Chapter 4

Urban Transformations in the Hydric Landscapes of Belém, Brazil
Environmental Memories and Urban Floods

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Introduction

In the late nineteenth century, the famous English naturalist Henry Walter Bates used to walk through the *várzea* forests of the Una Basin and sail through the streams that connected the Guajará Bay to the vicinity of what was then downtown Belém, Brazil. Bates described the Una Basin as his "favorite spot" and a "paradise for naturalists" (Bates 1944: 83). The contemporary urban imagery tells a different story, however. The status of paradise changed from the mid-twentieth century onward as the Una Basin endured the impacts of what Belém's policymakers envisioned as modernization (Costa et al. 2018).[1]

In the name of progress, modernity, and ultimately development, both nationally and internationally funded economic projects attracted a massive influx of investments and migrants to Belém between the 1960s and the late 1980s (Loureiro 1992). Among these immigrants, the poorer occupied the lowlands next to the streams that surrounded the city, giving rise to a land occupation form known as *baixadas*.[2] As the population density intensively amassed, it was common for inhabitants to build their houses not only on the riverbanks but also on the riverbeds in wooden suspended constructions called *palafitas*.[3]

The already extant hazards surrounding this population increased when factories installed facilities to make it easier to discharge industrial

waste into the Guajará Bay next to Una's basin watercourses. The banks of the Una River and its tributaries became dotted with various factories producing paper, vegetable oil, screws, packaging, and soap (Penteado 1968). Industrialization unfolded with the growing population density, resulting in increased environmental degradation of the Una Basin. It is not uncommon to find old residents in the Una Basin who recall the catastrophic image of fish floating on the surface of the Una River and other streams when the paper factory was opened in the mid-1960s (Costa et al. 2018). However, that was only the beginning of problematic water issues.

In an attempt to build drainage facilities, impose basic sanitation, and "advanced" water supplies the government of the State of Pará in which Belem sits, in a partnership with the municipal administration along with the federal government and an international financial institution, performed several rectification and canalization works along the city's watercourses that were connected to the Guajará Bay.[4] The project was known as Una Basin Macro-drainage. This chapter is centered on the impacts of these sanitation policies[5] and climate change, mainly on the floods in the city of Belém,[6] which were caused by the overflow of the drainage systems deployed since the 1990s, and on the Una Basin. For some inhabitants, Belém's urbanization implied an increasingly waterlogged reality, reflecting the disastrous combination between urban planning shortcomings and climate change effects.

The study is based on ethnography conducted in an impoverished, flood-prone neighborhood. Using the concept of environmental memory (Devos et al. 2010), it explores changes in the ways that people understand and relate to daily encounters with river waters and to flooding events, especially following a massive urban readjustment program. During fieldwork conducted between 2013 and 2016, I noted that some technicians and engineers involved in the Una Watershed Project stood against its paradigm as public policy. "The river has died after the project," they said. This assumption is examined throughout this chapter. The research supports that the policies actually generated critical changes in ways people relate to urban nature and to the hydric landscapes, among other social and environmental issues in the urban context.

This work argues that when socionatural disasters—that is disasters that can be seen as hybrids between nature and culture—happen, the institutionalized thresholds between nature and culture are disorganized. The regulation of relations with nature via public policies does not eradicate the environmental memory of the inhabitants from Una Basin, as will be seen throughout the chapter. This means that even if the works of macrodrainage neglect the river or the *igarapés*[7] that once existed, the old watercourses continue to exist in the memory of the inhabitants, es-

pecially when disasters in the form of floods return the channels to their once natural, chaotic, and destructive condition, resembling the rivers they have been in the past.

The chapter is organized as follows: To begin, it offers its contribution to the debate of climate change. It then addresses the Una Watershed Project as an example of climate change mitigation and urban readjustment that has taken place in the city of Belém. Afterward it presents an overview of the theoretical background regarding disaster studies, nature and culture dynamics, and environmental memory. Lastly, it discusses some ethnographic findings about how people react to floods and their consequences in scrambling the ontological realms of nature and culture employed in the everyday life of Una watershed residents. The conclusion reflects the implications of the material for discussing public policies on flooding and urban planning.

Climate Change in the Urban Amazon

With regard to the theme of this volume, the contribution of my chapter is to bring the urban Amazon to a central discussion about climate changes. Recent reports about climate changes in the Amazon (Nobre 2014; Marengo 2018) call attention to problems such as deforestation, biodiversity loss, erosion, and river siltation, as well as savanization and desertification risks. Although the reports recommend public policies on the part of local government and civilian society engagement in socioenvironmental issues, there is yet no mention of the climate change impacts in the cities of the Amazon. It reinforces Eduardo Brondizio's proclamation about the problem: to the academy and to the NGOs, Amazonian cities are invisible (Brondizio 2016). Consequently, the environmental issues and the climate change impacts in the cities are ignored, as if they are bound to the forest and to the Amazonian rural world.

However, research accomplished in the last decade show how Amazonian cities need to be included in the considerations about climate change. Farias's work (2012), for instance, discusses the relationship between climate changes and urban floods in Belém, with a focus on adaptation and vulnerability, both social and environmental, of the populations affected by these disasters. Although the definition of climate change includes human action's effects over the environment, when Farias refers to the urban floods in Belém, she supports that these are results of the sea level's increase and intense precipitation in seaside towns, as well as the urbanization process. The urbanization process, in turn, is treated as a synonym of population increase, and the occupation of areas by the poorest popula-

tion next to rivers and swamps is considered inappropriate by the public authorities.

A further study adds more layers of comprehension to the issue. On the one hand, Mansur et al. (2017) credits a great responsibility for urban floods in Belém to climate change and to the uncontrolled population growth since the 1970s. On the other hand, the work recognizes that these factors must be related to the cumulative result of politic decisions taken over the years. In other words, the effect of the climate change over cities such as Belém have been intensified through factors such as the inappropriate public policies of drainage and sanitation, lack of awareness by engineers and technicians about the local reality, and the neglect of the local population to participate in decision-making processes concerning the urban policies that have direct impacts on their lives (Mansur et al. 2017).

Both Farias's and Mansur et al.'s works merit placing the Amazonian cities at the center of discussions about environment, refusing the contradiction between the "built" urban and the "natural" environmental, which serves as an excuse for the invisibility of Amazonian cities in the context of climate change. Unlike former studies, they bring together environmental analysis and urban studies, reinforcing the urban and social features of what is considered the environmental. Cities as dynamic centers of global capitalism tend to compress in their territory the effects of the social and economic system, including the severe environmental impacts, which generally affect the poorest urban populations more frequently and intensely.

Cities such as Belém, a metropolis in the Global South, offer exemplars to understand how social problems are intensified by ecological factors. In recent years, events like floods are happening more often in Belém, in part due to demographic factors and inadequate storm drainage policies, but also on account of sea level rise[8] and higher incidence of rains.[9] Those social and environmental changes increase the social vulnerability of the poorest populations who suffer from the immediate impacts of climate change, especially due to the lack of public policies addressing the mitigation of hazards such as urban floods. However, as will be shown, the main problem in Belém is not necessarily the lack of public policies.

The Una Watershed Project

In Belém, official discourses and the public sentiment stress that the city's process of urbanization has been historically grounded in the antithesis between water and civilization (Cardoso and Ventura Neto 2013). Otherwise put, the foundational myth of Belém relies upon the idea that the

city was formed by conquering supposedly wild territories that originally belonged to water: swamps, creeks, and floodplains.[10] Thus, Belém—or at least its ideal of urbanization—is built in opposition to nature (Soares 2016).

On the pretext of overcoming the restraints of nature to achieve its goal of urbanization and modernity, Belém has gone through several slum-cleaning processes through public drainage works that have substantially transformed the city's landscape. Among those initiatives is the Una Watershed Project, which generated massive impacts on the riparian landscapes of the *baixadas* in the Una watershed. In spite of not being the main subject of this work, one must keep in mind that the Una Watershed Project is an expression of the conflicting relationship between the city of Belém and its waters. Taking place from 1993 to 2004, the Una Watershed Project received resources from the Interamerican Development Bank (IDB) and was responsible for draining wetlands, forming soil embankments, and implementing a basic sanitation system over a large amount of the city (Pará 2006).

On the books, the Una Watershed Project presents outstanding numbers regarding its accomplishments. A report by the Sewage Company of Pará (COSANPA in Portuguese) lists that the Una Watershed Project built 25,731 individual septic tanks, 91 collective cesspits, 307 kilometers of sewage network, 2,164 inspection wells, 3,887 cleaning terminals, and a drying bed of septic tanks (Pará 2006: 11). The strategy of creating concrete channel systems to drain water was replicated in other parts of the Una Basin, resulting in more than 24 kilometers of storm drainage channels. The Una Watershed Project cost, after all, over US$300 million (Pará 2006). Besides sanitation, the main goal of the project was to promote a socioeconomic transformation in the city, improving the well-being of about 600,000 people, representing approximately 120,000 families (Pará 2006).

The Una Watershed Project was completed with the installation of floodgates at the mouth of the Una and Jacaré river channels in order to avoid floods caused by the entrance of Guajará Bay waters into the city (Pará 2006). From then on, the old rivers and *igarapés* became drainage channels, and their flow toward Guajará Bay was partially blocked by the floodgates.

In reality, although the Una Watershed Project contributed to a very ambitious urban readjustment project that aimed to solve habitation problems and flooding in the city of Belém, the hydrologic landscapes of the Una Basin were instead converted into an immense flood-control system with no other purpose than the effective removal of the extreme amounts of tropical rainwater from the city (see figure 4.1). The transformations carried out by the Una Drainage Project resulted in an altered environ-

ment that required massive investments and extensive labor to maintain. The equipment and machines used in the maintenance of the public drainage works were diverted, sold, and improperly appropriated by groups related to the office of the newly elected mayor when he began his tenure in 2005 (Costa et al. 2018). Many areas of the watershed were deliberately excluded from the benefits of the Una Drainage Project. Also, the municipality did not carry out a set of complementary works of drainage, which were required in the contract with the IDB (Costa et al. 2018).

The political and ecological failure of the Una Watershed Project to maintain the public works of drainage and sanitation has, once more, made the population of the watershed vulnerable to environmental hazards and flooding (Soares and Cruz 2019). As a case of structural violence (Farmer 2005), there is a chain of complicity that goes from co-opted grassroots organizations in the Una watershed neighborhoods to local public administration and the IDB. This has resulted in changes in the ways through which Belém's inhabitants relate to the environment. Currently, these relationships are mediated, in part, through public policy related to drainage, sewer, and water management systems, which are embedded in social processes of inequality and marginalization manifest through urban flooding.

Environmental Memory and Disasters

In this chapter I approach water not just as a natural element but also as a set of processes, practices, and meanings that are essential to understanding urban policymaking and people's responses to it. What is considered urban infrastructure stems from negotiations between political actors, ideological struggles, and power relations that result in the uneven distribution of natural resources and environmental hazards related to the water.[11]

The flood season combined with intense tropical rains has always tended to provoke the overflow of watercourses. In the Amazon, a great amount of lands called *várzea* remain submerged during months of big tides and rains. This hydrologic dynamic does not necessarily imply the occurrence of a disaster. In rural areas, the population who live on riverbanks develop migration strategies involving areas that are not flooded during this time of year (Coelho 2013). Urbanization and sedentarization in large cities change completely the relationship between people with these hydroclimatic extremes. In these contexts, the urban populations—mostly the poorest—become the most vulnerable to floods. The literature on anthropology of disasters particularly focuses on these questions, since

it addresses not only the natural phenomena itself but also both social and physical elements that aggravate or reduce the impacts of a natural hazard (Oliver-Smith 2002: 27).

In the case of Belém, the literature on disasters sheds light upon two points that might be emphasized. The first one is that, as it was proposed by Oliver-Smith (2002), the distribution of disasters' effects is always unequal. If environments such as cities are socially built, then the effects of disasters tend to be distributed among urban populations as a reflection of the social relations that take place in the city. In following, the poorest population of Belém is the most vulnerable because the occupation process of the city's territory allowed the wealthiest to occupy the higher and, therefore, more valuable lands and forced the poorest in consequence to inhabit the wetlands next to the rivers, subjecting them to their floods (Trindade Junior 1997). The second point is that there are vulnerability patterns to disasters that are historically built. This means that a disaster can be the result of cumulative political decisions made throughout time (Nelson and Finan 2009), which in Belém entails the technological solutions embraced to manage urban waters.

Another aspect that should be highlighted is the specificity of the disasters[12] that occur in Belém. It concerns the cyclical disasters, as named by Nelson and Finan (2009) in their work about the drought in the Brazilian northeast. In fact, there is a parallel between the lack of water in the northeast of Brazil and the overflowing of watercourses in Belém, both of which are historical, seasonal, and predictable. The reasons are ecological but also political. They also both present themselves as "slow-onset phenomena" instead of "rapid-onset phenomena such as earthquakes and nuclear accidents" (Oliver-Smith 2002: 25). In the case of Belém, cyclical disasters like floods are intensified by urbanization and the social inequalities created and reproduced in the process mentioned above, resulting in disasters that combine natural and social aspects.

The environmental memory perspective (Devos et al. 2010) enables the researcher to address issues such as flooding not just as a physically disruptive, one-time event. Rather, it is possible to see it as a long-term process, which further reflects the considerations of Hoffman and Oliver-Smith (2002) on what a disaster is. There is a wider dynamic of class, politics, and production of urban space that precedes the flooding, as well as a recovery process that includes political struggles for rights over sanitation and adequate housing. In addition, there are also struggles over the social production of meaning on flooding, which contrasts with the framing of disasters offered by the media and other social institutions (Button 2002).

The media and public opinion often treat flooding as a natural and isolated event in which the poor are blamed for their situation because

their homes are built in inappropriate areas and they dump garbage and waste into drainage canals (Soares and Cruz 2019). However, flooding is a symptom of broader social issues that are manifested through sanitation and other infrastructure shortcomings in Belém. The focus on flooding being an isolated event masks more complex and systematic issues that lead to the current situation. In other words, the media, as well as the conventional wisdom, treat floods in Belém only as one-time environmental hazards, while they should be interpreted as social and cyclic disasters (Nelson and Finan 2009).

Disasters, Nature, and Culture

Besides the discussion about disasters, I also draw on Philippe Descola's (1998, 2003, 2011) and Bruno Latour's (2013) works concerning the overlap between the ontological domains of "nature"[13] and "culture."[14] Descola argues that naturalism[15] is specifically a Western ontology, not finding parallel in other societies. Among Amerindians, for instance, even when their cosmologies identify beings belonging to nature, they do it so these domains interpenetrate and dialogue, far from being hermetic as they are in Western societies. Still, Descola claims that even in the colonized Amazonian society, the relationship between culture and nature also occurs in line with more dialogical and porous ontological borders, bearing in mind the examples from the relations between human beings and animals in Amazonian contexts (1998). In another work, Descola (2011) reflects on how the separation between nature and culture in Western societies works only in the discursive plan, given that in their everyday lives, Europeans tend to ignore the apparent splitting between the natural and the cultural realms in the face of what the author calls "ontological slides." Included are the humanization of domestic animals, genetic manipulation, the actions of human beings over the environment, and the findings about chimpanzees' fabrication of tools and transmission of its techniques.

Descola's criticism to the unsustainable splitting between nature and culture in the Western world resonates with Bruno Latour's (2013), who cites modernity as a greater expression of the Westernized thought that separates society (culture, speech, and politics) from technique and whose object is the nature conceived as external and independent in relation to social and cultural processes. Latour identifies two processes operating dialectically through which modernity expresses itself via science. The first process is what Latour calls purification, which means the compartmentalization of scientific knowledge, creating nature and culture as independent objects. Paradoxically, purification generates a second process

he calls hybridization, which is the producing of quasi-objects that are not entirely composed from either nature or culture but are both at the same time.

An example that engages both these processes is the implementation of public policies that were destined to promote urbanization, mitigate environmental hazards and climate change impacts, and modify inhabitants' relationships with the local environmental, mostly with water. Large-scale projects like the Una Watershed Project institutionalize boundaries between ontological domains of nature and culture in the river-channel margins of the city. As a process of purification, when the river becomes a channel or simply a drainage ditch, a "natural" marker is transformed into a built or "cultural" form of environment, although this study questions how permanent this transformation really is given that the policy itself results in processes of hybridization. The public works of macro-drainage existing in Belém are examples of hybrids or quasi-objects, since they combine politics with natural actors like tropical rainstorms, tides, soil types, vegetation, and the preexisting natural drainage system in the city territory. Also, these natural and political actors compose networks that can be addressed in several scales of analysis, to begin with all management levels through which the project is produced: municipal, state, and federal, without neglecting the role of financial institutions such as the IDB in the formulation and implementation of the policies.

Besides, although changes in the city environment occur, in everyday life people continue to live near waterways and still try to make sense of the transformations carried out by the Una Watershed Project, especially when channels overflow flooding streets and households. Simply put, everyday life practices and events may keep the river alive in the memories of local communities, even while public policies seek to domesticate and sterilize urban hydric landscapes, revealing other ways of producing hybrids between city and nature.

Some questions arise: How do people relate to water after the conclusion of the Una Watershed Project? How do disasters, such as urban floods, affect the distinction between the ontological realms of nature and culture as well as the relationship between humans and nonhumans in the Una watershed?

Urban Flooding and the Thresholds between Nature and Culture

The following discussion draws on the idea of urban flooding in Belém as a cyclical disaster disrupting the ways through which urban planning has institutionalized environment and human relations.[16] As Virginia Acosta

pointed out in the recent Critical Issues on Risk and Disasters panel at the IAUES World Congress, disasters are *ventanas criticas* (critical windows) that permit us to see cultural dynamics. The work of Susanna Hoffman (2002) is an inspirational model to help us think about how disasters disrupt people's ways of organizing the world as they know it. It also emphasizes how disasters call into question the "promethean project of modernity"[17] (Kaika 2005: 5), in which technology and technocratic policies aiming to control nature are seen as key components to building cities.

Hoffman's (2002) analysis of the Oakland, California, fire in 1991 points to the symbolism of disasters and their role in collapsing the ontological dualism (nature/culture). The ethnographic examples presented by the author show how the fire made relations between humans and nonhumans collapse. The Oakland middle-class neighborhood was nearly destroyed by the fire. In the process, domestic animals ran into the woods, and the inhabitants feared that their pets had become wild animals. Also, the efforts to reconstruct houses and yards symbolized the inhabitants' desire to bring back the neighborhood to culture from a chaotic state of nature. The savage landscape produced by the fire was to be re-domesticated and reintroduced to the logic of culture. If the fire was the disrupting element in Oakland, water created the same effect in Belém.

In Belém, large-scale infrastructure public works projects such as the Una Watershed Project failed to promote an urban citizenship in relation to water, resulting in recurrent and repeated floods caused by the overflowing of the canal network redesigned by the drainage project. Just like the fire in Oakland, these floods had the same impact on disrupting the dualism between nature and culture. The following are some examples.

Example 1

Every year, rainfall and tides overfill the current drainage system. Heavily contaminated waters overflow the canals and cesspools, invading households and bringing pollution into direct contact with people. When I first entered Mr. Costa's house after a flood, I was quite shocked. He lives on his own in a two-story wooden house near the Galo Channel, the same home as his childhood. The flood not only destroyed furniture and domestic utensils but it also left a thick layer of mud on the floor and other places that had been in contact with water. Symbolically, the effects of the destruction caused by flooding resemble those caused by the fire in Oakland. In both instances, landscapes that humans had domesticated were taken by the chaotic agency of nature. Besides the confusion of nature and culture generated by the flood, water also scrambled domestic and public features. On the one hand, water brought into the domestic space

what should belong to the public sphere: garbage, sewage, and dead animals from the canal. On the other hand, domestic objects, documents, and photo albums were taken away by the overflowing waters.

Example 2

The Una Watershed Project transformed the former hydrographic basin into a network of canals and galleries in which the flow of water is controlled by floodgates located at the mouth of the river. During most of the year, when there is little rain, the canals resemble ditches. Nevertheless, the rainy season provokes an increase in water levels, which transforms the canals' appearance. This shift also changes the inhabitants' attitudes toward the canals. When the Galo Channel is close to overflowing, some dwellers see an opportunity to swim there, just as if it were a river again. They do so despite knowing that the water is considerably polluted. In those occasions, the bleak appearance of the canals transforms into the semblance of a thriving hydric landscape like the living waterways of the past. Rainwater feeds the channel, diluting dirt and sewage. The watercourse regains its volume, and its coloring changes: from pale gray, which reeks of sewage and filth, its waters become bulky and muddy just as many other Amazonian rivers. The perception of the residents on the channel is altered by the rain. A day after the flooding, residents will say, "All of it appeared just like a river."

Example 3

Residents often report encounters with wild animals, especially reptiles, during rainy seasons. It seems that such animals come from the rivers and forests surrounding the city when they get stuck in the drainage network. Or, possibly, they simply find the network a habitable environment where they can easily find food and shelter. When the system floods due to intense rainfalls, those animals approach the nearby streets and households, especially the low-lying terrains and wetlands where residents build their homes. Seeming to combine fantasy and facts, a local resident, Mrs. Barroso, once told me that an anaconda (*Eunectes murinus*) used to live beneath a woman's house near the São Joaquim Channel. Mrs. Barroso said that the fragile household used to shake when the serpent moved in the flooded ground. The family began to worry when they realized the serpent was growing exponentially, and it eventually captured and ate a cat. Fearing for her children, she called the fire department, who apprehended the creature.

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The final story above is an extreme example of interaction between humans and dangerous animals in the Una Basin. However, the presence of animals brought by the rains is not unusual. After a flood in 2015, Mr. Costa told me his neighbor found a group of small turtles in her backyard. They could not say if the turtles had come from another household in the neighborhood or if they actually lived on the Galo Channel and were brought to the backyard by the flood.

These cases are also reported on the local news. In 2011, a newspaper published a story revealing the presence of hundreds of tilapia (*Oreochromis niloticus*) in a channel in the Una Basin (Portal Orm 2011). At the same time, dead fish started to appear over the surface of Visconde de Inhaúma Channel, calling the attention of the local inhabitants and the public health authorities. The story reported that experts recommend the inhabitants not eat those fish. However, residents stated that they had the habit of fishing the tilapia, and those fish were already part of the local people's diet. A researcher interviewed by a newspaper suggested that the fish belonged to a particular pool or cistern in the neighborhood and that they were taken into the channel during the last flood. The same researcher predicted that the tilapia would adapt themselves to the channel's waters, remaining there as part of the aquatic fauna.

Visiting the research locus during fieldwork in 2016, I saw a shoal of fish in the waters of this channel. They were diverse in size, but their gray color and red scales indicated they were tilapia. Mr. Alfredo, an eighty-five-year-old inhabitant who was walking me around the neighborhood that day, confirmed and explained: those fish were a remnant from the old *igarapé* that existed a long time ago in the exact place where the channel was built. He said that this channel was different from the other ones because its water is clean, which means that the same water from the old *igarapé* continues to pour into the midstream of the channel and into the backyards of the neighborhood. Just as Mr. Alfredo and other residents in some areas of the Una Basin still can identify, the waters from springs next to the old *igarapés* still flow even after they were transformed into channels. This tale shows the awareness of the in situ residents of the constant everyday life-relationship with the city's hydric landscape, a feature that was neglected by the technocratic paradigm that guided the Macrodrainage project of the Una Basin.

The examples above show how everyday practices and cyclic flooding disrupt the institutionalized thresholds between nature and culture. They call attention to the uncertainty of the attempts to control nature via technology, which again constitutes what Maria Kaika (2005) calls the "promethean project of modernity." In these episodes, natural forces people believed to be tamed regain their agency, revealing that they actually have

remained aggressive and unmanageable. In Belém, for instance, an ordinary rainstorm readily overcomes the recently implemented drainage and sanitation technologies. Through floods, water invades neighborhoods, destroys households, and puts humans in contact not only with waste, sewage, and gray mud but also with dangerous and unwelcome animals.

The *igarapé* (natural entity) may be dead when transformed into a channel (cultural entity), the latter built and understood as resulting from the extinction of the first. It is not unusual to hear some inhabitants refer to the channels as "trenches" or "ditches," mostly on occasions that bring up the problems of sewage and risk of contamination through water contact. In this context, the relation between risk, blame, and technology becomes evident. Technology, as it was pointed by Mary Douglas and Aaron Wildavsky (1992), was once responsible for overcoming the entailments of moral and danger, when the lack of scientific knowledge about natural dangers was seen as a moral problem. In Belém, the very use of science and technique has resulted in an anachronistic macro-drainage system, which receives sewage and waste but is unable to bear the city's pluviometric demand. In this case, technology applied to public policies has turned into a risk factor for flooding. Technocratic solutions did not solve the problem of floods. Instead, these events have become even more frequent and intense over the years.[18]

Generally associated with disease, garbage, and floods, the drainage channel is understood by some local inhabitants and experts as a river that died so public policies of urbanization and sanitation could live, disregarding the complexities of watercourses and relationships between people, water, plants, and animals in the Amazonian context. In the absence of a satisfactory synthesis between the city and its rivers, the channel system represents a technical solution for nature's instrumentation with high social and environmental costs.

Figure 4.1. A drainage channel in the Una Basin, Belém, 2017. © Pedro Paulo de Miranda Araújo Soares.

Nonetheless, the data related in this chapter implies that the "death" of the watercourses in Belém is not permanent and the ideas of *igarapé*, river, and channel are negotiated, situational categories that vary in accordance with the perspective of who is describing the landscape and their relationship with it. Also, these points of view stem from the beholder's position in the power struggles in Belém's

socioenvironmental arena. These categories and values adhere to a vast set of images about water and its symbolism in the Amazon that evokes a hydric psyche (Bachelard 2008) but also points to an anthropological problem when referring to the relations between humans and nonhumans (Descola 1998, 2003; Latour 2013; Viveiros de Castro 2002).

Conclusions

Where once Henry Walter Bates saw and wrote of a vibrant and lush paradise now exists an environment overrun with sewage and disease. Within this context, climate change effects such as sea level rise and increased rainfall are combined with infrastructural deficiencies, generating environmental hazards that affect specially the urban poor. In Bates's favorite spot, what remains today is a complex social-ecological landscape, where flooded and eroded urban settings strain the quality of life and livelihood of impoverished and increasingly stratified social classes.

The Una Watershed Project was an expression of urban planning in Belém consisting of a vertical, unilateral, and universal sanitation and drainage policy dominated by a technical and scientific "rationality" on what constitutes "modern" cities (Scott 1998). This sort of project involves the replication of public policy models and an articulation between city and nature that disregards local tactics and strategies for adaptation to climatic extremes and urban infrastructure deficits. It seems that the scientific and technical language used in the Una Watershed Project insulated policymakers from local knowledge and overlooked the Amazonian livelihoods based on direct contact with water.

Within this context, the unending occurrence of floods suggests that the river, which has been transformed by technocratic public works, is seen as a river once again by the population, even after it was turned into a mere drainage canal and a sewer disposal. Everyday practices, as well as flooding episodes, can shatter the institutionalized ways of managing urban waters.

In a context where water is a constant feature in people's everyday lives and the thresholds of nature and culture remain unclear, flooding can be seen as an indicator of the technological failure of the city, a city that is constantly reclaimed by nature through floods. In an Amazonian city such as Belém, which has been through ambitious urban readjustment programs, the persistence of floods is a sign that taming nature may not be a beneficial operation. This brings up the question about how flooding and its consequent ontological disruptions may help to reflect upon the effectiveness of public policies on drainage and sanitation in the Amazonian scenario.

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Notes

1. Parts of this text were abridged from Costa, Soares, and Dias 2018.
2. *Baixadas* are known as a precarious type of habitation and land use, which is characterized by high population density, lack of urban infrastructure, and occupation of the soil on floodplains or lowlands near watercourses (Trindade Júnior 1997).
3. *Palafita* is a local name for precarious stilt houses in the *baixadas* of Belém.
4. This practice can be observed in many areas of the city throughout the twentieth century and, more recently, in the Una Basin itself. There are exceptions, of course, such as the Tucunduba Basin Project, which consisted of public work projects that aimed at maintaining the natural attributes of rivers in an area comprised of five districts (Barbosa 2003). The Tucunduba River is still navigable and local communities still use the watercourse for swimming and fishing, despite its sewage contaminated waters.
5. In Brazil, a federal law defines basic sanitation as a set of public works and equipment divided into four components: sewage, water management, solid waste management, and urban drainage (Brasil 2007). In this chapter, special attention is given to urban drainage.
6. The city was founded in 1616 in an area inhabited by Tupinambá tribes before the coming of Spanish, Dutch, English, and Portuguese settlers. Belém is currently the second largest city in the Amazon Delta regions (1.4 million inhabitants).
7. *Igarapé* is a local expression that means a watercourse of varying dimensions that flows into the main river.
8. Vinagre et al. (2017) analyzed the functionality and the drainage system behavior of the Una Basin using the software SWMM (Storm Water Management Model). The assessment estimated tides of 3.15 meters maximum within 3 hours of severe rainfall, simulating a rain that occured on 9 May 2011. In 2020, watermark levels in Belém reached 3.70 meters during rainy season, which indicates how sea level rise is a growing factor in shifting flood patterns.
9. Santos et al. (2019) confirmed not only that the annual average rainfall in Belém has increased between 1961 and 2010 but also that wet seasons have been increasing in intensity in the last thirty years, mostly under the influence of the El Niña phenomena.
10. In 1973, Augusto Meira Filho wrote that Belém's vocation for "progress" and "opulence" would only be accomplished by "conquering lowlands, forests, and swamps" (Meira Filho 1973: 44). These words express an ideology of progress and modernity based on suppressing and mastering nature so the city can thrive. The

    very same ideology oriented public policies on sanitation implemented in Belém throughout the twentieth century and in the first two decades of the 2000s.

11. Both the excess and the absence of water in the Global South are not only coincidental but also complementary. Flooding and water shortages are connected in cities like Belém. Matthew Gandy states that the constitution of the "hydrological subject" should be a measure of urban citizenship in different social-environmental contexts (2014).

12. Among disaster agents there are natural hazards (atmospheric, hydrological, geological, biological), technological hazards (dangerous material, destructive processes, mechanical and productive), and even social hazards such as war, terrorism, civil conflict, use of hazardous material processes or technologies (Oliver-Smith 2002: 25).

13. "Nature" here is understood as the natural elements along with all beings that dwell in it. The commonsense notion of nature includes biochemical phenomena, physical and metabolic processes involving those natural elements usually depicted as prehumen and external to society (Heynen, Kaika, and Swyngedowu 2006)

14. In this work, "culture" appears as a synonym of human action over the nature. This action—the work—is characterized by Marx (2009) as the essence of human condition and establishes a dialectic relationship between subject and object. This dialectic is reassessed later by Lévi-Strauss (2009) in his distinction between nature and culture. The Lévi-Straussian scheme suggests that humans act over nature, domesticating it while imposing order and particular rules upon it, which can be perceived by human beings as universal and chaotic (Lévi-Strauss 2009).

15. Dualist ontology assumes that, whereby nature is the common ground to all living things around the world, only humans are capable of developing cultural faculties. Yet, human beings participate simultaneously in both cultural and natural domains, because they do not cease to exist as a biological species.

16. According to Latour (2013) and Lemos (2003), technicians and experts tend to insulate themselves from politics and decision-making processes, depicting sociocultural features in terms of technical solutions addressing only nature.

17. "The historical geographical process that started with industrialization and urbanization and aimed at taming nature through technology, human labor, and capital investment" (Kaika 2005: 5).

18. In light of floods that occurred in March 2020, both municipal and state governments decreed a state of emergency for the first time in history in Belém's metropolitan area and in parts of the countryside.

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