

“The Sea Has Waves, The Fula Has Cows”: Moving Waters, Labour and Capital in Anthropocene Senegal

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Abstract In times of climate crisis, water has become a crucial resource of environmental justice and geopolitics, but its scarcity is socially constructed. It depends on socio-economic structures, cultural politics, and the sciences that are mobilized to manage its fluid processes. This essay argues for the necessity of a hydrosociological approach that integrates the current Anthropocene debates on the technological transformation of planet Earth with more reflection on waterscapes, especially in the Global South. Drawing on a recent publication by Maura Benegiamo, Capitalist developments in the Senegal Delta are here considered as exemplary of global investment strategies that produce brutal forms of extractivism, while displacing money, water, land, and people. Waterscapes reengineering of the Senegal flows, for the monocrop production of agrofuel, is alienating the Fula people of the Sahel the grazing land for their cattle. Such case calls for a political reassessment of the hydrosocial question of the Anthropocene along complementary lines of inquiry: socio-economic, cultural-political, ideological, and epistemological.

Keywords Senegal Delta. Hydrosociology. Land grabbing. Anthropocene. Capitalocene.

Summary 1 Introduction. – 2 The Hydrosocial Question of the Anthropocene. – 3 Benegiamo on the Senegal Delta and Global Capitalism. – 4 Concluding Remarks and Further Perspectives on Hydrosociology and Land Grabbing.



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Dialectics sees the world as fundamentally constituted of process, relation, and change. [...] Dialectics provides a way of understanding the flow of history as well as the flow of water, and reveals how these flows are very closely related. (Linton 2009, 25)

The water spoke of change, of the passing moment, and the rock of what endures, of geological aeons. A river is continually present, but the water in it is forever traveling, forever changed, forever renewed, a permanent instability that is often a metaphor of time. (Solnit 2004, 84)

1 Introduction

Rebecca Solnit's reference to the Heraclitan flow of water in Yosemite Valley points to its double meaning as a symbol of the passing moment and as a running quasi-locus of cultural heritage. Indeed, rivers, like coastlines and even waterfalls, occupy an abiding place in collective memory.¹ Eadweard Muybridge's iconic photographs of the waters and rocks of the Yosemite in the late nineteenth century are an example of such aesthetic legacies (Solnit 2004, 75-100). They can be seen as a rewilded water aesthetic in comparison to urban waterscapes, such as the classic ones, from the *vedute* of Venice's Piazza San Marco in the early modern period to the waterfront skyline of New York in the twentieth century (Krellig 2018). Muybridge and later photographers, most prominently Ansel Adams and Cedric Wright, working for the Sierra Club towards a new environmentalist sensitivity mediated by images, marginalized or erased humans from their 'vedute' to promote an ideal of pristine nature (Kelsey 2013). But natural and artificial waterscapes cannot be neatly distinguished, as landscapes are the embodiment and memory of natural-cultural dialectics (Iovino 2016). Hydrosociologist Jamie Linton points to the interconnectedness of the two movements of water and history, drawing on the Hegelo-Marxist dialectical conception of reality as a subjective-objective unfolding. By paying attention to the sociology of moving waters, both Solnit and Linton invite us to reconsider our geographies in terms of symbolic meaning and anthropic transformation, rather than wrongly assuming the background immutability of land and rock as opposed to the timescale of human history.

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¹ On water as cultural heritage, see Vallerani, Visentin 2018.

Indeed, waters are less elusive than they seem at first glance. They offer some insight into the enduring embeddedness of human praxis in nature. Civilizations and societies have flourished where this element has been abundant and accessible (Wantzen 2023). In turn, geomorphologies are shaped by interventions to control, direct, and tame water flows over the centuries, if not millennia. These entanglements make a hydrosocial approach necessary – a novel cross-disciplinary paradigm that can integrate hydrology with the social sciences (Linton, Budds 2014; Osti 2023). Land use, investments, and engineering projects, especially in agriculture and energy production, raise deep concerns today. They relate to the unsustainability of economic forms of water, soil, and labor exploitation that are deepening the metabolic rift between natural cycles and industrial progress (Foster 2000; Padovan 2000; Saito 2023). To be sure, the social and ecological costs of environmental imbalances are not evenly distributed across the planet. Rather, unequal ecological exchanges take place in the framework of neocolonial political asymmetries, at the expense of the Global South (Foster 2000, esp. chs 1 and 10; Yusof 2018).

Eco-critical interventions in the Anthropocene debate have made us aware that socio-economic structures and political decisions are fundamental causes of environmental change, at both local and planetary scales. Accordingly, an analysis of capitalism is fundamental to a sound explanation of ongoing natural-artificial processes (Moore 2016; Malm 2016) and to the search for solutions to the environmental crisis (Fraser 2021). ‘Adaptation’ to climate change, if it is not accompanied by policies of social and environmental justice, increases inequalities in the desperate race for resources. This is at the expense of the most vulnerable:

The corporate quest for natural resources – as Naomi Klein points out – will become more rapacious, more violent. Arable land in Africa will continue to be seized to provide food and fuel for wealthier nations, unleashing a new stage of neocolonial plunder layered on top of the most plundered places on earth. (Klein 2014, 48-9)

In times of dramatic climate change, water also becomes a crucial geopolitical asset, but its scarcity is *socially constructed*. It depends on the social settings, cultural politics, and scientific abstractions that are mobilized to manage its fluid processes.² Thus, water has

² Linton’s research perspective is summarized in programmatic statements such as: “Water is what we make of it” (Linton 2009, 3) and “We will be considering water primarily as a process rather than a thing” (4). He also makes it clear that this is by no means a radical relativist stance, but rather a historical and sociological one rooted in a dialectical understanding of socio-natural reality.

long been at the center of modernist engineering projects and economic valorization, especially for agriculture and electricity production. Linton (2009, 52) mentions that dams account for about 40% of the world's irrigated land and 20% of the world's electricity.³ As he claims (in the opening quotation above), there is no purely abstract hydrological cycle, but rather a dialectic of nature and culture in which water flows and control over them are always separated in reality, so that they cannot be properly understood without history (Omodeo et al. 2022).

In this perspective, more environmental studies should address Anthropocene waterscapes starting from the Global South, not only because its vast expanses have been understudied but especially because they are exposed to the most brutal forms of extractivism, a central ecological and economic problem of the current geological epoch (Gómez-Barris 2017; Vindal Ødegaard, Rivera Andía 2019). The Global South is the target of massive programs of financialization of natural resources, which the eco-Marxist John Bellamy Foster has recently defined as the

Great Expropriation of global commons [...] justified on the grounds of saving nature by turning it into a market, thereby replacing the laws of nature with the laws of commodity value. (Foster 2022b, 5)

Moreover, politically disadvantaged areas pay the highest costs of unbalanced exchange. Their perspective is needed in order to achieve 'stronger objectivity' – to use the category of feminist epistemologist Sandra Harding (1993) – about ongoing global processes. This is the correction to the Anthropocene narrative called for by critical perspectives such as Kathryn Yusoff's:

This planetary analytic [the 'Anthropocene'] has failed to do the work to properly identify its own histories of colonial earth-writing, to name the masters of broken earths, and to redress the legacy of racialized subjects that geology leaves in its wake. It has failed to grapple with the inheritance of violent dispossession of indigenous land under the auspices of a colonial geo-logics or to address the extractive grammars of geology that labor in the instrumentation and instrumentalization of dominant colonial narratives and their subjective, often subjugating registers that are an ongoing praxis of displacement. (Yusof 2018)

A brilliant example of socio-critical environmental studies from the standpoint of the Global South is Maura Benegiamo's recent book

3 For a more general and up-to-date global water assessment, see Connor, Abete 2024.

in Italian, *The Earth Inside Capital: Conflicts, Ecological Crisis, and Development in the Senegal Delta* (Benegiamo 2021). Her case study deals with current capitalist investment strategies in Africa, their capacity to ‘move’ money, water and land, and to displace people. I would like to emphasize the relevance of her insights for a political reassessment of the hydrosocial question of the Anthropocene, although this is not her explicit concern. In this essay I take the question of Anthropocene hydrosociology as the background from which I zoom in into her analysis and theses. In the conclusion, I briefly discuss the connection between hydrosociology and political epistemology for a better understanding of the world’s waters.

2 The Hydrosocial Question of the Anthropocene

Rivers and deltaic regions have attracted attention in Anthropocene studies from the very beginning. After Paul Crutzen introduced the concept in 2000, researchers began to study river flows as an example of anthropic transformations of the Earth System (Syvitski et al. 2019). Among others, the Mississippi received particular attention as a test case for cross-disciplinary research connecting the natural sciences, the social sciences and humanities (Rosol et al. 2021). Other kindred sites – rivers, deltas and lagoons – proved particularly interesting for novel inquiries, such as the Yellow River and the Lagoon of Venice, that is, natural-artificial areas that offer well-documented evidence of *longue-durée* geo-anthropology. This includes archaeological remains and archival records (Mostern 2021; Omodeo, Trevisani 2022a; Bassani et al. 2022).

In the development of the Anthropocene debate, which has stretched far beyond the disciplinary boundaries of geology, environmental concerns have always played a central role. In this respect, rivers and deltaic regions are again quite relevant, as their unruly waters raise many concerns in terms of both water scarcity and water superabundance. Rising temperatures and sea levels increase the frequency of hazards such as flooding and land erosion. According to the sixth assessment report of the IPCC (22 March 2023), climate change requires urgent measures to tame water flows. However, it also indicates that, rather than “hard defences” (e.g. dams and embankments), river restoration along with the protection of wetlands, ponds and lakes, could be highly beneficial in mitigating the climate crisis on a global scale.⁴

⁴ IPCC 2023, 73: “Natural rivers, wetlands and upstream forests reduce flood risk in most circumstances (*high confidence*). Enhancing natural water retention such as by restoring wetlands and rivers, land use planning such as no build zones or upstream forest management, can further reduce flood risk (*medium confidence*). For inland flooding, combinations of non-structural measures like early warning systems and structural

Recent interdisciplinary developments in hydrology - variously labeled 'socio-hydrology' or 'hydro-sociology', depending on whether the emphasis is on the social or the engineering part - have embraced the challenge of the Anthropocene. Indeed, they have dispelled the once cherished image of the water cycle and water engineering as pure forms of knowledge and intervention that can treat the molecules of H₂O in isolation from their ecological and cultural contexts. In fact, the 'hydro' and the 'social' are so deeply intertwined that there is hardly a drop of water on our planet that has not been touched by techno-science. Our technological practices affect the Earth System as a whole in multiple ways that are related to global developments - technological, economic and political. This is why

water internalizes and reflects social and power relations that might otherwise remain invisible. This, in practice, implies that we need to think differently about water, attend to the social circumstances of water circulation, and ask questions about how water, social structures, power relations, and technologies are internally related. (Linton, Budds 2014, 178)

Briefly put, hydrosociology considers the reciprocal making of social structures and water flows, thereby offering a dialectical key to understanding Anthropocene waters.

As for Anthropocene sociology, historical epistemologist Jürgen Renn has aptly pointed out that the technosphere, which today functions as a major geological factor, cannot be understood without considering the maintenance labor required for its constant production and reproduction (Renn 2020, ch. 16). The technosphere is only relatively autonomous, as it cannot do without human activity (Haff 2019). Labor and machines - as is well known among sociologists of science and technology - are embedded in evolving social formations, power relations and mentalities (Omodeo 2018, drawing on Boris Hessen and Antonio Gramsci). Of all the forces of social transformation, capitalism has been a fundamental driver of change since the inception of modernity in the sixteenth century and perhaps even before. It is the engine of accumulation and concentration of monetary wealth, according to the logic expressed by Karl Marx in the formula M-C-M.⁵ As ecological critics of capitalism have stressed, dominant forms of economic reductionism (especially neoliberal politics) have not only fostered instrumental relations between capital owners and wage laborers, but have also historically profited from colonial exploitation,

measures like levees have reduced loss of lives (*medium confidence*), but hard defences against flooding or sea level rise can also be maladaptive (*high confidence*)".

5 On the materiality of capitalist civilization, one can still rely on Braudel 1973.

the control of reproductive practices – especially the relationship between women and their bodies – and the massive depletion of natural resources (Federici 2004; Barca 2020). The epistemological divide between the natural and social sciences actually reflects an ontological rift which accelerates the ecological imbalance between resources-devouring economic processes and natural regenerative cycles. This finds its most vivid representation in the calculations of the so-called Earth Overshoot Day, that is, the date on which the renewable resources of the Earth’s annual budget are exhausted.⁶

Water management, it is often claimed, has been at the heart of the flourishing and even the collapse of societies and civilizations. According to Karl August Wittfogel (1957), Asiatic empires rested on grandiose hydroengineering that allowed them both to thrive and to establish centralized, despotic forms of rule. His political-epistemological interpretation has proved at once fruitful, as a starting point for later hydrosociological research, and limited, as it has ostensibly reinforced Orientalist prejudices. However, the interrelationship between water flows, their regulation and the forms of knowledge associated with them is undeniable and still fuels important lines of inquiry in environmental history (Amrith 2018), the social history of science (Mukerji 2009; Chakrabarti 2020) and cultural anthropology (Strang 2023). A crucial takeaway from these explorations of water cultures is that human agency cannot be objectified as a blind force, but must be understood on the basis of the consciousness, intentions and imaginations that direct and redirect human geological praxis (Omodeo 2022). The mobile infrastructures of today’s global society could perhaps be described as the “semiotics of Integrated World Capitalism” that underlie processes of subjectivation and are in turn transformed by sensing, knowing and acting subjectivities. Félix Guattari considered four such factors in particular: natural environments, the economy, technoscience and mentalities (culture-cum-ideology). Together, they constitute the multiple object of natural-artificial ecology as a geanthropological reality (Guattari 1989).

3 Benegiamo on the Senegal Delta and Global Capitalism

Against the background of the Anthropocene hypothesis, including hydrosociology and political-epistemological concerns about the co-constituency of humans and their environment, one can appreciate the contribution of the sociologist of science Benegiamo to the understanding of the relationship between capitalism, water and soil, on

⁶ This year the date was 2 August 2023. <https://www.overshootday.org>.

the basis of a study of investments and social dynamics in Senegal.⁷ Her book offers an informed and critical analysis of the entanglements of hydroengineering, agriculture, globalization, land grabbing and political conflicts in the Ndiaël reserve of the Senegal river delta.

Benegiamo outlines the local, historical and global contexts of the case that the book examines: the investment of an Italian company specialized in the production of vegetable oil and agro-energy in the Senegal delta. This geographical area already was already a place of intense agricultural, social and botanical experimentation when it was a French colony, but after the country's independence in 1960, it was invested by massive projects of rice production. Over the years, hydroengineering projects and the expansion of agricultural land use (which began in the 1960s but accelerated after the 1980s) have deprived the pastoral communities and their animals of 70% of their pastures. Some figures can help to understand the dimensions of the problem: in 1964 alone, a dam 82 km long alienated 30,000 hectares of land (Benegiamo 2021, 51); moreover, between 1980 and 2000, the amount of irrigated agricultural land increased from less than 10,400 ha to 44,000 ha. Immediately, the government promoted the immigration of sedentary farmers into the delta area. Under these conditions, a common land such as the Ndiaël reserve has become increasingly valuable as a refuge for shepherds, whose cattle require large grazing land and access to water.

The arrival of the Italo-Senegalese company Senhuile-Senethanol, according to Benegiamo's reconstruction, introduces an additional concern from both an environmental and social point of view. Indeed, its acquisition (in the form of a 50-year concession) of 20 Kha has *de facto* privatized a large part of a protected area (the full extension of which is 46 kha), without taking into account the fact that it constitutes a vital resource for wild species and for shepherds' livestock. To make this operation possible, the area had to be downgraded from its protected status. This move, approved by President Abdoulaye Wade, is particularly unfortunate because the Ndiaël reserve - a French hunting ground in colonial and post-colonial times - was included in the Ramsar Convention on Wetlands (1971), which Senegal was the first country in West Africa to sign in 1977. Unfortunately, Ndiaël was added to the Montreux list of ecologically degraded wetlands in 1995. The construction of dams since the 1950s and the steady use of water for agricultural purposes have made the area drier.

This Senegalese version of the tragedy of the commons threatens the lives of the local cattle farmers. The tendency to marginalize them has not really changed, although the sustainability of pastoral semi-nomadism has been acknowledged as an eco-dynamic practice

⁷ For a broad hydrosocial introduction to the Senegal river, see Taïbi et al. 2023.

capable of adapting to elusive rainfall and meteorological patterns. Benegiamo stresses that the movement of cattle in the Sahel has proven to be of great ecosystemic value, for example in fertilizing the soil, spreading seeds and eradicating flammable dry vegetation that could cause fires. As she argues, the very concept of habitat should be revised, since it concerns the “co-production of human and non-human activities, which interact towards the maintenance of dynamic balances, functional to the preservation of an ecosystem” (Benegiamo 2021, 61; Author’s transl.). Such a remark is very much in line with the Anthropocene epistemology about the need for an adequate scientific-historical paradigm capable of explaining the co-production of human cultures and their natural environments. In particular, the importance of pastoral life has been acknowledged by recent legislation in West-African countries such as Niger and Guinea (since the 1990s), Mauritania (2000), Mali (2001) and Burkina Faso (2002).

Benegiamo also outlines the broader geopolitical context of the investments in the Senegal delta as part of new global patterns of neoliberal governance, which can be traced back to the establishment of the World Trade Organization in 1995 and reached a peak in the food crises of 2007-08. After this turn, the acquisition of land and the control of primary production by large multinational corporations became imperative for them in order to navigate the fluctuations of the financial markets (on which, see also Benegiamo 2022). The acquisition of land naturally implies that of water: its regulation and exploitation, the drying up of biologically valuable ‘muds’ and the denial of access to water for local communities. As Benegiamo argues, the phase of globalization that began in the 1990s induced a shift in Africa from ‘developmental’ politics, aimed at self-sufficiency to ‘food-security’ strategies aimed at securing access to commodity markets. The new logic was one of national differentiation and specialization of production within a global space of free trade. This shift ‘from production to circulation’, promoted by institutions of global governance such as the World Bank and the International Monetary Fund, implied the ‘re-primarization’ of African economies. The institutions of global governance regarded Africa as a specialized agrarian space. Accordingly, its hydrosociology was redirected towards maximizing monocrop production. However, this policy and the increasing mechanization of agriculture made it vulnerable to financial fluctuations, especially in relation to the prices of oil and chemical products. This vulnerability was most evident in the food prices crisis of 2007-08.

To capture the economic developments that frame the investments in the Ndiaël wetlands, Benegiamo resorts to the concept of ‘agrarian extractivism’. She defines it as “the intensive exploitation of the territory [...] for goals that are alien to the territory itself, the uses of the local population and the preservation of environmental balances”

(Benegiamo 2021, 69; Author's transl.). Extractivism can be seen as an inverted version of earlier models of development. Indeed, it is mobilized

in contrast with the dirigiste policies adopted by post-colonial and socialist governments centered on the modernization of local agricultural systems to achieve national self-sufficiency. (Benegiamo 2022, 158)

Instead of ensuring the self-sufficiency of states, it makes their economies more dependent on external factors with devastating social and environmental consequences. As the Senegal case shows, current investments concern the land, but neglect labor and people's welfare.

These considerations lead Benegiamo to critically engage with the relationship between dominant 'narratives of development' and processes of land grabbing in subsequent phases of Senegalese history - we could call this process, from a hydrosociological perspective, land-and-water alienation. According to Benegiamo, the three most powerful ideas behind these changes are: 'modernization', 'energy transition' and the myth of the beneficial impact of 'private investment'. They have become major ideological factors of social legitimation and transformation, replacing earlier national policies based on the centrality of the state. A decisive moment was the signing of agreements with the IMF and the WB in 1980. They introduced neoliberal agricultural policies in Senegal. According to them, the state had to step back from production. In 1995, the WTO imposed the suppression of customs duties and the end of price controls. This plunging of the Senegalese economy into a deregulated global market impoverished small producers and triggered a large phenomenon of farmers' migration that continues to this day. New investments in agrofuel, spurred by EU renewable energy directives, exacerbated these trends around 2000. Later, the global crisis of cheap food led entrepreneurs from capitalist centers to buy land, and this new investment policy particularly affected Africa. In Madagascar, for instance, the concession of 1,300,000 ha of agricultural land to the South Korean company Daewoo Logistics in 2008 sparked a major revolt, which caused a rapid change of power and the suspension of the project.

Italian investors in Senegal also met with opposition and clashes. Unrest in Senegal has affected political decisions on land concession and water use. The concession of the Ndiaël reserve on the Senegal delta was the result of long negotiations and compromises, after other sites proved more conflictual. The choice of an ecological protected area signals the fragility of the commons, as a target for privatization in times of neoliberal hegemony. Benegiamo also

addresses the environmental fate of this commons. As she reports, Senhuile never felt accountable for its interventions: the poisonous spraying of pesticides from airplanes, the side effects of its irrigation systems and water use, the desertification effects of the deforestation of 6,000 ha of savannah for monoculture, and the dangers to people's health and well-being. Benegiamo considers, among other things, the case of the canalization works. They severely restricted pastoral mobility and irreversibly altered grazing paths. Access to wells became difficult for villages. Moreover, the lack of protection caused animals and children to drown (Benegiamo 2021, 123).

The marginalization of pastoral life and shepherds is one of the most dramatic consequences of these developments. Benegiamo regards them as the triggers of a cultural crisis that can only be understood by stepping back from modernist fantasies of technological progress and taking a closer look at local customs, practices and beliefs. To this end, she describes in detail the special relationship of the Fula people of the Sahel ('Peul', in French) with their cattle. This finds expression in mythologies and identities, as described by the Guinean writer Tierno Monénembo in his novel *Peuls*:

In the beginning, it was the cow. Guéno, the Eternal, first created the cow. Then he created woman; only after, the Fula. He put the woman behind the cow. He put the Fula behind the woman. This is what the genesis of the shepherd says, this is what the holy trinity of the shepherd does. (Monénembo 2004, 11, quoted in Benegiamo 2021, 136; Author's transl.)

For these people, the relationship with the cattle is not one of ownership, but rather one of mutual belonging, because humans and animals have a parallel lineage. Their ancestors already belonged together. As a Fula song says:

God has the whole universe, the Fula has cows.
The savannah has elephants, the Fula has cows.
The cliff has monkeys, the Fula has cows.
The moor has deer, the Fula has cows.
The sea has waves, the Fula has cows.
(Monénembo 2004, 12, quoted in Benegiamo 2021, 136; Author's transl.)

But private companies, which have replaced the state in with the task of 'developing' and 'modernizing' the country, silence the shepherds and relegate their culture to an image of backwardness and superstition. In this sense, they perpetuate colonial violence under new conditions, because, as Amilcar Cabral lucidly remarked

whatever may be the material aspects of this domination, it can be maintained only by the permanent, organized repression of the cultural life of the people concerned. (Cabral 2023, 78)

Under these conditions, democracy and solidarity become secondary with respect to private interests. In order to mask this situation, the image of the 'responsible' company is created and propagated in many ways, including through philanthropic projects. By contrast, dissent and protests become invisible and are criminalized. Local communities are not treated as legitimate stakeholders in economic transactions that take place far above them. Yet, environmentally and socially just development would require socialized and transparent forms of decision-making. Furthermore, as Benegiamo reports, there is a lot of pressure on shepherds to become sedentary, but this cannot really happen without investment, adequate structures and the production of sufficient livestock fodder. Sedentary farming is also less resilient to climate change, as shepherds and their animals cannot adapt to the weather conditions by following the rain. In the face of these contradictions, claims about entrepreneurial ethics merely conceal the lack of regulation. Furthermore, the widespread image of empty African land to be put into production is a continuation of colonial dreams of appropriation and domination that do not respect the dignity of those from whom common land is taken.

4 Concluding Remarks and Further Perspectives on Hydrosociology and Land Grabbing

In her book on Senegal, Benegiamo stresses that the nomadism of pastoral life has proven more resilient to climate uncertainties than monoculture and sedentary agriculture, because it is more adaptable to the contingencies of rainfall patterns. This is a very relevant issue, because the Sahel has been threatened by drought and famine throughout the second half of the twentieth century. It is useful to recall that, when one of the worst such tragedies in recent years struck this region in the Sixties and Seventies, international organizations such as the FAO were quick to acknowledge the existence of social, economic and political responsibilities. The Argentinian philosopher of science Rolando Garcia, director of the research program on *Drought and Man* for the International Federation of Institutes for Advanced Study, came to the conclusion that societies are not passive in relation to the climate because they are agents of climate change and, what is more, the organization, practices and use of resources (especially water and soil) make societies more or less vulnerable to climate change:

We stated above that ‘there is a tendency to consider climate and climatic fluctuations as a *given*’ and that ‘society is thus conceived as a passive receptor of the impact of climate’. In verbal discussions on these matters we have found readiness to accept this criticism, but for the wrong reasons. The usual answer is: ‘of course, we must take into consideration that society in turn modifies the climate’. This may be true, but we do not mean only that. We refuse to consider society as a passive receptor of climatic ‘impact’, not – or not only – because society may in turn influence the climate, but because climatic phenomena are only meaningful with reference to a certain society. (Garcia 1981, XII)

David Harvey later emphasized the existence of path-dependencies, in which societies forge natural conditions for their reproduction and the perpetuation of the status quo in a kind of reflexive mechanism. Ecological transformations can make the society that generated them necessary for the maintenance of the very material conditions of social life (Harvey 1996, 94).

The interconnection between climate and society is also well documented in the UNESCO’s Arid Zones Initiatives of 1948-64 and, later, in its Water Programmes. These programs have long recognized the economic and social importance of water knowledge and, since the 1990s, have emphasized its relevance to environmental politics – or ‘sustainable development’ (Salih 2015). Hydrosociology, as a two-pronged inquiry into the human and natural dimensions of water, has now been included in the IX Strategic Intergovernmental Hydrological Programme, for the five-year period 2022-29, in relation to the cross-disciplinary approaches linking hydrological and sociological forms of knowledge. From the viewpoint of hydrosociology, river engineering and the transformation of waterscapes exemplify human-natural processes (Sivapalan et al. 2012). This assumption calls for a closer investigation of the social structures and their history, as well as the forms of political agency that have shaped them. This program clearly embodies an Anthropocene line of research:

The UNESCO Intergovernmental Hydrological Programme (IHP), founded in 1975, is a long-term programme executed in successive eight-year phases. Its programmatic focus has gone through a profound transformation from a single discipline mode, to a multi-disciplinary undertaking, aimed at advancing hydrological knowledge through supporting scientific research and educational programmes. Ever since the early 2000s, with the increased presence of social science components, including growth in the quality and quantity of citizen science inputs, IHP has been evolving into a truly transdisciplinary undertaking. This progress has

capitalized on the recognition that solutions to the world's water-related problems are not just technical, engineering or natural science issues, but have strong human and sociocultural dimensions, where social sciences play an increasingly important role. (IHP 2022, 3)

Benegiamo's book is an example of the sociological studies that can be brought to bear on an Anthropocene investigation of the geological and anthropological components of river flows. As she demonstrates, the recent history of Senegal shows that the politics of water and soil cannot be separated from political decision-making and economic interests. Africa must be at the center of understanding these global processes, where access to resources will become increasingly conflictual unless transboundary cooperation is implemented (Stephan, Dumont 2024). Arguably, the geopolitical competition between economic actors and political powers over resources is currently exposed by the West African conflicts, which go far beyond the regional scale. Extractivism, as Benegiamo remarks, concerns not only mining (for example, of uranium, rare earths, gold and diamonds), but also agriculture. Investments, such as Senhuile's in the Senegal delta, are part of large programs of landscapes and society reengineering. Water is at the center: this is the most precious resource for the lives of humans, livestock and plants. As Jeremy Schmidt has argued, managing water is tantamount to managing the conditions for life itself (Schmidt 2017, 20). Conflicts over its use are at once struggles over different visions of society and values. They are inscribed in the territory, as rivers are major factors of geomorphological transformation.⁸

These natural and social path dependencies are inscribed in landscapes as sites of cultural heritage and natural-cultural scenographies for future generations. Since the early modern period, as Philippe Descola has argued, landscapes and their representation have been prototypical of the culturalization of nature and the naturalization of culture:

The infinite and homogeneous space of linear perspective is [...] constructed on axes that start from an arbitrary point, that of the direction of the gaze of the observer. So a subjective impression serves as the starting point for the rationalization of a world of experience in which the phenomenal space of perception is transposed into a mathematical space. Such an 'objectification of the subjective' produces a twofold effect: it creates a distance between man and the world by making the autonomy of things depend upon

⁸ In Omodeo, Trevisani 2022b we take the Lagoon of Venice as an example of natural-cultural geomorphological transformation.

man; and it systematizes and stabilizes the external universe even as it confers upon the subject absolute mastery over the organization of this newly conquered exteriority. (Descola 2013, 59-60)

What the Anthropocene debate adds to this is that the internal-external logic of domination and objectification is not just a problem of abstraction and symbolic representation, but one of ecological and social change. The inscription of land in capital, as the title of Benegiamo's book suggests, is actually a technological inscription. In this regard, it is useful to quote once again one of the best-known ecological passages of Marx's *Capital* (vol. 1, chap. XV, 10), which points to the double exploitation of the land and the workers as a consequence of the absorption of the countryside in industrial mechanical production:

All progress in capitalistic agriculture is a progress in the art, not only of robbing the labourer, but of robbing the soil; all progress in increasing the fertility of the soil for a given time, is a progress towards ruining the lasting sources of that fertility. The more a country starts its development on the foundation of modern industry, [...] the more rapid is this process of destruction. Capitalist production, therefore, develops technology, and the combining together of various processes into a social whole, only by sapping the original sources of all wealth – the soil and the labourer. (Marx 1976, 637-8)

The current transformation of the Senegal, following a pattern that is similar to that of other regions of the world, falls today under the compass of a neocolonial land-grabbing phenomenon that alienates the soil and inserts it into the economic circuits of production and commodification. Benegiamo's research reminds us that the Anthropocene predicament of a riverine system like the Senegal delta and the ecological and social future of a commons like the Ndiaël wetlands will depend on our ability to critically assess and resist a new wave of the "so-called primitive accumulation" (Angus 2023), in Africa and elsewhere.

These remarks mainly concern the 'political economy' of water-scapes, that is, their necessary inscription in economic and political agendas. Moreover, since the organization, maintenance and use of water are inscribed in antagonistic settings, their understanding must be situated (that is to say, it cannot assume an external, quasi-divine viewpoint 'from nowhere'). In particular, it is the perspective of the Global South, that is, of the countries and populations that are most directly affected by extractivist politics and unequal exchanges.

In my view, the outlined economical-political critique, as fundamental as it is, cannot do without the complement of political epistemology (Omodeo 2019). Indeed, a critical reflection on science and technology is crucial for an adequate assessment of the material and

cultural (intellectual, spiritual, symbolic) developments of societies in general. This holds true for our epoch, in which science has proven to be an essential force of production and reproduction, while technology has become the main factor of geological transformation of the Earth System (Renn 2020). From the perspective of a critical theory of knowledge (or political epistemology), scientific abstractions and the material transformations they produce signal the non-neutrality of scientific knowledge and the profound political significance of its concepts and theories (its so-called ‘historical a priori’).

In this essay, I have in mind in particular water knowledge, for which a political epistemology of hydrosociology is needed. Attempts to understand water and its cycles independently of human agency and culture are proving inadequate to the challenges posed by the current multiple planetary crises – challenges that are summarized in the Sustainable Development Goals of the UN Agenda 2030. No abstraction is absolutely valid, nor is there any necessary unique solution (or unique technical solution) to resource-related problems. Validity and goals are inseparable.⁹ Accordingly, water politics cannot be reduced to the mere modeling, calculation, engineering and control of flows. Rather, it is at once a technical, environmental, biological and cultural issue. It calls for multidisciplinary collaborations based on ideals that ought to be made explicit in order to provide directions for collective action. Hydrosociology, according to the authors and the perspectives I am discussing here, should be linked to a dynamic and multiple understanding of the natural-cultural reality. This is the result of the entanglement of several processes that include: natural ecosystems, socio-political agency, psychological-cultural meaning and technoscience. By adopting an epistemology of contextual situatedness, hydrosociological knowledge embraces a historical perspective from below that promotes more democratic, socialized and cross-cultural paradigms. As scholars like Linton have argued and sociologists of science like Benegiamo have shown, the planet is not an abstract cosmological or geological entity devoid of human subjectivity and agency; rather, it poses a problem of global governance that can best be understood from a perspective from below that takes into account the unequal relations that ground the Anthropocene conjuncture. In this respect, I see UNESCO’s original perspective – as outlined in its 1945 Constitution – as an apt expression of a non-neutral epistemology, since it explicitly targets peace and prosperity as goals to be achieved through scientific exchange and mutual cultural understanding:

⁹ Ciccotti et al. (forthcoming) brought forward the thesis of the non-neutrality of science and the cultural-political shaping of scientific theories in a paradigmatic manner in their classic work on political epistemology of the Seventies. See also Rose, Rose 1976.

the purpose [is] of advancing, through the educational and scientific and cultural relations of the peoples of the world, the objectives of international peace and of the common welfare of mankind.¹⁰

Accordingly, for the pursuit of greater concerning the world's waterscapes and their interdependencies, critical thinking should address the ideological, epistemological, economic and political conditions of oppression and potentials for emancipation. This requires a different hydrology is needed, one that learns from the experiences of the Global South and emancipates silenced voices from subalternity.

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¹⁰ *Constitution of the United Nations Educational, Scientific and Cultural Organisation*, signed at London, on 16 November 1945. https://treaties.un.org/Pages/showDetails.aspx?objid=08000002801651f0&clang=_en.

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