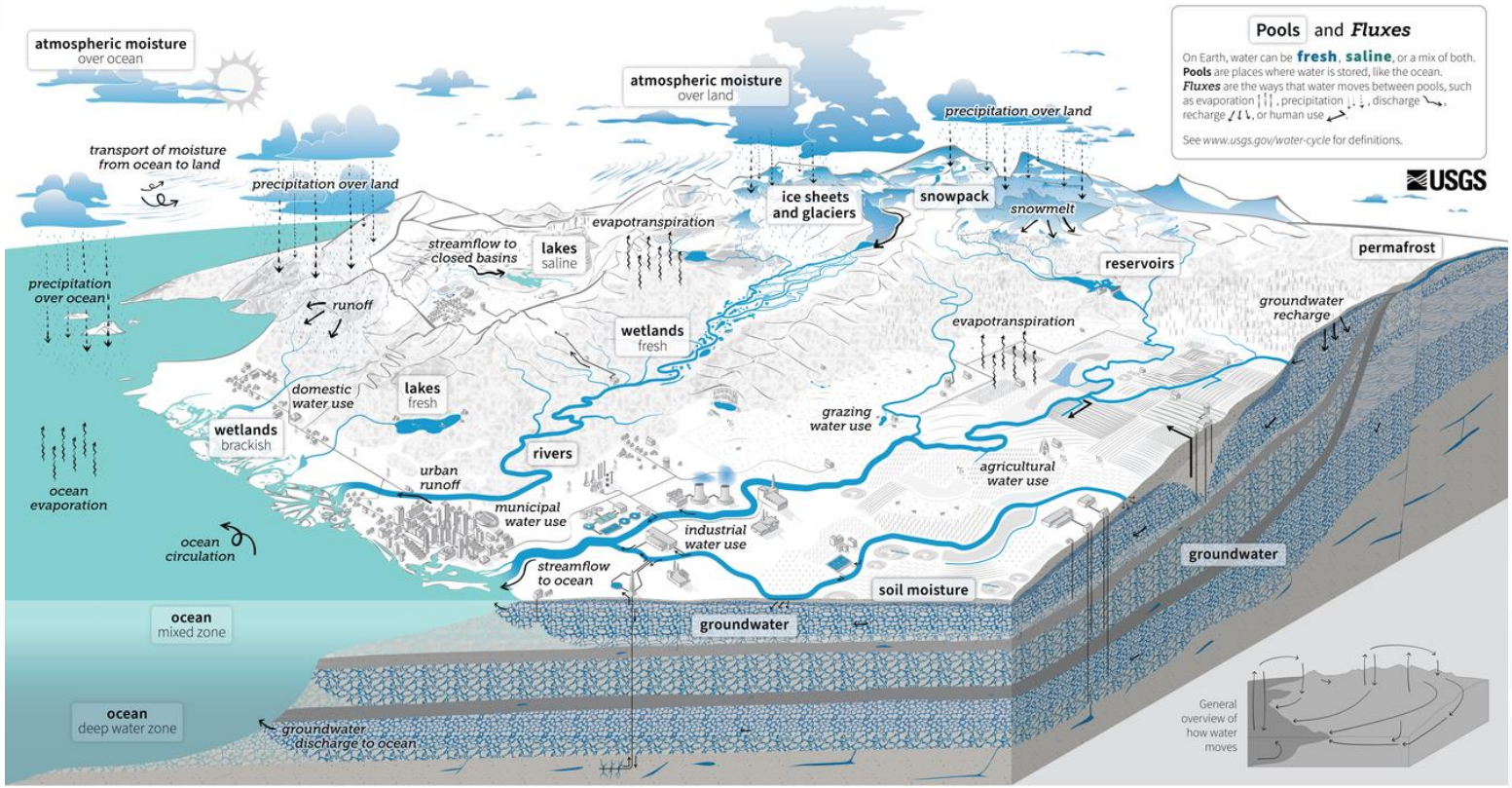
Hydro-social relations

- Water and society as inseparable: **hydrosocial**
- **Plural and context-specific** hydrosocial relations
  - water is many 'things' at the same time.
  - How water is known shape its governance
- Water management and governance as a **political**
- Focus: **interconnection, overlap, tension** between different hydrosocial relations

Frick-Trzebitzky, F. , Alba R. and Fehrs K. (2023). Adaptive governance as bricolage. Geographica Helvetica, 78(3), 397-409. Open Access

Meehan, Katie, et al. *Water: A critical introduction*. John Wiley & Sons, 2023.

Humans are part of the water cycle!



The Water Cycle

The water cycle describes where water is found on Earth and how it moves. Water can be stored in the atmosphere, on Earth's surface, or below the ground. It can be in a liquid, solid, or gaseous state. Water moves between the places it is stored at large scales and at very small scales. Water moves naturally and because of human interaction, both of which affect where water is stored, how it moves, and how clean it is.

Liquid water can be fresh, saline (salty), or a mix (brackish). Ninety-six percent of all water is saline and stored in **oceans**. Places like the ocean, where water is stored, are called **pools**. On land, saline water is stored in **saline lakes**, whereas fresh water is stored in liquid form in **freshwater lakes**, artificial **reservoirs**, **rivers**, **wetlands**, and in soil as **soil moisture**. Deeper underground, liquid water is stored as **groundwater** in aquifers, within the cracks and pores of rock. The solid, frozen form of water is stored in **ice sheets**, **glaciers**, and **snowpack** at high elevations or near the Earth's poles. Frozen water is also found in the soil as **permafrost**. Water vapor, the gaseous form of water, is stored as **atmospheric moisture** over the ocean and land.

As it moves, water can transform into a liquid, a solid, or a gas. The different ways in which water moves between pools are known as **fluxes**. **Circulation** mixes water in the oceans and transports water vapor in the atmosphere. Water moves between the atmosphere and the Earth's surface through **evaporation**, **evapotranspiration**, and **precipitation**. Water moves across the land surface through **snowmelt**, **runoff**, and **streamflow**. Through infiltration and **groundwater recharge**, water moves into the ground. When underground, groundwater flows within aquifers and can return to the surface through **springs** or from natural **groundwater discharge** into rivers and oceans.

Humans alter the water cycle. We redirect rivers, build dams to store water, and drain water from wetlands for development. We use water from rivers, lakes, reservoirs, and groundwater aquifers. We use that water (1) to supply our **homes** and **communities**; (2) for **agricultural** irrigation and **grazing** livestock; and (3) in **industrial** activities like thermoelectric power generation, mining, and aquaculture. The amount of available water depends on how much water is in each pool (water quantity). Water availability also depends on when and how fast water moves (water timing), how much water is used (water use), and how clean the water is (water quality).

Human activities affect **water quality**. In agricultural and urban areas, irrigation and precipitation wash fertilizers and pesticides into rivers and groundwater. Power plants and factories return heated and contaminated water to rivers. Runoff carries chemicals, sediment, and sewage into rivers and lakes. Downstream from these types of sources, contaminated water can cause harmful algal blooms, spread diseases, and harm habitats. **Climate change** is also affecting the water cycle. It affects water quality, quantity, timing, and use. Climate change is also causing ocean acidification, sea level rise, and extreme weather. Understanding these impacts can allow progress toward sustainable water use.

Corson-Dosch et al.. https://www.usgs.gov/media/images/water-cycle-png

Hydro-social relations: water can be several things at the same time!

WIREs WATER

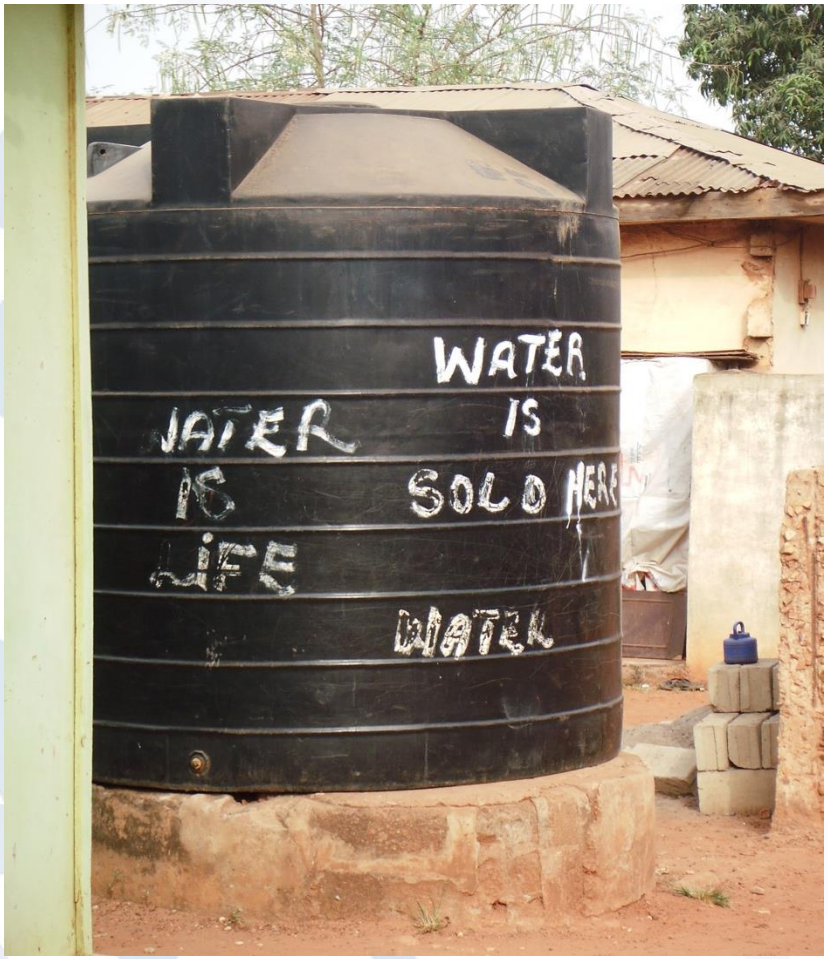
Advanced Review

Household water sharing: A review of water gifts, exchanges, and transfers across cultures

Amber Wutich, Jessica Budds, Wendy Jepson, Leila M. Harris, Ellis Adams, Alexandra Brewis, Lee Cronk, Christine DeMyers, Kenneth Maes, Tennille Marley, Joshua Miller, Amber Pearson ... See all authors

First published: 07 September 2018 | https://doi.org/10.1002/wat2.1309 | Citations: 75

Funding information NIMH, Grant/Award Number: R21MH108444; Lloyd's Register Foundation; NSF, Grant/Award Numbers: DEB-1637590, SES-1462086, BCS GSS-156092, GRFP 026257-001, GSS-1434203; Northwestern University; TAMU Water Security Initiative; Texas A&M University College of Geosciences; Arizona State University's School of Human Evolution and Social Change



Water storage in Accra. Photos by Alba R.

Hydrosocial relations: politics

"water governance concerns deeply **political choices** about where the water should flow; about the norms, rules and laws on which such choices should be based; about who is best able or qualified to decide about this; and about the kind of societal future that this choices support" (Zwarteveen et al., 2017:8, emphasis added)

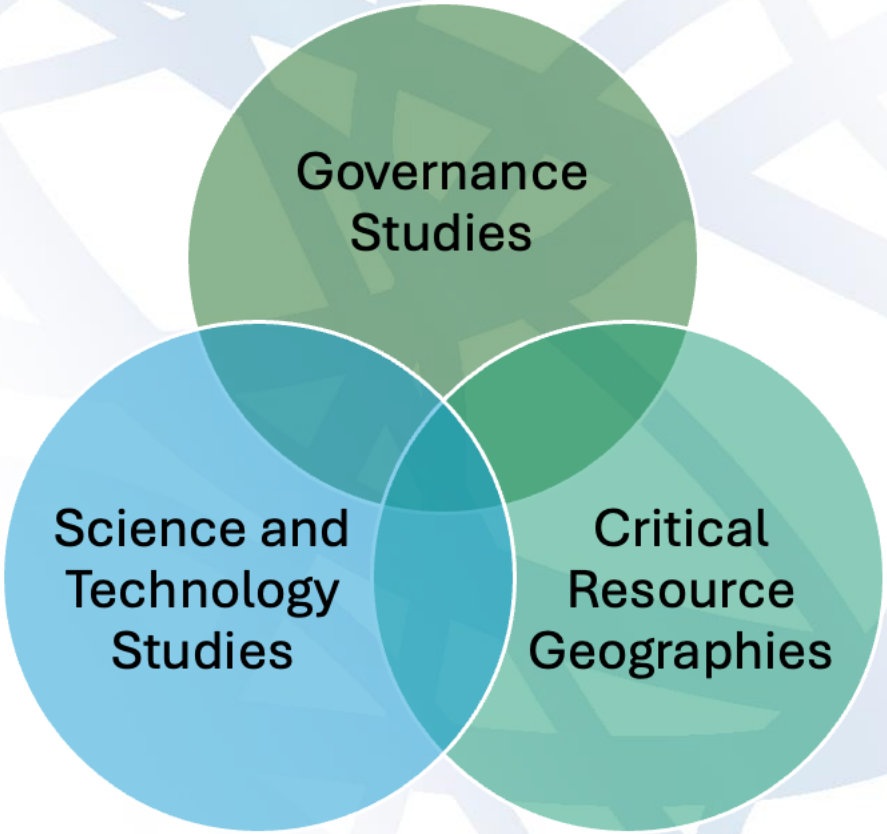
2. Researching hydrosocial relations (from a governance perspective)

Researching water and society relations

- How are governance approaches and infrastructure for regulating waters developed and implemented?
- By whom and for whose benefit?
- What are the outcomes in terms of the distribution of social, economic and ecological benefits and harms?
- Which and whose knowledges and expertise are involved?

Experiencing the sea by boat. Photo by R. Alba
Collecting data. Photo by C. Spadaro
Measuring waters. Photo by L. Betancur Alarcon

Studying water and society relations: research approaches



Studying water and society relations: research methods

Qualitative Methods

- Interviews
- Participatory observations
- Document analysis (i.e. policies, newspaper articles)
- Participatory mapping
- Walking and riding along

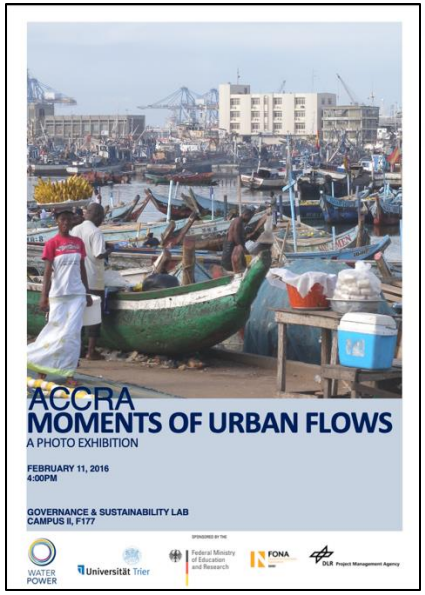
Research Approaches

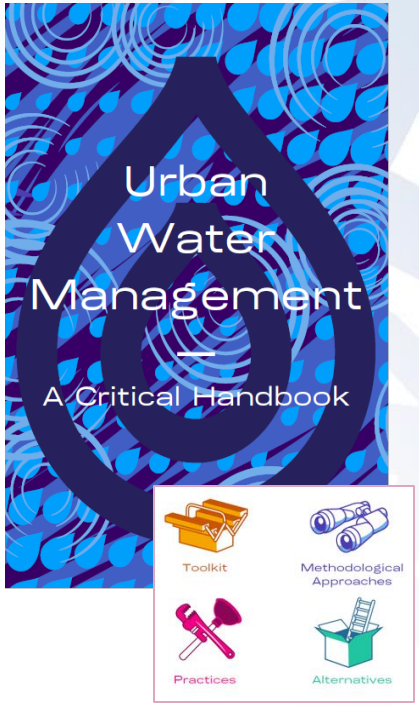
- Study up
- Shadowing: Follow the truck!
- Collective research: interdisciplinary collaborations, art-research community

An engineer (middle) and a human geographer (me) interview the manager (left) of the Weja Water Treatment Plant, Accra. Photo by Waterpower

Inter- and transdisciplinary approaches

- Interdisciplinarity: Working with colleagues from other disciplines (i.e. hydrology, sociology, anthropology, etc)
- Transdisciplinarity: Working with people beyond academic (i.e. policy makers, activists, general public, etc.)





Example 1: Sogamoso river, Colombia – Why are different ways of knowing water important?

Betancur-Alarcón, L.; Pulgarín-Morales, L.; Jiménez-Saénz, C.; Alba, R & Krueger, T. (in review) Electrified Rhythms: How Hydropower Infrastructure Transforms Hydrosocial Relations of Riverine Communities in the Lower Sogamoso River, Colombia.

Example 2: Elbe river, Germany – How is water governed? What are the different ways of relating with water in a tidal region?

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Any question and/or comment?

….

3. Some examples

Example 1: Sogamoso river, Colombia

- Why are different ways of knowing and relating with water important?

Betancur-Alarcón, L.; Pulgarín-Morales, L.; Jiménez-Saénz, C.; Alba, R & Krueger, T. (in review) Electrified Rhythms: How Hydropower Infrastructure Transforms Hydrosocial Relations of Riverine Communities in the Lower Sogamoso River, Colombia.

The project

water security for whom?

Social and material perspectives on inequality around multipurpose reservoirs in Colombia.

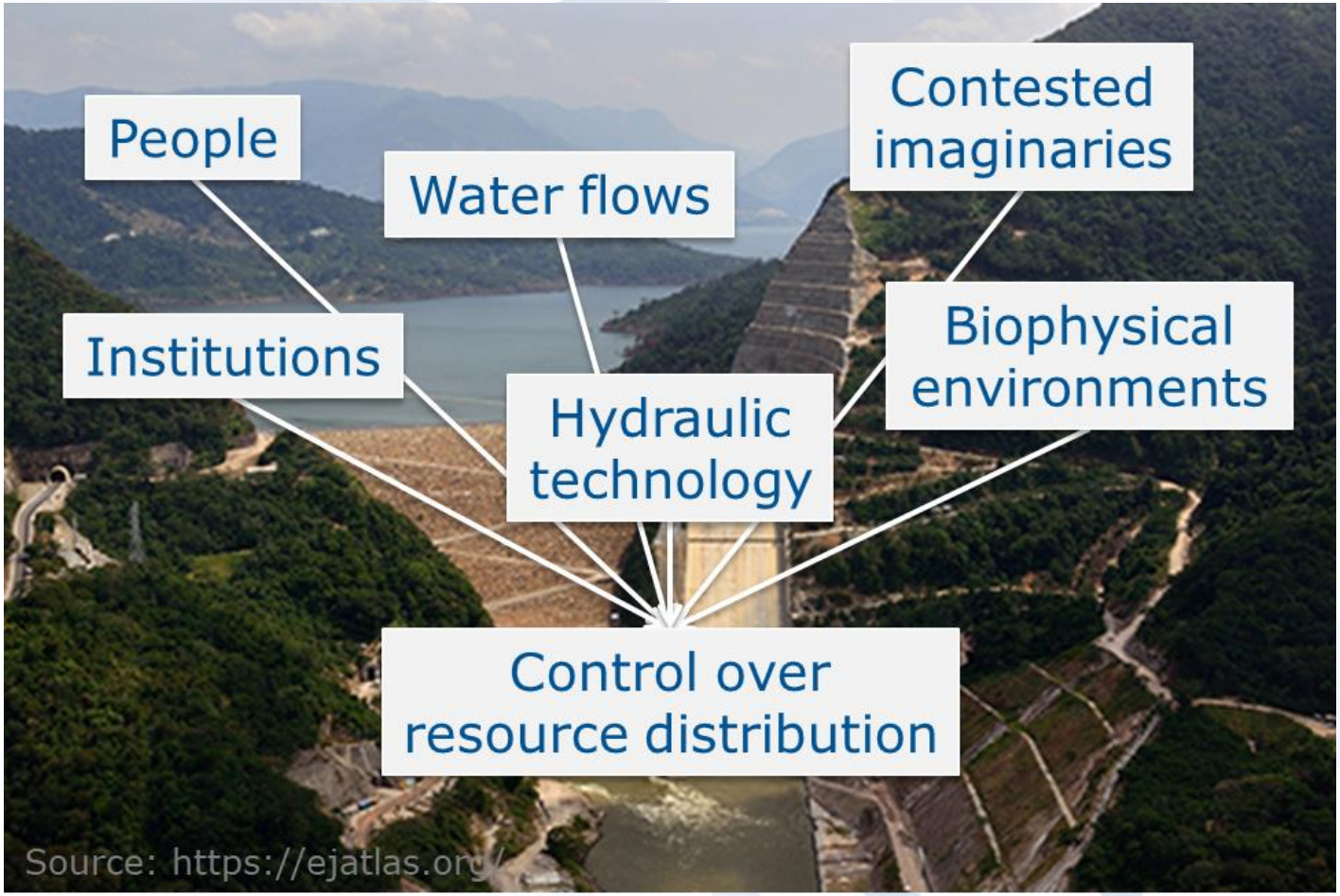
Scan here for more info

Dams as focus

Photo credits: P. Hostert, 2023

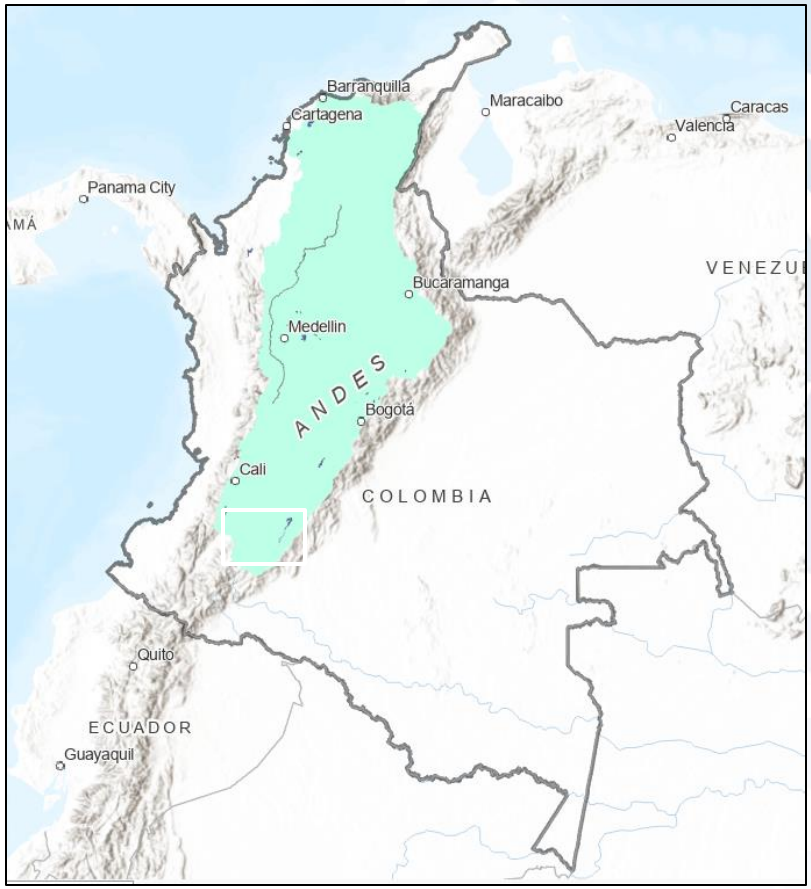
1) Distruptive and contested
2) Water-food-energy
3) Geographies of power

Dams and hydrosocial relations



Source: Kruger 2021, representation of hydrosocial territories

Magdalena River Basin

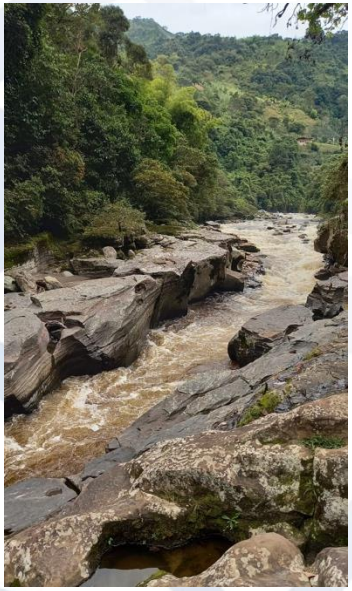


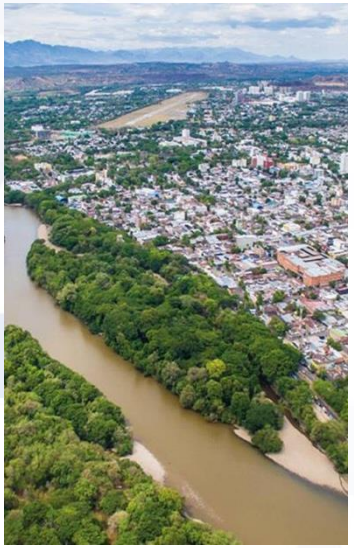
77%
of the population of Colombia

70%
of the hydropower production

157.000
People depend on inland fisheries in the basin

25%
of the country (258,437 km2)

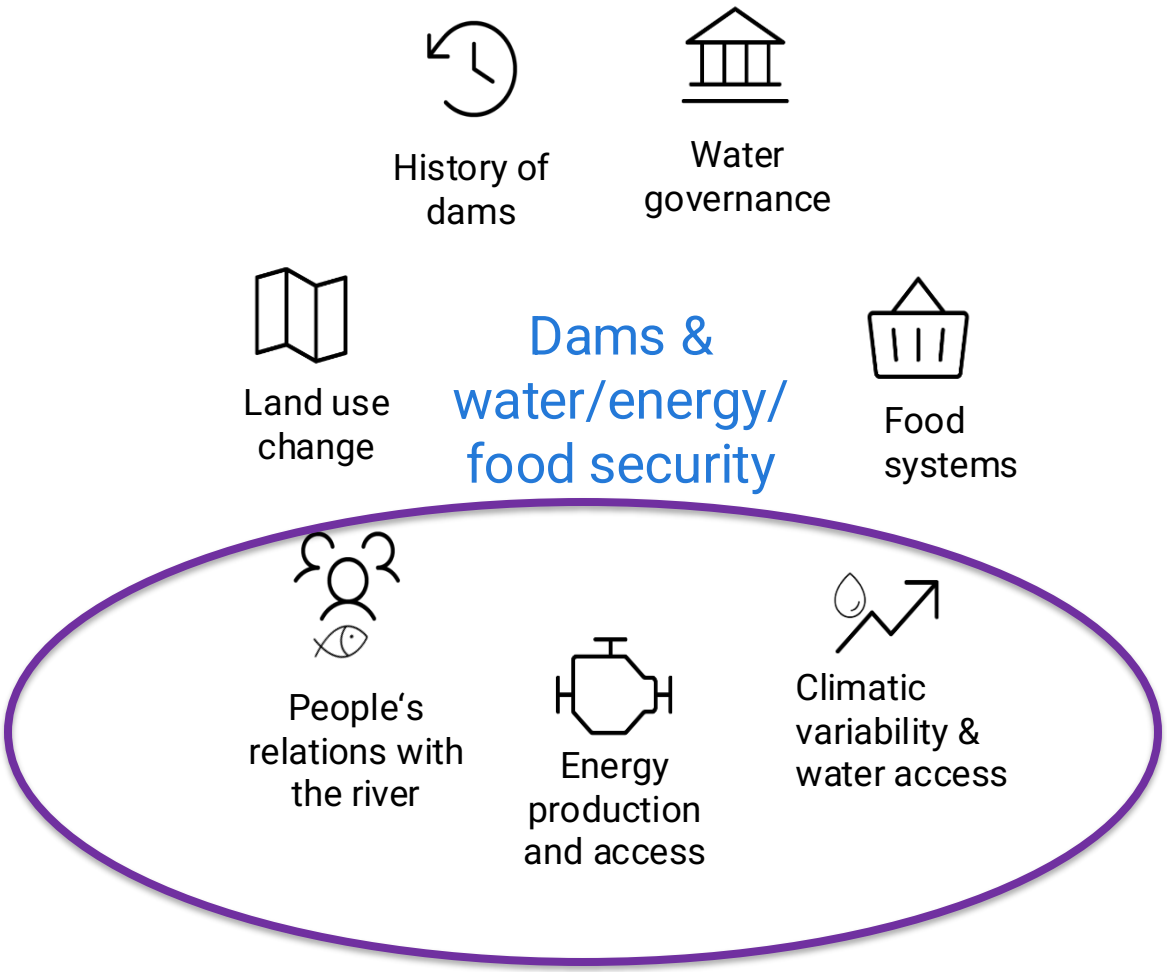




Quelle:TNC, 2016; Restrepo et. al, 2020; Fundación Natura, 2021.

The challenges: Water (and energy) governance

Interdisciplinary & multi-method approach



Laura Betancur-Alarcón (HU Berlin)

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Camila Jiménez-Saénz (PUJ)

Rossella Alba (HU Berlin)

Tobias Krueger (HU Berlin)

Interdisciplinary & multi-method approach

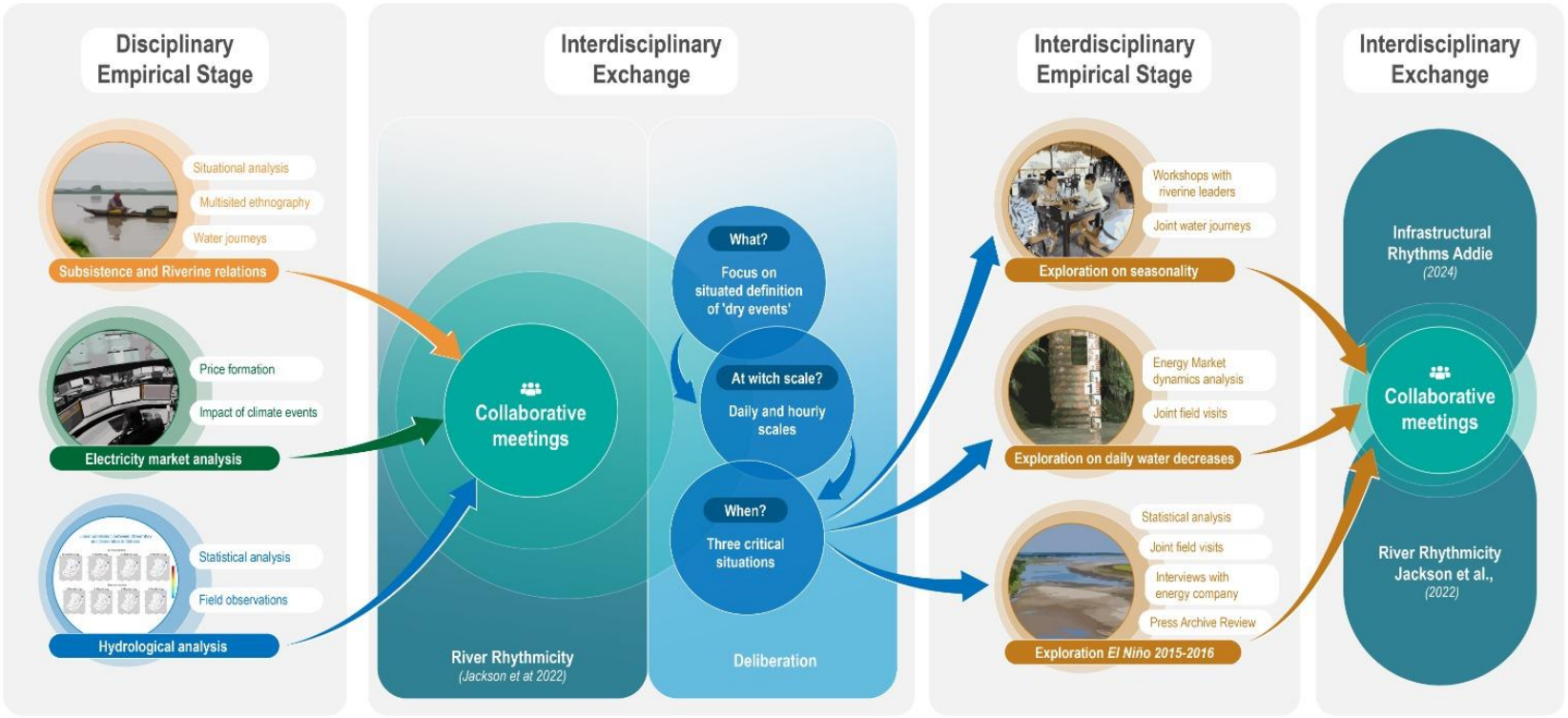

Figure 2 Diagram of the four stages of our interdisciplinary methodology.

Lower Sogamoso River

Urban and rural settlements downstream of the Hidrosogamoso dam. The zoomed-in view details the river's braided morphology, crucial for riverine livelihoods. A yellow triangle represents the selected streamflow station.

Hidrosogamoso dam,
By Motero colombia - Own work, CC BY-SA 4.0, https://commons.wikimedia.org/w/index.php?curid=46457844

Livelihoods, seasons and rivers

Credits: L. Betancur Alarcon

Livelihoods, seasons and rivers

Temporal division of livelihoods following river seasonality and job market dynamics.

"We knew that those months were not for growing crops because the plants would not grow without rain. But for fishing, it was the best because there was a subienda [fish spawning migration]. In early November and December, the river was at a low level, making it easier for us to fish. Tiempo de verano was no longer useful for cropping. We had to wait for the rains to return in April and May" (Participant #6, Workshop 2, testimony collected by Betancur Alarcon L.)

Livelihoods, seasons and rivers

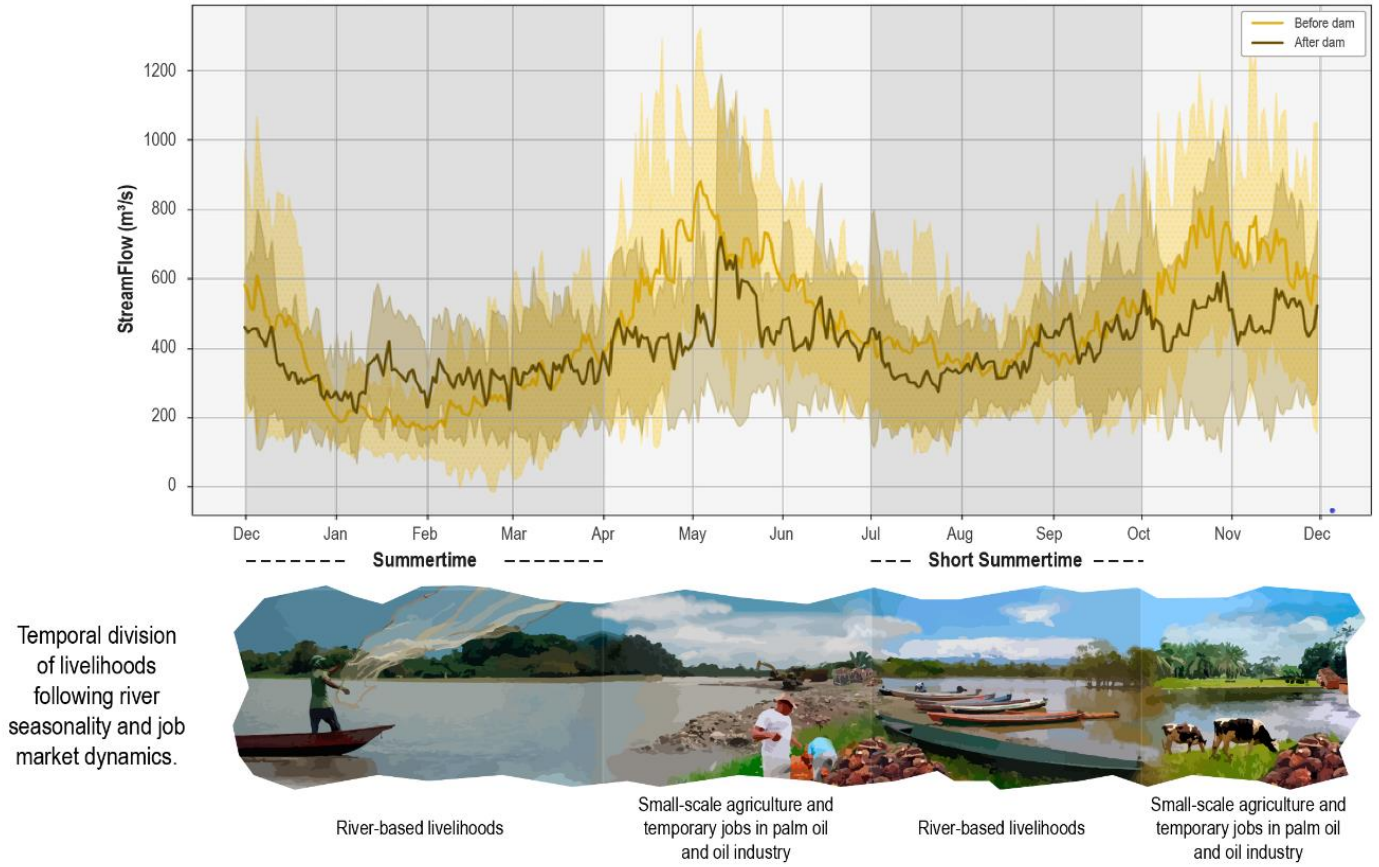

Figure 3 Daily average streamflow before and after dam commissioning in relation to seasonal jobs, which used to vary with falling and rising waters. Yellow: average daily streamflow from January 1, 1992, to June 7, 2014, the official date of commissioning. Brown: daily average data from December 1, 2014, when the plant started operations. The shading shows one standard deviation above and below the average.

Livelihoods, seasons and rivers

Experiential knowledge shape collective social and economic practices (e.g. commission systems, capachera)

"Right now, we do not know [if we are going fishing]. Other fishers come at night and say to you: 'Brother, let's go; tomorrow will be a good day for fishing'. But then the power plant starts, and at 6 a.m., they open the gates. It hurts people's fishing because the river rises and the fish go somewhere else. It is not like before, when I used to go fishing for 15 days; it was full 15 days!"

(Participant 4, Workshop 2 testimony collected by Betancur Alarcon).

Some take away messages…

- *Ribereños* rely largely on their experiential knowledge for their livelihood practices
- *Ribereños* have to deal with water discharge variations that upset local environmental knowledge and subsistence
- Construction *and* daily operation of hydropower infrastructure (and the electricity market) influences hydrosocial relations.
- Implications for: adaptation, compensation, future (energy and water) planning

Example 2: Elbe river, Germany – How is water governed? What are the different ways of relating with water in a tidal region?

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Abb. 4-1: Lage der Deichlinien und Sperrwerke (1) Leda, (2) Ems, (3) Leysiel, (4) Hunte, (5) Ochtum, (6) Lesum, (7) Geeste, (8 und 9) Cuxhaven, (10) Oste, (11) Freiburg, (12) Wischhafen), (13) Ruthenstrom, (14) Abbenfleth, (15) Schwinge, (16) Lühe, (17) Este, (18) Seevesiel, (19) Ilmenau

LNWKWN, 2020, Generalplan Küstenschutz, Niedersachsen/Bremen, Schutzdeiche

Practices of governing water: water managers

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Deichschau auf dem Elbdeich: Deichrichter und -geschworene haben das Unterfeuer Somfletherwisch in der Gemeinde Jork passiert. Foto Vasel

ARCHIV

Herbstdeichschauen im Alten Land starten

Die Deichrichter und -geschworenen des Deichverbandes der II. Meile Alten Landes haben am Donnerstag den zwölf Kilometer langen Elbdeich zwischen dem Lühe-Sperrwerk bis zur Landesgrenze in Hamburg-Cranz in Augenschein genommen.

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Home > Lokales > Altes Land > Elbdeich im Alten Land wird zehn Jahre zur Baustelle

Klimawandel

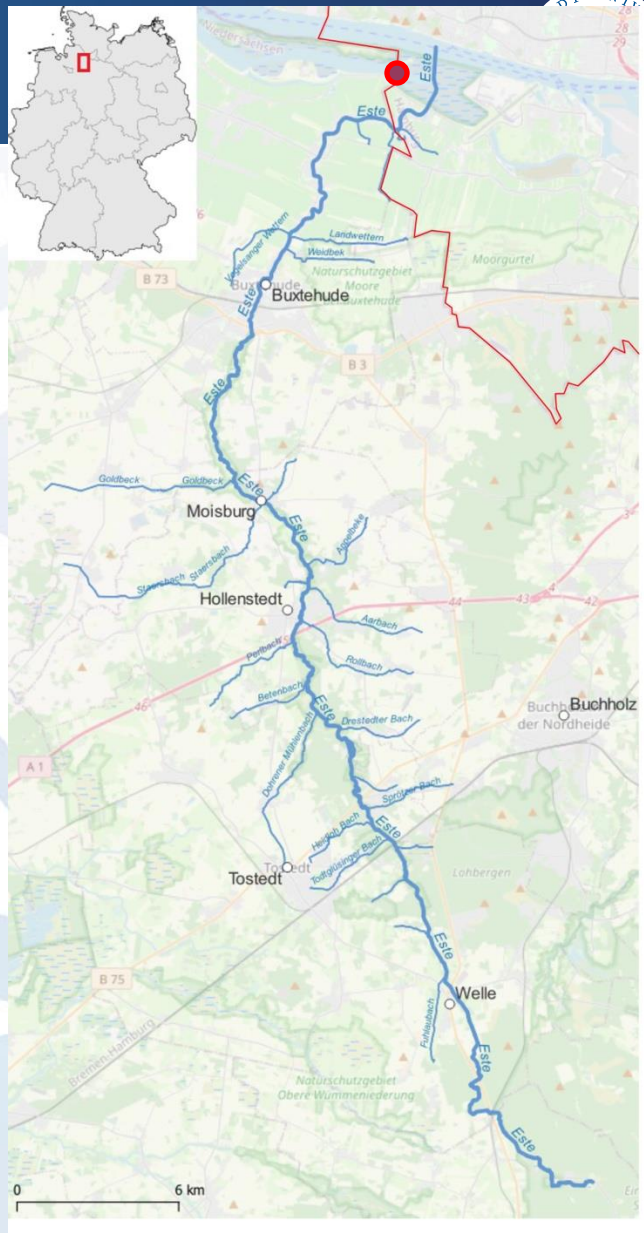
T+ Elbdeich im Alten Land wird zehn Jahre zur Baustelle

So wird es zehn Jahre lang zwischen dem Lühe-Anleger und Schöpfwerk Twielenfleth aussehen: Die Raupe modelliert hier satellitenunterstützt den neuen Deich in Stadersand, im Hintergrund liegt das schwimmende LNG-Terminal. Foto: Vasel

Bevor die Deichbauer loslegen können, müssen Fauna und Flora zwischen Grünendeich und Twielenfleth kartiert werden. Ab 2028 soll die Deicherhöhung starten.

Practices of governing water: administrative regulations

Elbe dyke, 2024, Jork. Alba R.



Practices of governing water: collaborative initiatives

MENÜ Ich suche ... HANSESTADT BUXTEHUDE

Este-Anrainer gründen Hochwasserschutzverband

Buxtehude. Es ist vollbracht: Alle anwesenden Kommunen, die Landkreise Harburg und Stade sowie die Freie und Hansestadt Hamburg haben am frühen Montagabend, 10. Juli, den Weg freigemacht und mit deutlicher Mehrheit für die Gründung des Hochwasserschutzverbands Este gestimmt.

Practices of governing water: art-research-community engagement (?)

Marlies Abramowski
Rossella Alba
Carmen Breuker
Steffen Gill
Jakob Harms
Christoph Reimers
Mascha Richter
Anping Richter
Lenya Kraske
Anja Tiedemann
Thorsten Wilrodt

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Fotos: Christoph Reimers, Steffen Gill

Collaborative storytelling

Collaborative storytelling

Foto: Steffen Gill

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JAKOB HARMS

WIR SIND DIE STRÖMUNG
LENYA KRASKE

FARBEN FÜHLEN
AM FLUSS
CARMEN BREUKER

SPUREN. BLEIBEN.
FÜR IMMER?
MASCHA RICHTER

NEUNAUGE
ANPING RICHTER

VON HIER
ANJA TIEDEMANN

BARGHUSEN
THORSTEN WILRODT

EIS LAND FLUSS
CHRISTOPH REIMERS

SEI WASSER, MEIN FREUND
STEFFEN GILL

VOGEL(AN)SICHTEN
MARLIES
ABRAMOWSKI

Some take away messages…

Practices of governing water:

- Water managers
- Rules and regulations
- Collaborative initiatives
- Art-research-community engagements

-> Which practices have (more/less) authority, legitimacy and recognition? Whose perspectives and knowledges do these practices value?

Recap

1. From water to hydrosocial relations
2. Researching hydrosocial relations
3. Some examples from Colombia and beyond

-> What would be a ‘psycological’ way of thinking about hydrosocial relations?

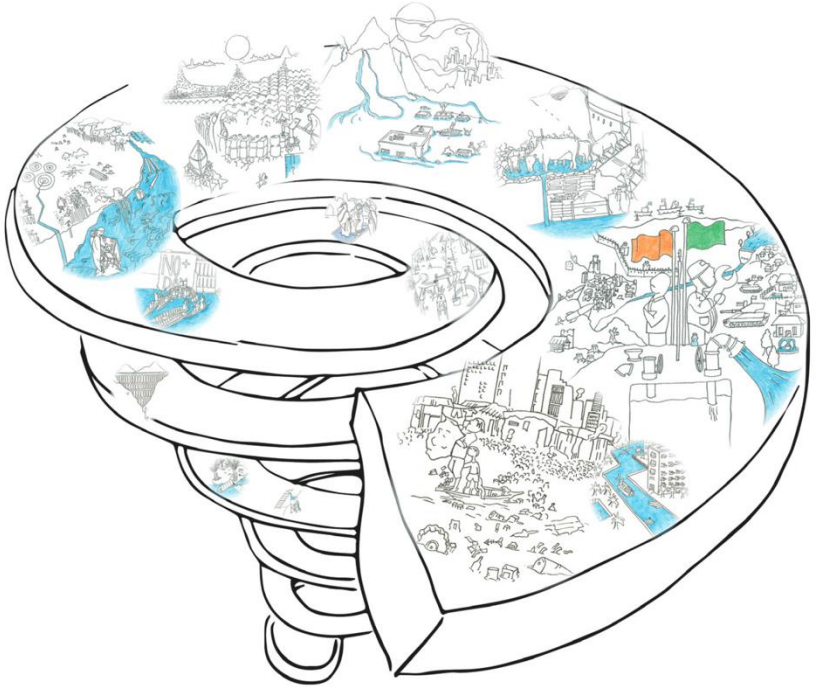


Figure 8.3 The hydrosocial spiral (created by Ruth Macdougall).

In: Farnum, R.L., Macdougall, R. and Thompson, C., 2018. Re-envisioning the hydro cycle. *Water, Creativity and Meaning: Multidisciplinary understandings of human-water relationships.*

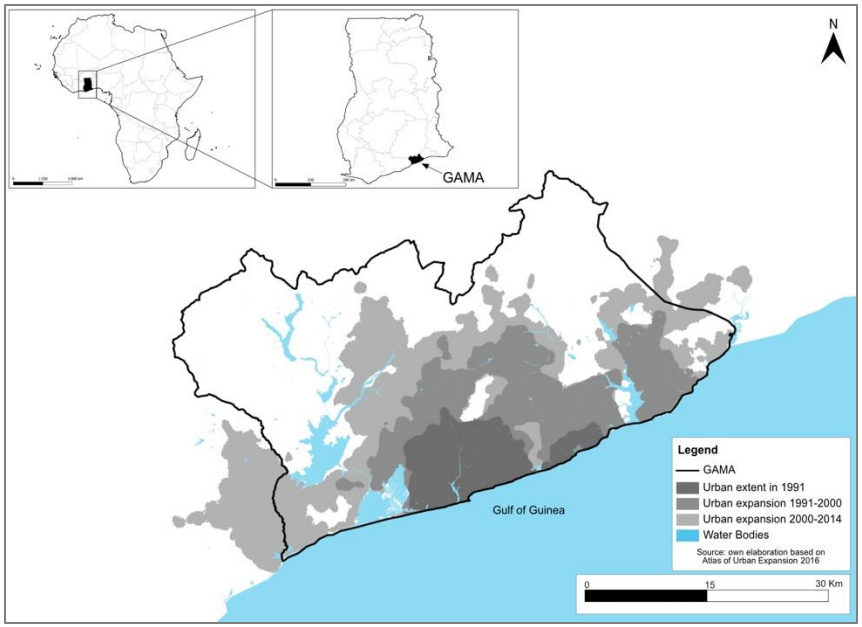
Example 3: Urban water supply in Accra, Ghana – What are the different practices through which residents access?

Alba, R., & Bruns, A. (2022). First-class but not for long: Heterogeneous infrastructure and water bricolage in Accra's kiosk compounds. In *Urban Forum* (Vol. 33, No. 2, pp. 129-151). *Open access*

Frick-Trzebitzky, F., Alba, R., & Fehrs, K. (2023). Adaptive governance as bricolage. *Geographica Helvetica*, *78*(3), 397-409.

Alba, R., & Kanesu, R. (2024). Working with water: a dialogue on care, infrastructure and labour. *Territory, Politics, Governance*, 1-17.

Accra, Ghana



Urban expansion of Accra 1991-2014. Source: Atlas of Urban Expansion 2016.

Villa, kiosk and construction site in Accra, 2017.

Accra, Ghana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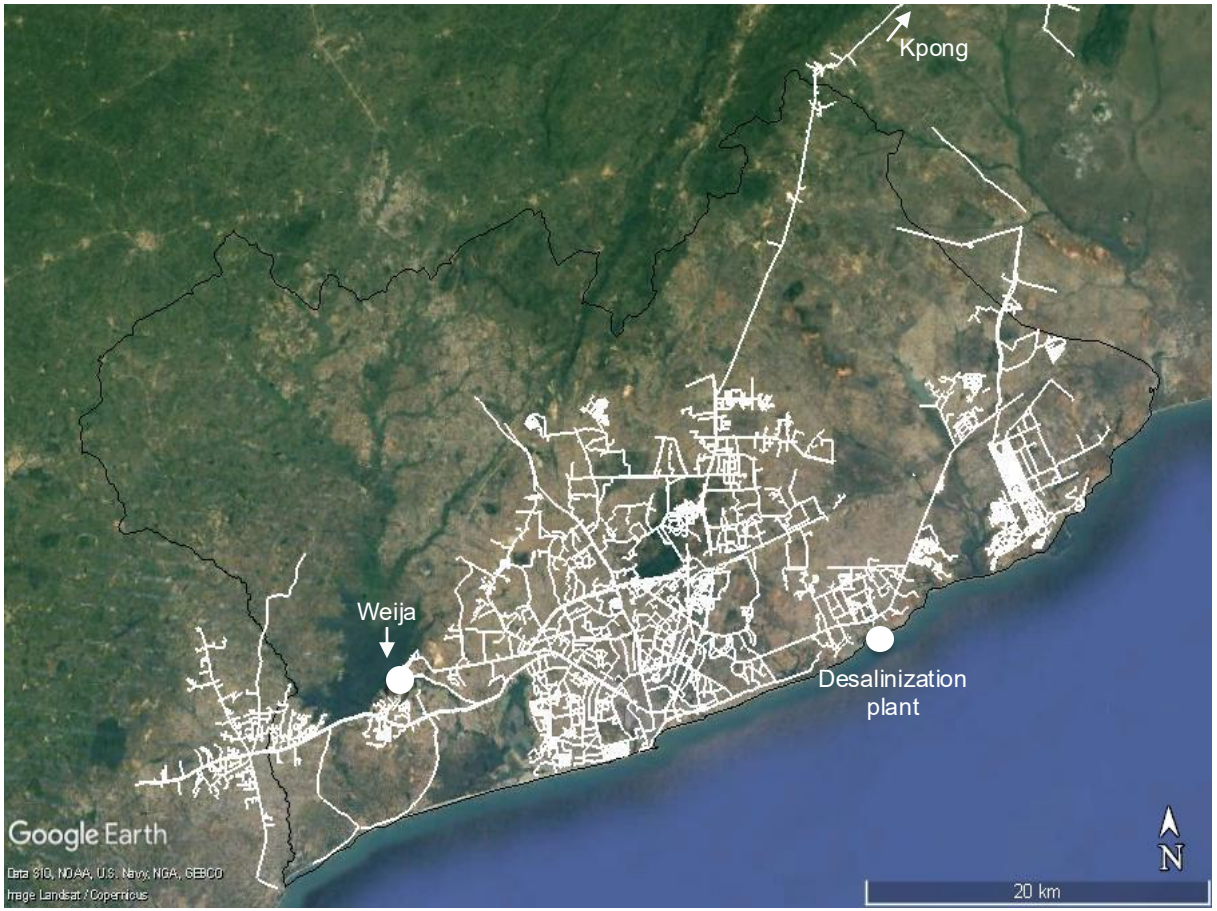
Projects
The Assembly
Documents Centre
FAQs
Building & Construction Permit
Business Operating Permit
Outdoor Advertising Permit
Waste Management Services
Marriage Registration
Citizens Feedback

Networked water supply

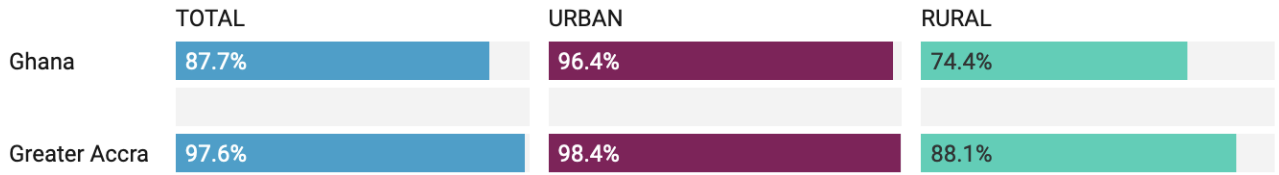
The Ghana Water Company Limited (GWCL) is the only legally recognized urban water provider in Ghana.



Main transmission pipelines GWCL (white) and administrative boundaries of the Greater Accra Metropolitan Area (black).

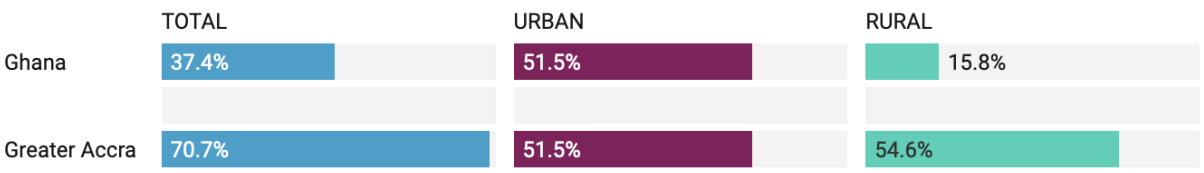
Water access in Ghana

Figure 1: Proportion of Households With Access to Basic Drinking Water Services* by Type of Locality and Region



* Drinking water from an improved source, provided either water is on the premises or round-trip collection time is 30 min or less.

Figure 3: Proportion of Households Using Sachet Water as Main Source of Drinking Water by Type of Locality and Region



https://census2021.statsghana.gov.gh/subreport.php?readreport=NjMzMzk0MDg5LjAzNg==&Ghana-2021-Population-and-Housing-Census-General-Report-Volume-3M

Water access in Accra

Source of water	Drinking	Domestic
Pipe-born inside dwelling	8.8%	18.9%
Pipe-born outside dwelling	4.6%	15.5%
Pipe-born from a neighbour	11.9%	30%
Public tap	1%	6.5%
Well	0.5%	6.7%
Natural source	0.1%	2%
Bottled water	0.1%	n.a.
Sachet water	70.9%	2.4%
Tanker supply/Vendor	1.3%	17.4%
Other	-	0.5%

Households by primary source of water supply for drinking and domestic uses for Greater Accra Metropolitan Area, 2014. Source: Ghana Living Standard Survey, GSS 2014.

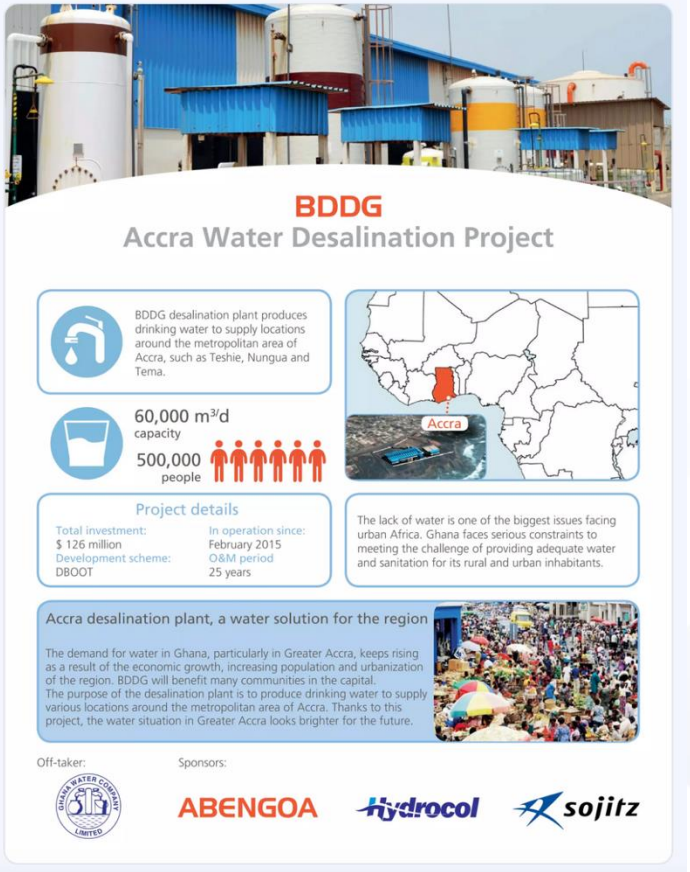
Neighbour selling water

Water tanker

Modern Water, modern infrastructure

Kpong drinking water plant, Ghana. Waterpower, 2015

Photo by Waldemar on Unsplash



Everyday practices of regulating water

Heterogeneous infrastructure configurations: "the range of infrastructural options potentially available to a person for everyday use" (Lawhon et al., 2018, p.726)

Water bricolage: multiple ways through which different actors engage with, modify and adapt infrastructural designs, institutions and formalized policies to meet their needs, mandates and desires (Benouniche et al. 2014; Kuper et al. 2017, Munro, 2019)

Alba, R., & Bruns, A. (2022). First-class but not for long: Heterogeneous infrastructure and water bricolage in Accra's kiosk compounds. In *Urban Forum* (Vol. 33, No. 2, pp. 129-151). *Open access*

Frick-Trzebitzky, F., **Alba, R.**, & Fehrs, K. (2023). Adaptive governance as bricolage. *Geographica Helvetica*, *78*(3), 397-409.

Alba, R., & Kanesu, R. (2024). Working with water: a dialogue on care, infrastructure and labour. *Territory, Politics, Governance*, 1-17.

Researching supplying water

Water vendor and filling point for tanker trucks.

- **Water bricolage**: multiple ways through which different actors engage with, modify and adapt infrastructural designs, institutions and formalized policies to meet their needs, mandates and desires
- **Follow the water** to trace socio-ecological processes underpinning urbanization

Alba, R., Kooy, M. and Bruns, A., 2022. Conflicts, cooperation and experimentation: Analysing the politics of urban water through Accra's heterogeneous water supply infrastructure. *Environment and Planning E: Nature and space*, *5*(1), pp.250-271.

Edano, a first-class residential area

Edano spatial plan

Edano: higher income houses.

Villa, kiosk and construction site in Edano, 2017.

Kiosks compounds

Schematic representation of a section of Edano; kiosk compounds in red.

Kiosk compounds

"For kiosks, because they are not permanent houses, as much as possible, we [GWCL] will not connect water, but in areas where we have a lot of kiosks, we rather put up standpipes"

(Interview GWCL, Low Income Urban Communities Unit, 2017).

Kiosk compound seen from outside, Edano, 2017.

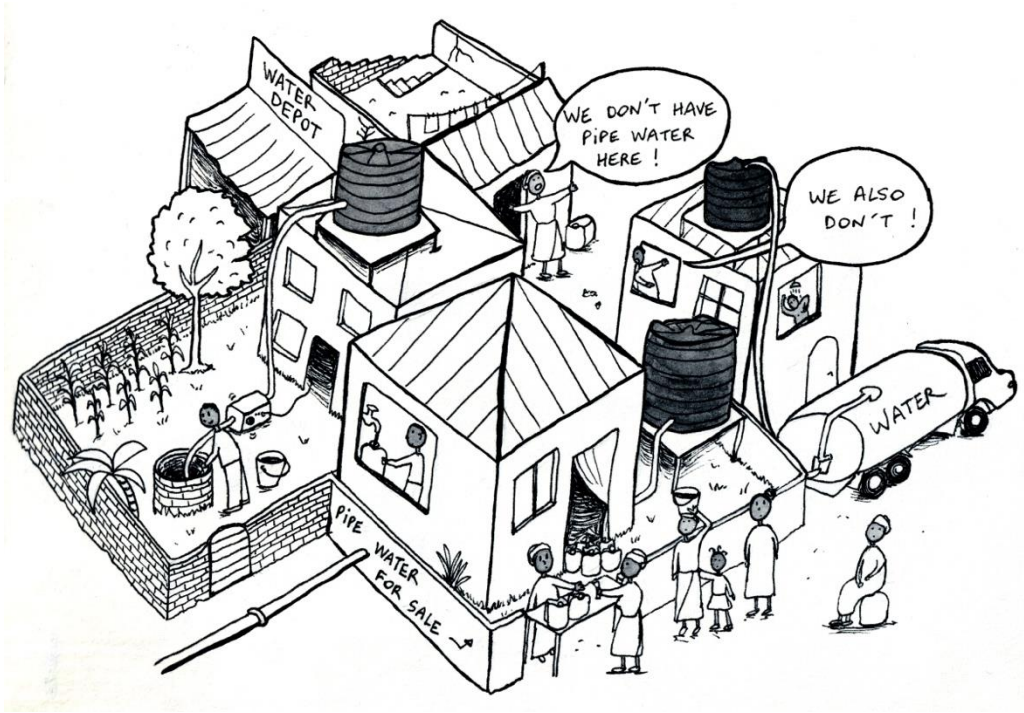
3 plots, 3 water access practices

"At the neighbour there is always water"
(Interview kiosk inhabitants, 2017)

The care-taker of the plot managed a connection to the water network

The the plot owner set up a connection to the water network

Everyday practices of regulating water



- Regulating water as a messy, open ended, incremental, provisional process
- Blurring boundaries (formal/informal, legal/illegal, etc.)
- Processes of marginalization
- Opportunities for incremental improvements
- Implications: urban water policies, assessment of water access, housing policies

Image credits: Waterpower.