Hydroreflexivity

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Every environment, every place is shaped by water: by the way it is situated and used; by how it is protected, managed, and distributed; by the conditions of its accessibility; by its quality, and by its quantity. Water can be both a protector and a threat, and the struggles over water can be both for and against it.

Hydroreflexivity is a collaboration between e-flux Architecture and "Fertile Futures," the Portuguese Pavilion at the 18th International Architecture Exhibition, La Biennale di Venezia curated by Andreia Garcia with Ana Neiva and Diogo Aguiar.

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Don't Call Me Gaia

Emanuele Coccia

The present conditions we are experiencing—and trying to designate with different names, all equally inadequate: Anthropocene, climate crisis, Capitalocene, etc.—are unprecedented, not only from a historical or ecological point of view, but also and especially from a cognitive and political point of view.

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Irrigation and a Critical Awareness of Land

Eglantina Monteiro

The construction of the Santa Clara dam (1963–73) on the Mira River created a 12,000-hectare "irrigation perimeter" for hydro-agricultural exploitation along a 41-kilometer strip of Portuguese coast in the southwest of Alentejo, between Vila Nova de Milfontes and the village of Rogil.

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Water Flows, Stones Take…

Ana Salgueiro

Only a few hours after the heavy rain began, water and detritus overflowed and destroyed the stream banks of the island's principal localities. Taking back areas of unduly occupied flood plain, torrents of water swept away everything in its path.

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Necro-Hydrology

Ifor Duncan

For the fathers of the dam, a masterpiece of Italy's rapid post-war industrialization, Paolini stated that there is an eerie sense that the mountain collapsed, but the dam—sculpted to a morbid perfection—survived the ensuing landslide. Casting a great shadow into the ravine, Vajont now stands as a tomb to the megalomania of hydropower engineering.

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Wetlands of Resistance

Ameneh Solati

Draining the Marshes In the mid-1970s, a forty-five-minute-long documentary film by Kassem Hawal titled Al-Ahwar (The Marshes) presented a window i…

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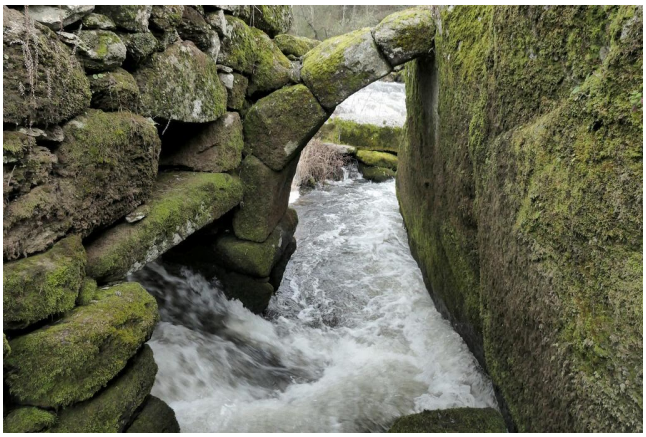

Troubled Waters: An inquiry into water's modes of existence

Álvaro Domingues

In founding mythologies of the world, water can be the beginning or the destruction of everything; fertility and creation; everything that existed before the ashes.

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Editorial

Andreia Garcia, Ana Neiva, Diogo Aguiar, and e-flux Architecture

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Editorial

is a collaboration between e-flux Architecture and "Fertile Futures," the Portuguese Pavilion at the 18th International Architecture Exhibition, La Biennale di Venezia curated by Andreia Garcia with Ana Neiva and Diogo Aguiar, featuring contributions by Emanuele Coccia, Álvaro Domingues, Ifor Duncan, Eglantina Monteiro, Ana Salgueiro, and Ameneh Solati.

"Water is Life." As Standing Rock protestors declared, access to freshwater must be ensured for all and fought for at all costs. With the widescale privatization and belligerent contamination of this vital natural resource, the struggle for water has become more urgent than ever. However, the fight for water is not a new struggle. People have been collectively negotiating their relationship with water for as long as they have lived together. Water has also, at the same time, been a means for people to negotiate how they live together. This is just one of the many ways that water is reflexive. Struggles over water are also incredibly varied, as water is not only life; it is also territory. Every environment, every place is shaped by water: by the way it is situated and used; by how it is protected, managed, and distributed; by the conditions of its accessibility; by its quality, and by its quantity. Water can be both a protector and a threat, and the struggles over water can be both for and against it.

The 2023 Portuguese Pavilion at the Venice Architecture Biennale focuses on the entanglements of water with local economies, politics, and cultures to imagine more fair, inclusive, equitable, diverse, generous, abundant, productive, and responsible futures in seven distinct hydrogeographies across Portuguese territory: the Tâmega Basin, located in the north of Portugal, which was once an agricultural base but is now home to one of the largest hydropower complexes in the world; Douro International, in the northeast, a natural park shared by Portugal and Spain whose high river banks are essential to soil and ecosystem conservation; Middle Tejo, located in the center of the country, where the mining industry has extensively contaminated the Zêzere River and groundwater; the Alqueva Reservoir in the southeast, which as the largest artificial lake in Europe attracts a growing number of tourists while contributing to the overproductivity of agribusiness; the Mira River in the southwest, which high yield farms not only contaminate, but also create unequal access to water and inadequate working and housing conditions; the Lagoa das Sete Cidades in the Azores, whose eutrophication is caused by romanticized livestock activity; and Madeira's streams, whose regular flooding highlights the cost of the island's rapid and unplanned urbanization.

Although each of these situations requires specific local solutions, they are all symptomatic of broader global trends, orientations, and practices. It thus becomes crucial to share knowledge and learn from the experience of others. Since we are all connected by water and all water is connected, developing new models and strategies for

pontoatelier, "Liquid Memory," triptych, 2023. © pontoatelier.

managing and conserving water resources is a crucial step towards creating a fairer, more sustainable, and more diverse future. This work certainly goes beyond the singular domain of architecture, but the architect is well suited to position themselves at the nexus of many different forms of knowledge, disciplines, temporalities, and scales. The act of developing, articulating, and realizing a common imagination lies at the core of what it means to be an architect. Doing so, however, might require finding other ways of performing architecture.

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e-flux Architecture is an archive and editorial project founded in 2016. e-flux Architecture describes strains of critical discourse surrounding contemporary architecture, culture, and theory internationally.

Alvaro Domingues

Troubled Waters: An inquiry into water's modes of existence

I. Equations

> On the bank of the Tamega river, alongside the Cavez bridge, there is an old chapel of St. Bartholomew, where an annual pilgrimage takes place on the 23rd and 24th of August. The pilgrims believe that the water from the sulphureous springs there, collected on the 24th, before the sun sets, is an antidote to actual or possible diseases. This is why many bottles full of this water are taken, and children are dipped in it, and in this case the shirts of the sick should be thrown into the water.
> —José Leite de Vasconcelos, 1938[1]

Before science and technology could colonize modern thought with their rationalities and abstractions, there were no clear boundaries between the different ways that things existed and what could explain them. Water quenched thirst, but it also healed wounds, exorcized evil spirits, moved mills, and made bread. In founding mythologies of the world, water can be the beginning or the destruction of everything; fertility and creation; everything that existed before the ashes.

Holding unfathomable mysteries and infinite spaces, the sea is a shapeless mass that is permanently agitated in the fury of waves, in shipwrecks, in the uneasy calm, the still air, the constant sparkle of the sun scorching in the slightest disturbance of the water's surface. There was no sea in the delights of the garden of Eden. The sea is the memory of the flood, of the tremendous punishment of the gods that destroyed everything under the abyss of the waters that fell from the heavens. The unbridled vigor of the stormy sea is nothing but the breath of this pent-up fury, the great chaos, the cosmic tumult that inhabits the depths and blackness of this liquid mass, the monsters that devour ships.

On the contrary, fresh water, the moving waters of rivers and streams, the crystal-clear waters of lakes, the freshness of springs, are sources of life, abundance, and pleasure for the senses. Henry David Thoreau, for instance, described Walden, the lake around which his utopian manifesto of life away from the voracity of civilization is organized, as "blue at one time and green at another, even from the same point of view. Lying between the earth and the heavens, it partakes of the color of both. It is Earth's eye, looking into which the beholder measures the depth of his own nature… Nothing so fair, so pure, and at the same time so large, as a lake. Sky water."[2]

Such is the vastness of water's image and imaginary. There are so many uses for and ways of using water. At the same time, there is a simultaneous ease and difficulty of discerning the exact nature of issues and controversies

Sharing of water. Ruin of a water mill in the Tâmega river: buttress reinforcement of the exterior wall, 2022. © Alvaro Domingues.

that mobilize it from a political, social, and technological point of view, whatever the scale that is under consideration. This is perhaps due to the fact that the ways water is socially inscribed are in permanent flux, from the social collectives involved and their interests to the relevant geographical scope for resolving this or that situation, the nature of conflicts and the respective forms of regulation, the socio-technical systems that organize exploitation, distribution, and consumption, and the seasonal periods of scarcity or abundance. The variation of frameworks and the diversity of conflicts surrounding water prove its potential as a descriptor of social relations.

Three distinct ways of seeing water often run through and become entangled its varied situations. Viewed as a chemical substance—two atoms of hydrogen and one of oxygen—water can be addressed by drawing from scientific knowledge such as hydrology and hydrography, hydraulic engineering, climatology, physical geography, and the broader group of environmental sciences. Water can also be seen as a resource, and usually a "natural" one that is embedded in more or less complex social, political, and economic processes. Water is inscribed in political contexts and socio-technical systems—from hydraulic technologies and infrastructure to socio-economic, geopolitical, or hydro-political structures—that presuppose an unequal distribution of power, conflicting uses, and modes of regulation. With its increasing utilization in industrial processes and consumption in domestic situations, water is also treated as a commodity, which increases pollution risks and creates situations of scarcity and unequal access.

During Portugal's dictatorial political regime (1926–1974) and fragile modernization process that lasted until the end of the 1950s, a diverse biophysical and cultural regionalism prevailed throughout the Portuguese territory. In the dry southern Mediterranean regions, there were *latifundia*, wheat production, and extensive grazing; in the north, on the Atlantic coast, predominantly subsistence family-scale peasant economy prevailed; and in diverse mountain environments were poor soils, an economy of scarcity, and unequal distribution of land. The centrality of the agricultural economy meant that water played out in micro-geographies and modes of use and management that were highly dependent on traditional technologies and organization, such as collective management of *levadas* (irrigation channels).

Vertigo. Pressure pipeline for passage of water between reservoirs, 2022. © Alvaro Domingues.

Following World War II, however, a profound process of de-ruralization took place. While depopulating rural areas, the economic unit of the family, cultural references of peasantry, and the very landscapes whose physiognomy was dependent on the persistence of certain techniques of maintenance and cultivation all disappeared. Electrification gained momentum in the 1960s, which led to the State-led development of hydroelectric production. After the Revolution in April 1974, and particularly after joining the European Economic Community in 1986, Portugal's geography became polarized: the territory remaining after de-ruralization was mostly characterized by depopulation and abandonment, and investments in large-scale water-related projects with an extractive profile, such as hydroelectric production, agribusiness, or tourism. This situation gave rise to new localisms, new contexts largely created by global dynamics.

Given these intersections of water's different modes of existence and the paradigm of "liquid modernity" it gives rise to, we may ask a series of questions.[3] First, what is local? Following the deep erosion of previously existing modes of social coherence, of an economic base that is not dependent on income, salaries, or locally generated production, of neighborhoods that do not necessarily imply sharing common references and worldviews, and where the mobilization of local natural resources is organized by private companies and global market logics, how can we identify and legitimize micro-geographic areas of action? Second, what is territory? Taking into account the diversity and unequal distribution of powers and interests, the coexistence of very different values and imaginaries, the complexity (and confusion) of territorial regulation mechanisms, the rapid evolution of sociotechnical systems and the way they reconfigure forms of social and territorial organization, the disengagement of local resident populations from issues related to land ownership or use, and the simultaneous presence of archaic ties of a collective nature, abstract public rights, diffuse private rights, and those belonging to deterritorialized global logics, how can we understand the social construction of geography? Third, how can we define collectives, communities, and the commons? Faced with the phenomena of individuation, fluidity, multiple belongings, and the fragmentation of society, how can we redesign common things, consensuses, priorities and hierarchies, the invisible connections between universal, national, and local rights?

Water channel for mini-hydraulics in Poi river, Ribeira de Pena, Summer 2022. © Alvaro Domingues.

II. Snapshots

Between a large granite rock and the ruin of a mill built of the same stone, the river Tâmega flows. Its water has been dammed a little upstream, but returns to the course of the river further down with the energy of the current not being used. Part of this water, diverted from its natural course, used to be a *levada*, which by virtue of gravity would irrigate terraced fields built between the riverbank and itself. As a source of energy and an indispensable resource, water has built society and territory. Sharing water defined codes of living together, rights of possession, use, and distribution; possibilities of having watering troughs for cattle, washing tanks for clothes, fountains for human supply, water for pigs, for corn, for vegetable gardens, and for the baptismal font.

In the long and rather stable time of *longue durée*, everything seemed quite clear and simple: the mutual relations between territory and society were confined to well-defined geographical areas, and from material culture to ways of life, economic organization, ways of doing and thinking, and traditions.[4] Between the existence of water as a gift from nature or the gods and water that was mixed with manure to make corn grow, there was no clear break: the natural and the supernatural coexisted in everyday life, with the violence of a thunderstorm's rain conjured up with prayers to the deities in the sky.

The persistence of norms on the collective use of water, from common lands, cattle herding, paths, ovens, and washhouses to ritual practices of belief, festivals, funerary ceremonies, marriages, and their moral and ethical codes all constituted powerful mechanisms of social regulation and stability. The transfer of knowledge related to techniques and methods of cultivation, the organization of labor, building, food preparation, objects, tools, and other artifacts contributed to the coherence of the whole, in the preservation of a collective memory, a way of being in the world, an identity. Of course, none of this implies or guarantees any scenario of egalitarianism or social justice. The sense of community is valid both for codes of solidarity and sharing, and for the legitimation of different places and social roles.

The reproduction of localisms—micro-societies and their respective territories of belonging—and the central role of neighborhood relationships depended on the durability

St. Aleixo irrigation canal, Ribeira de Pena, Summer 2022. © Alvaro Domingues.

and stability of these characteristics. As Arjun Appadurai states: "the long-term reproduction of a neighborhood that is simultaneously practical, valued, and taken-for-granted depends on the seamless interaction of localized spaces and times with local subjects possessed of the knowledge to reproduce locality."[5] However, this geographic inscription, which is usually connoted with rootedness and is most often implicit in the qualities of the local, proves to be quite fragile. But processes of modernization radically destabilize local contexts. They cause mass population movements, call into question pre-existing sustainable economic logics, and disseminate normative values, lifestyles, and consumptive practices. As a result, the attribution of meaning to the local and the sense of self changes radically, as does the definition of collective interests and common things, along with their respective rhetoric and legitimation processes.

What is called the modernization process—the predominance of techno-scientific rationality, the role of the State, formal law and other social normative and framing mechanisms, commodification and capitalism, the growing complexity of social and technical systems—precipitates change, causes mass population movements, calls into question economic logics based on self-consumption and self-production, and disseminates and generalizes or massifies consumptions, values, lifestyles. In short, it radically destabilizes local contexts. As a result, the attribution of meaning or the sense of self as local changes. So does the definition of collective interest and common things, as well as their respective rhetoric and legitimation processes.

In other words, with the loss of the cultural basis of traditional irrigation and collective water, the sense of local inscription has also been lost. One can be a resident in a certain place but be completely different from one's neighbor, even a stranger, acknowledging other belongings and other codes. Water is deeply embedded in varied contexts and in constant renegotiation over its ownership, management, and use, not only as a purely economic resource but also as a symbol of sovereignty, power, identity or citizenship.[6] And community—the collective that decides upon and regulates what is common—cannot be reduced to a social group confined to a clearly delimited place. In contexts like Middle Tâmega, which was marked by de-ruralization and its abrupt metamorphoses and processes of mass

emigration, the issue is even clearer. Appadurai claims: "As groups migrate, regroup in new locations, reconstruct their histories, and reconfigure their ethnic projects, the *ethno* in ethnography takes on a slippery, nonlocalized quality… The landscapes of group identity—the ethnoscapes—around the world are no longer familiar anthropological objects, insofar as groups are no longer tightly territorialized, spatially bounded, historically unselfconscious, or culturally homogeneous."[7]

In Portugal, the Water Law of 1919 emerged as part of the implementation of the First Portuguese Republic (1910–1926), of a new model of the State and the definition and regulation of public things. This included regulating ways of appropriating water for modern industrial purposes, urban supply, hydroelectric power production, and the construction of irrigation systems with modern techniques and materials to organize the collection and distribution of water.

Dividing walls in the marshes and pastures of the Daivões reservoir, Ribeira de Pena, Winter 2023. © Alvaro Domingues.

III. Vertigo

As the waters of streams, lakes and lagoons, as well as fluvial and underground waters, one of the most important factors of national wealth, whose development the Government must aid and foster … it is of the utmost urgency to promote the agricultural and electric energy use of the waters of the hydrographic basins of our rivers, to reduce as much as possible the import of subsistence and fuel, whilst intensifying and valuing Portuguese labor.
—Portuguese Water Law, 1919[8]

Meanwhile, the old local systems, characteristic of pre-modern rurality, were already in transformation. After the turbulence of World War II, and in view of emigration opportunities to Europe, the USA or Canada, and Portuguese urbanization itself from the end of the 1950s, a profound process of de-ruralization took place. Beyond simple depopulation, de-ruralization touched on three key pillars of rurality: the predominant economic mode of family production; the progressive disappearance of cultural references to peasantry (tradition, family, community, religion, self-enclosure, conservatism); and the very landscapes whose physiognomy was dependent

on the persistence of certain techniques, products, and agricultural cultivation and livestock farming systems that were inscribed in the geographic variety of the Portuguese territory.

Although the National Electrification Act dates back to 1944, large-scale hydroelectric projects came in the 1950s and 1960s, when with the help of the Marshall Plan the State took the lead in power production and distribution, thus breaking the liberalism of private initiatives of previous decades. Today, however, the opposite is true, with disorganized global capitalism taking over the competencies and tutelage of Portugal's crisis-ridden, neo-liberal, drifting welfare state. Water, a resource long considered a public good, is being captured by a process that operates in the instability and continuous metamorphosis of capitalism, according to geopolitics and conflicts, fragility, and corruption, variability of tax systems (and paradises), very low wages, environmental and social dumping, as well as, on the contrary, prosperity and consumer power, highly skilled labor, poles of excellence in innovation, and ease of financing. Liquid capitalism has reached a remarkable degree of fluidity, circulating on the planetary roulette wheel, adapting itself, continuously innovating, neutralizing its contradictions, confounding its historical opponents, occupying the spaces of non-market social relations. The power of technological apparatuses and the socio-technical systems of which they are part multiplies, expands, colonizes, normalizes, and adjusts any mercantile system of production, distribution, and consumption. Let there be profit and a financial engine, and if there is no future, let there be future markets.

It would be very strange if, faced with organizations, technologies, and prostheses of such novelty and power that allow for uses and functionalities so different from those that existed before, society organized itself in the same way, reproduced the same way of spatially accommodating and territorializing itself. There are, therefore, no ready-made solutions waiting to be handed out indiscriminately. Instead, equations must be found, and knowledge must be built that can rebuild citizenry and citizenship in times of globalization and change. Social architectures and political geographies must be found that can make this possible.

Contrary to the slowness of the pre-modern past, localisms today only survive at the rapid speed required by their favorable exposure to everything that moves and circulates, wherever it comes from. This is also why the geographic outline of places change, widening or compressing themselves to the spatiality that is most adjusted to identify places, neighbors, invented communities, and their objects, imaginaries, practices, and mythologies. In light of the power of global energy markets and Iberdrola's new "Gigabattery" project—a major hydropower complex consisting of three dams over the Tâmega River—one example of this is the Alto Tâmega and Barroso Hydroelectric Enterprise (EHATB, EIM, SA). Originally founded in 1989 by six municipalities, EHATB distributes and publicly invest profits from the production and sale of energy.

If *levadas* and *baldios* (wastelands) were pre-modern forms of self-organization and collective redistribution, EHATB is a hybrid form, sitting between the logic of global capital with public interest. The same catchment that delivers water to the turbines at the Bragadas power station (EHATB) also delivers water to a collective irrigation system. And at another power station, Alvadia, the water leaving the turbine is transformed into public irrigation before returning to the river. There is no connection between the origin of the water used by Gigabateria and the water from the levadas; the Gouvães reservoir (Iberdrola) is part of the water reserve for public supply (capture, treatment, and high-level public supply system). There are two ways of thinking about democracy: building consensus or managing conflict. The first is impossible, the other is an open challenge.

A wash-house, now supplied with piped water and practically unused, but a point of sociability chosen to place the public telephone, meanwhile also dysfunctional because the technologies and telecommunication devices have changed. Ribeira de Pena, 2023. © Alvaro Domingues.

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1
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2
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Ameneh Solati

Wetlands of Resistance

Draining the Marshes

In the mid-1970s, a forty-five-minute-long documentary film by Kassem Hawal titled *Al-Ahwar* (*The Marshes*) presented a window into the multifaceted existence and vitality of the Ahwari people residing in the Mesopotamian marshes. Nestled within the impoverished southern Iraq between the cities Nasiriyah and Basrah, this wetland expanse provided the backdrop for a portrayal of diverse aspects of Ahwari life, from the roles and experiences of women and social relationships to modes of production and construction, healthcare, and education. The film culminates in footage capturing the exuberance of a wedding celebration aboard a sailing boat. The film was widely screened in theaters in Iraq and across the Arab world until an abrupt stop in 1991.

In March 1991, an unprecedented civil uprising against Saddam's ruling Ba'ath party regime erupted across the country. It followed the devastating eight-year war with Iran, and only a month since Iraq invaded Kuwait, both of which left the nation ravaged. This was the only nation-wide uprising that occurred during the thirty-five-year dictatorial rule by the Ba'ath party led by Saddam Hussein (1979–2003), and was the largest insurrection in the region until the Arab Spring in 2010. The rebellion first ignited in south of Iraq before radiating outward, gradually spreading across most of the country. Iraqi military forces were immediately deployed to reclaim cities. To seek refuge, Shi'a revolutionaries hid in the southern marshes and Kurdish revolutionaries hid in the northern mountains. Although the environment of the southern wetlands is vastly different from the northern mountain environment, they both stood as natural defensive perimeters, out of the state's reach. The resistance in the north succeeded in demarcating a Kurdish autonomous zone. However, the resistance elsewhere across the country was brutally suppressed.

The aftermath of the 1991 uprising saw the marshes and their inhabitants subjected to a form of retaliation for their disloyalty that was different than other parts of the country. After all, not only did the marsh environment offer the ideal hideaway, but the indigenous inhabitants of the marshes actively contributed to the uprising, aligning themselves with the forces of the revolution. Rooted in a longstanding history of providing refuge to those oppressed by or who oppose authority—from slaves during the Abbasids rule to factions within the communist party in the sixties—Ahwari people also contested the state and fiercely defended their autonomous modes of existence, one that is intricately intertwined with the marsh environment.[1] Far more than mere zones of ecological and cultural richness or biological diversity, the Iraqi wetlands are a complex arena where political agency is articulated and enacted; a space where power is both challenged and reproduced. The unique qualities of the marshes attract attention and aggression, regardless of

Still from Kassem Hawal, Al-Ahwar (1976). Courtesy of Kassem Hawal and the author.

the regime that holds power in the region.

Still from Kassem Hawal, Al-Ahwar (1976). Courtesy of Kassem Hawal and the author.

As a response to the uprising, the military electrocuted the water of the marshes, contaminated them with toxic chemicals, burned villages, and blasted the armories

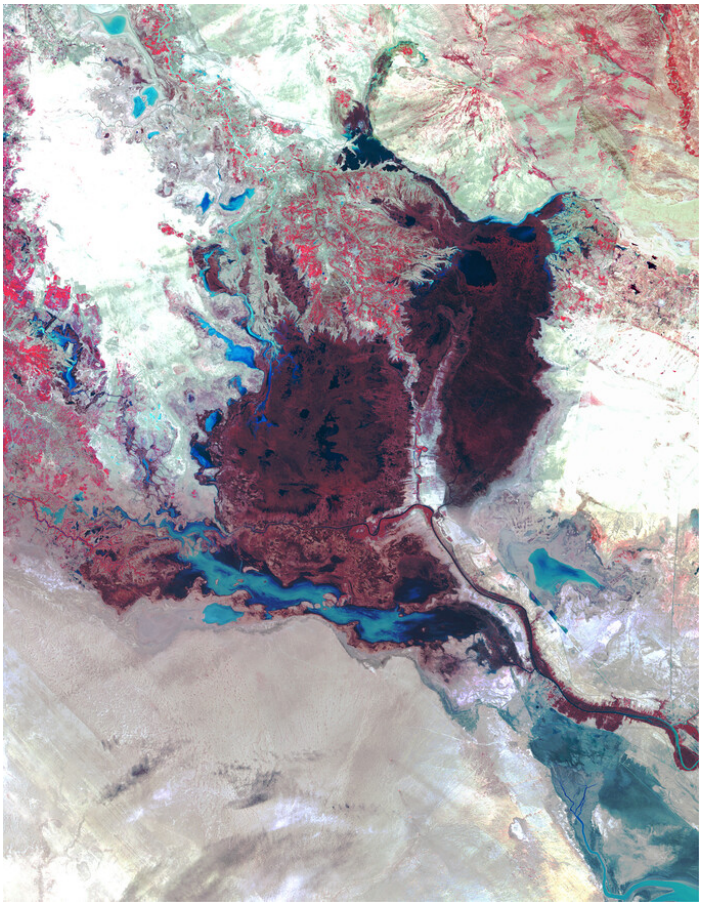
Still from Kassem Hawal, Al-Ahwar (1976). Courtesy of Kassem Hawal and the author.

spread throughout with depleted uranium, exposing the inhabitants to radiation. In 1993, Explosive Ordinance Disposal (EOD) officials carried out a demolition operation in the marsh villages which resulted in the formation of a massive mushroom cloud, the effects of which continue to have a devastating impact on the health of current and future generations.[2] However, to eliminate the breeding

Still from Kassem Hawal, Al-Ahwar (1976). Courtesy of Kassem Hawal and the author.

Still from Kassem Hawal, Al-Ahwar (1976). Courtesy of Kassem Hawal and the author.

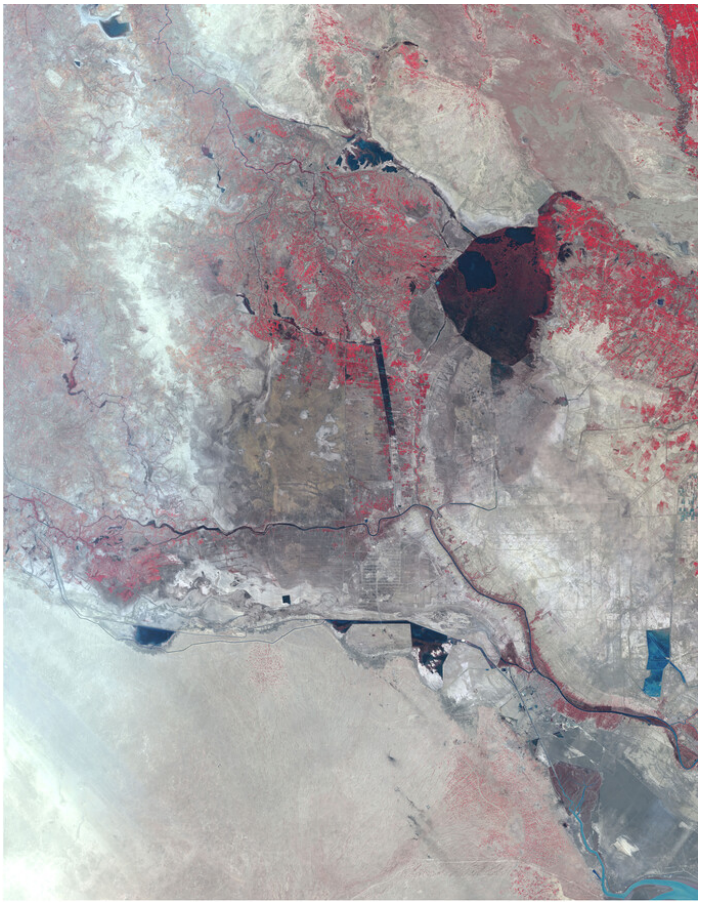
ground and waters of resistance, the entire ecosystem was transformed. Despite the fact that Iraq was grappling at the time with crippling sanctions imposed by the United Nations Security Council, a closure of Iraqi airspace, and the aftermath of the Iran and the Gulf war, Saddam ordered the construction of extensive, large-scale, advanced water engineering projects to drain the marshes. Various techniques were deployed to desiccate the marshes once and for all, such as flooding, diverting, evaporating, and blocking water. This involved the construction of dams, canals, sluices, barrages, polders, causeways, artificial lakes, rivers, dikes, and embankments. These infrastructures were justified by the government under the rhetoric of encouraging the economic, social, and cultural revival of the area, all the while giving these developments names that emphasized the state's victory in repressing the uprising, like "AlQadisia" River (which references a historic battle in which Arabs won over Persians), "Mother of the Battle" River, "Fidelity to the Leader" River, "Crown of the Battle" River, "Glory" River, and "Saddam" River.



Landsat satellite imagery of Mesopotamia's Marshes, Left: 1973–1976; Right: 2000. Source: NASA Earth Observatory.

Within only two or three years, ninety percent of the marshes were drained.[3] The remaining ten percent only survived because the marsh was partially under Iranian state control. The drainage resulted in mass human displacement, the loss of the area's unique environmental biodiversity, and with it, the lives of countless species of plants, fish, animals, and birds.

Alongside these projects to drain the marshes, in 1991, following the uprising, the Iraqi minister of foreign affairs Tariq Aziz ordered every copy—both positive and negative—of "The Marshes" to be burned.[4] Hawal's film stood as evidence to both the ecocide and genocide that took place in the marshes. Alongside this film, every cultural resource on the marshes was banned or destroyed. The only other copy Hawal stored outside Iraq was in Beirut, which had been previously stolen in 1982 by Israeli forces during their occupation of Lebanon. As Hawal mentions, the film was then transported to Israel and stored in the archives of Israel's ministry of defense.[5]



Landsat satellite imagery of Mesopotamia's Marshes, Left: 1973–1976; Right: 2000. Source: NASA Earth Observatory.

Inhabiting Wetlands

Dating back nearly 6,500 years, the Mesopotamian marshes are one of the largest ecosystems of their kind in Eurasia. They have a direct relationship with the mountains in the north, relying on seasonal snowmelt in Turkey and Iran, and downstream floodwaters through the Tigris, Euphrates, Karkheh, and Karun rivers. By taking in excess water, the marshes function as a natural flood management system. Its three main marshes once covered an area of approximately 20,000 square kilometers, consisting of swampy terrains, waterways, lagoons, reed beds, waterfowls, wildlife, and for thousands of years, the homes of its human inhabitants, the Ahwari people. Within this environment, Ahwari people practice their distinct culture and traditions involving water mobility, production, farming, animal husbandry, politics, and social relations, which as a result of being located on water, are all spatially articulated and designed.

Building an archipelago of artificial islands of floating reedbeds requires a deliberate set of design decisions. The unique, intricately articulated spatial configuration of daily life allows for gender, familial, and societal relations to become unbound by the limitations of modern spatial definitions and divisions. Within each village, each family dwelling is built on a separate floating reedbed. The dwelling's only sheltered spaces are those designated for resting, hosting, or housing livestock, each of which have a separate detached structure. Hosting, for example, is an integral part of their social and tribal activities and takes place in a dedicated structure called the *Mudhif*, which serves as a guesthouse and for ceremonial occasions such as births, weddings, funerals, or other important meetings. It is built with far more intricate construction techniques than other structures in the village, and each Mudhif often represents a particular tribe. The building is constructed collaboratively amongst members of the community with woven and bent reeds. Buildings are expanded every few years if not demolished and rebuilt due to the fragile nature of reed. Most other activities are predominantly performed by Ahwari women, from baking and dairy making to cultivating, fishing, animal husbandry, reed cutting, and weaving, all of which take place mostly outdoors on the floating reedbed or on boats in the water.

The Ahwari people's reliance on a remote wet environment is not coincidence. To build on water and limiting movement to water-based vehicles is a strategic decision to protect the villages from aggressors' access and movement, and therefore provide a degree of independence and autonomy. The seasonally changing water bodies dotted by villages of floating reedbeds and extensive mazes of reed-lined waterways and swampy lands produce an illegible and unmappable condition. In defying conventional cartographic logics, the marshes are rendered as an impenetrable terrain. The Ahwari people are acutely aware of these unique conditions, and gain the skills that are essential for inhabiting and navigating the marshes from childhood through orally codified ancestral knowledge. Living in a challenging environment is an act of ethnic, cultural, and self-determination.

Taming the Waters, Taming the People

The Ba'ath regime was not the first ruling power to target the marshes and its inhabitants, nor was the aftermath of the 1991 uprising its first attempt to gain control over the area. From Sumerian to Ottoman and British rule, records recount military campaigns dispatched to the marshes to attack "outlaws." One of the main reason for this could stem from the economic wealth to be gained by extracting the oil that lies underneath some of the marshes, exemplifying the colonial logic that renders a natural environment as *terra nulliu* to justify its occupation and exploitation. In fact, contrary to Saddam's typically nationalist and Arab-supremacy ideologies, his plans for draining the marshes were inspired by designs dating back to the 1950's under the British mandate in Iraq drawn up by British engineers for the British-controlled Iraq Petroleum company to facilitate infrastructural

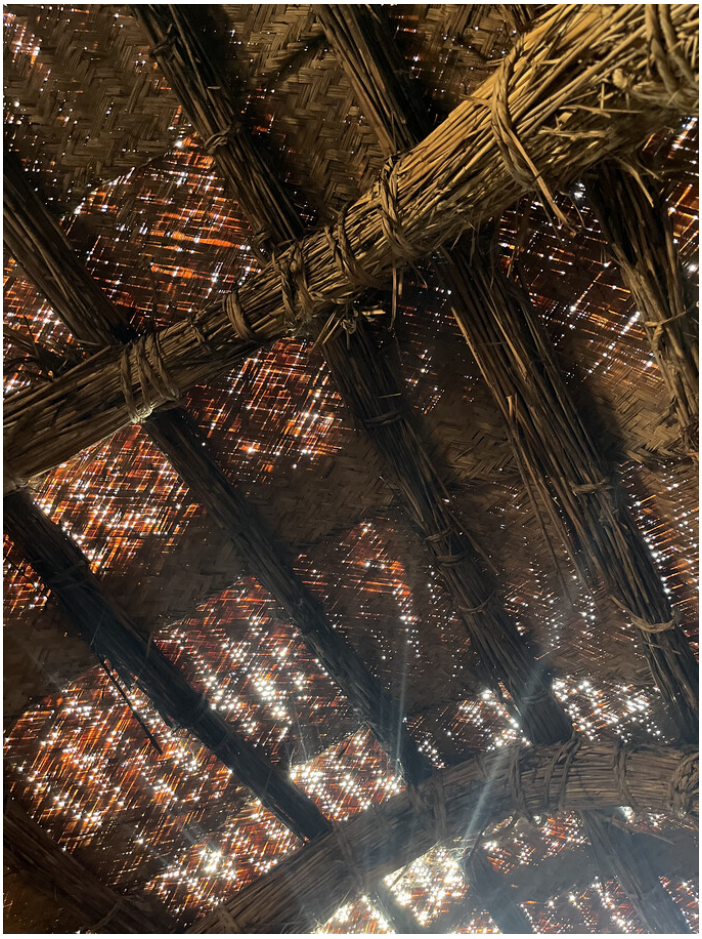
A marsh dwelling on a floating reedbed, Hammar Marsh, Iraq. Photo: Ameneh Solati, 2022.

Mudhif (guesthouse), Hammar Marsh, Iraq. Photo: Ameneh Solati, 2022.

Interior of a Mudhif (guesthouse), al-Chibayish, Iraq. Photo: Ameneh Solati, 2022.

developments.[6] The British authorities then were aware that a multi-ethnic region such as south of Iraq would prove difficult to govern, even a threat to sovereignty if not

Interior of a marsh dwelling, Hammar Marsh, Iraq. Photo: Ameneh Solati, 2022.



Ceiling of a marsh dwelling, Hammar Marsh, Iraq. Photo: Ameneh Solati, 2022.

eliminated or divided. The marshes, after all, are neither a homogenous natural environment that could be simply exploited, nor an uninhabited territory that could be easily absorbed into systems of governance. However, the threat of autonomy, resistance, and self-sufficiency of the marsh inhabitants triggered an unprecedented aggression by the Ba'ath party regime far exceeding any strategies necessary to extract oil.

The 1991 drainage projects were predated by earlier campaigns of spatial reform that started once the Ba'ath party came to power in 1968, and notably intensified during the war that Iraq instigated with Iran in 1980, whose damage was concentrated in the south of Iraq.[7] The eastern-most marsh, Al Hawizeh, not only overlaps with one of the biggest and richest oil deposits in Iraq, but is also bisected by the Iranian border. As the position of the marsh and its treacherous environment was a point of vulnerability for national security, Saddam started recommending in the 1980s constructing new petrol stations, police barracks, electrical grid connections, irrigation projects to enforce modern agricultural techniques, land surveying and leveling, and paving roads. Modernist technopolitics such as these laid the groundwork for the more radical drainage projects that occurred in 1991, all of which were done in the hope that a more "familiar" dry environment would encourage the water-roaming marsh-dwellers to finally become sedentary, and their movements more predictable.[8]

Barbarism and Resistance

Historically, the birth of the state coupled with the spread of western notions of civilization and progress helped create both material and subjective distinctions and divisions between different geographies and environments globally. As a consequence, the very concept of law became synonymous with morality, with spaces where the tentacles of state authority exert minimal or no control relegated as lawless and by extension immoral. By applying this logic to either the mountains, forest, ocean, desert or the wetlands, the inherent wildness of the natural environment is extended to its inhabitants, branding them as barbarians. Among these environments, the swampy marshes are one of the lowest on the scale of supposed civility. As James C. Scott

Reeds tied to act as a sign for navigation, Hammar Marsh, Iraq. Photo: Ameneh Solati, 2022.

argues: "Once we entertain the possibility that the 'barbarians' are not just 'there' as a residue but may well have chosen their location, their subsistence practices, and their social structure to maintain their autonomy, the standard civilizational story of social evolution collapses."[9] The Mesopotamian marshes is one of many such ecologies that challenge the reductive conceptions of the natural world and those who inhabit it. They offer alternative understandings and disrupt established hierarchies between humans and their surroundings.

Throughout history and to this day, Ahwari practices of resistance and autonomy are perceived as barbaric or uncivil, and often in relation to law, either rebelling against or hiding from it. This logic serves to dehumanize and demoralize the Ahwari people. However, the unique environment of the marshes generates modes of living that defy state hegemony. It has fostered an ecology that values the relationships between nature, humans, and non-humans, and allows the Ahwari people to maintain tribal social structures based on kinship and self-governance. This posed a threat to the Iraqi citizen's identity that the Ba'ath regime sought to define as part of its nation-building project. Therefore, since the start of the regime's rule, approaches towards the marshes were always based on two strategies: transforming the environment to influence the subject, and influencing the subject to resettle to a desired environment. Aggressive methods were applied in 1989 such as economic blockades, withdrawing food supply agencies, and banning the sale of fish.[10] At the same time, they sought to discipline the Ahwari people into the ideal, homogenous, civil Iraqi citizens. As such, the regime set out to to transform Ahwari modes of living by introducing plans for housing, public health facilities, schools, and marketplaces, all of which were poorly developed or left unfinished. One speaker in the Iraqi parliament even suggested in a 1992 assembly that relocating marshland inhabitants to houses along the highway would make them "good citizens" by providing them with access to electricity, clean water, standardized education, and medical care—similar strategies that were deployed in displacing Kurdish population in north of Iraq.

The various historical efforts by different powers to consolidate ethnic differences in Iraqi society has left a large impact. Since the construction of one of the earliest dams in Iraq in 1939, Ahwari people have been displaced to other parts of Iraq and subjected to oppressive and discriminatory practices—from isolating them on the margins of cities dedicated mostly to ethnic minorities such as the Thawra (Sadr City) in Baghdad, to limiting their access to public services and basic human rights.[11] Additionally, resettlement and displacement forced the Ahwari people to adopt new skills and modes of survival. Ahwari culture and traditions that are tied to their watery environment are rapidly eroding after decades of displacement.

Relief from the South-West Palace of Nineveh, Room XXVIII, c. 640–620 BC. Campaign in southern Babylonia during the reign of Ashurbanipal. Panels 2-6. In the marshes of southern Babylonia, Assyrian soldiers on boat chases enemies trying to run away; some are hiding in the reeds. Source: Wikimedia Commons.

The Flood

Despite extensive efforts to eradicate the marshes and its inhabitants, as soon as the government began to crumble and the United States invaded in 2003, the marshes were the first site to be liberated by its own people. They did not wait for American troops, nor for the transitional Iraqi government to welcome them back: they took matters into their own hands, breaching sand dikes and dams. With the help of neighboring tribes and some machinery and tools, they initiated the re-flooding of the marshes. Despite a ban on returning to the marshes put in place in 1991, the uncertainty of the future, and the risk of explosive mines planted en route, Ahwari people were determined to bring back the water that was essential for their return. In a few years, seventy percent of the water in the marshes returned, as did some Ahwari people, living in various proximities and relations to the marsh water.[12]

In 2006, Kassem Hawal received a phone call informing him that a negative of "The Marshes" was miraculously found. A few years later, the film was restored and again screened in theaters locally and internationally, only this time reminiscent of a place that used to be. The returning of both the water and the Ahwari people to the wetlands was a fleeting joy, as American and European governmental and private sector companies soon descended upon the region, eagerly investing in new oil field stations in the area. Despite the marshes being listed as a UNESCO World Heritage Site in 2016, little was done to maintain the water levels and quality in the marshes. In fact, the designation did more harm than good, limiting the freedom of the Ahwari people to sustain their particular modes of living in the face of a rapid decline in water levels, due in part to changes in rainfall patterns and humidity, rising temperatures, stronger and dryer winds, and toxic dust.

Given that the hydrology of the marshes relies on rivers that originate beyond the area or even the national

The remains of what seems to be a dam constructed during the drainage projects which was destroyed by the Ahwari people during their return after the fall of the regime in 2003, Central Marsh, Iraq. Photo: Ameneh Solati, 2022.

borders of Iraq, the scarcity of marsh water is not just a result of climate conditions. It is also a consequence of hydropower developments in Turkey and Iran that effectively weaponize water to advance those countries' political and economic agendas. The Tigris and Euphrates rivers, for instance, have most recently been affected by Turkish water infrastructure projects like the Ilisu Dam, which is part of the Southeastern Anatolia Project (GAP) consisting of twenty-two dams and nineteen hydraulic power plants.[13] In addition to devastating impacts within Turkey, including the displacement of 80,000 people, the completion of the Ilsu Dam in 2018 has also significantly reduced the hydrological flood processes of upstream flood water that the marshes rely on for its survival. Similar river-based infrastructural developments in Iraq have also altered the geographic distribution of water so that it is distributed in central Iraq for agriculture and urban use before it even reaches the marshes in the south.

Visions for the Future

The future of the marshes is a subject of much debate and speculation. Jassem al-Asadi, a native who worked for the Ministry of Water Resources for thirty years before co-founding Nature Iraq, a non-governmental organization dedicated to Iraq's environmental health, was instrumental to virtually all research that has taken place about the marshes over the past decade.[14] In his capacity as a managing director of the NGO's Chibaish office, within the marsh region, Al-Asadi created and disseminated baseline representations of the marsh environmental conditions by surveying, monitoring, and documenting the area.[15] Al-Asadi argues that the climatic challenges and water scarcity confronting the marshes, which extend beyond Iraq's sphere of control in a region bereft of water resource agreements, render the preservation of the entire wetlands an implausible objective.[16] Instead, he advocates for a pragmatic and attainable approach: the identification and designation of a specific manageable area within the marshes as a nature reserve. By directing all resources and endeavors towards protecting this demarcated zone, he hopes that water

Dried Marsh, Al-Chibayish, Iraq. Photo: Ameneh Solati, 2022.

demands can be mitigated and at least one marsh area's survival guaranteed.

Others, like Abu Haidar offer an alternative vision for the survival of the marshes. Abu Haidar is an independent *Mashhoof* (traditional canoe) tour guide and native to the region who returned to the marshes after the fall of the regime in 2003, choosing to establish a home on solid ground by the shores of the marshes. He argues that the only way for the marshes to survive is to develop cultural- and eco-tourism in the area.[17] Highlighting the economic value of the area will, he claims, compel the government to engage more vigorously in regional water negotiations and prompt improved management and equitable distribution of water resources at a local level. Abu Haidar elaborates how the development of eco-tourisim in marshes can provide new economic opportunities for the locals, many of whom currently live beneath the poverty line: villagers could offer unique guest accommodation in their homes on floating reedbeds; fishermen could supply fresh local catch; bakers could make fresh bread; dairy farmers could milk water buffaloes and make *geimar* (thickened cream); weavers could fashion rugs and baskets from harvested reeds. The experience would be enriched by traditional poetry recitals, harmonized with a symphony of water, rustling reeds, croaking frogs, and melodious bird songs.

Conventional narratives in history and anthropology often treat subsistence, kinship relations, and cultural practices as fixed entities, assumed to be ecologically and culturally predetermined, and therefore easily replicable. However, these intricate environments and their corresponding ways of life are intricately woven into interconnected ecological rhythms, consistencies, and harmonies that defy simplistic recreation. While Al-Asadi's vision leaves the fate and role of the inhabitants within a nature reserve uncertain, Abu Haidar's leaves them reliant on tourism for their sustenance, an industry that is highly sensitive to unstable climatic and security conditions, both of which

Iraq suffers from. Furthermore, tourism would both render the Ahwari people as props in an open-air museum and threaten the marsh ecology with required infrastructural developments. Both visions provoke contemplation on the ramifications of introducing novel dependencies, industries, and regulations to the marshes, and the potential impact on both the ecological system and the autonomy and self-reliance of the Ahwari people.

remind us of the inextricable relation between environmental resistance and violence.

X

Ameneh Solati is a Rotterdam-based researcher and architectural designer. Her practice investigates overlooked spaces and devices as means of unpacking entangled power relations and forms of resistance. She is an editor and organizer at Failed Architecture.

Video still of Abu Haidar on a Mashhoof (traditional canoe), Hammar Marsh, Iraq. Courtesy of Ameneh Solati, 2022.

Echoes of Violence

In February 2023, reports emerged that Jassem al-Asadi had been abducted.[18] His brother testified that Al-Asadi was forcibly removed from his car in broad daylight on the highway between Hilla and Baghdad by armed individuals masquerading as civilians who operated with military-level skills. Both the abductors and government officials remained silent for two weeks, with neither public condemnation nor demands, which caused widespread distress in the Iraqi environmental and local marsh communities. Against the backdrop of countless activist deaths both within Iraq and beyond, Al-Asadi's fate appeared ominously grim. But finally, he was released, and immediately left Iraq to be treated for the torture he endured during captivity. Despite the threat to his life, Al-Asadi decided to return and continue his work to protect the marshes. These echoes of the 1991 uprising

Hydroreflexivity is a collaboration between e-flux Architecture and "Fertile Futures," the Portuguese Pavilion at the 18th International Architecture Exhibition, La Biennale di Venezia curated by Andreia Garcia with Ana Neiva and Diogo Aguiar.

1
See: Faisal Al-Samir, *Thawrat al-Zanj* (Baghdad, Maktabat al-Manār, 1971); Johan Franzén, *Red Star Over Iraq: Iraqi Communism Before Saddam* (Hurst, 2011), 179.

2
Ryan Manya, "'The Hidden story': Life as a young Marsh Arab," Substack, https://ryanmanya.substack.com/p/504539e2-bc1c-4fda-9f28-0a9fa91a156c?fbclid=PAAabZCS0XBh_GIwi535-tTWMeIDe8rympHU8E-zxdolG2nUy1dJXfzZJ_y6s .

3
UNEP , *Early Warning and Assessment Technical Report, The Mesopotamian Marshlands: Demise of an Ecosystem* (2001), https://wedocs.unep.org/bitstream/handle/20.500.11822/8231/-The%20Mesopotamian%20Marshlands%20_%20Demise%20of%20and%20Ecosystem-2001227.pdf?sequence=3 .

4
Kassem Hawal, *Al-Ahwar (The Marshes): Film Scenario and Experience* (Tunisia: Nathar Publishers, 2019).

5
As a rejection to the dictatorial Ba'ath party rule, Hawal left Iraq as they came to power and joined the Palestinian Resistance Movement in Lebanon. He was later perused to return temporarily to Iraq to film the marshes. Hawal sought political asylum in the Hague where he currently lives.

6
UNEP , *Early Warning and Assessment Technical Report* .

7
C. Jones, M. Sultan, E. Yan, A. Milewski, M. Hussein, A. Al-Dousari, S. Al-Kaisy, R. Becker, "Hydrologic impacts of engineering projects on the Tigris–Euphrates system and its marshlands," *Journal of Hydrology* 353, no. 1–2 (2008): 59–75.

8
Ariel Ahram, *Development, Counterinsurgency, and the Destruction of the Iraqi Marshes* (International Journal of Middle East Studies, 2015).

9
James C. Scott, *The Art of Not Being Governed: An Anarchist History of Upland Southeast Asia* (Yale University Press, 2009), 8.

10
In a panel discussion held at New York University on October 26, 2004, cosponsored by Carnegie Council, Environment Conservation Education Program, New York University, the Al-Khoei Foundation (UK), and the Kevorkian Center for Near Eastern Studies, New York University, Joanne Bauer quoted Max van der Stoel, Special Rapporteur on Human Rights in Iraq, who briefed the UN General Assembly in response to the internal inter-agency memorandum ordering the destruction of the marshes.

11
Ryan Manya, "The Marsh Arabs and their Conflict with the Modern State," Middle East Voice (November 9, 20222), https://middleeastvoice.co.uk/2022/11/09/the-marsh-arabs-and-their-conflict-with-the-modern-state/ .

12
NASA Earth Observatory, "World of Change: Mesopotamia Marshes," https://earthobservatory.nasa.gov/world-of-change/iraq.php .

13
Roz Price, *Environmental risks in Iraq* (Institute of Development Studies, 2018), https://assets.publishing.service.gov.uk/media/5b3b63a3e5274a6ff466faa5/Environmental_risks_in_Iraq.pdf .

14
"The National Atlas of Marshes and Wetlands in Iraq," *Nature Iraq* , http://www.natureiraq.org/the-national-atlas-of-marshes-and-wetlands-of-iraq.html .

15
These studies have been fundamental for further comprehensive research endeavors in the area spanning archeology, anthropology, biology, and environmental sciences

16
Jassem al-Asadi, phone conversation with author, January 23, 2023.

17
Abu Haidar, conversation with author, December, 2022.

18
"Jassim Al-Asadi: 'kidnapped' environmental activist campaigning to preserve the marshes in Iraq," *BBC Arabic* (February 5, 2023), https://www.bbc.com/arabic/world-64525364 .

Ifor Duncan

Necro-Hydrology

Vajont wall, November 2021. Photo: Ifor Duncan.

We see it from across the Piave. Driving through the town of Longarone, I catch a glimpse of the concrete wall nestled within a narrow ravine on the other side of the valley.

Francesco, the Professor who is my guide, tells me that Longarone was destroyed. The new town built in its place in the 1960s is a center for the manufacture of ice cream and sunglasses.

The Piave river links the Dolomites to Venice, two UNESCO heritage sites with a new one in the middle: Prosecco. Due to the booming popularity of the sparkling wine, water and soil have been exploited in the vineyards that spread across the drought-affected hills downstream.

We drive through a tunnel excavated to access the dam's control buildings, and then wind our way up on foot to Casso, a ghost village above. Its population was killed when at 10:39pm on October 9, 1963, 260 million cubic meters of mountainside descended from Monte Toc into the reservoir of the recently finished Vajont dam. A wave 250 meters high jumped over the concrete wall, devastating Casso, Longarone, and other towns downstream, killing at least 2,500 people.

From Casso, Francesco points down towards the ground

Earth and rubble that has filled-in the Vajont reservoir and is held back by the dam's wall, November 2021. Photo: Ifor Duncan.

behind the wall. Designed to be the tallest dam in the world, earth now fills the upstream side to 200 of the 260-meter-high wall. A new geology resulting from catastrophe, Francesco says that the filled-in reservoir has become "a laboratory of erosion, look at the layers of sediment along the side worn away since the 1960s."

To mark the thirtieth anniversary of the catastrophe, the actor and director Marco Paolini—who hails from Belluno, a city south along the Piave—staged a televised piece of investigative theatre entitled "Vajont: 9 October 1963." In the purpose-built theatre above the dam, Paolini asked his audience to imagine the weight of a cubic meter of water.

Upstream, at the Erto Museum, there is a photograph of a scale model of the dam sculpted in clay. Photographed in studio isolation, the model looks like a tsunami wave. The elegance of its form acts as a strange premonition of the instability of Monte Toc; its long history of landslides studied but ignored by the dam's surveyors. For the fathers of the dam, a masterpiece of Italy's rapid post-war industrialization, Paolini stated that there is an eerie sense that the mountain collapsed, but the dam—sculpted to a morbid perfection—survived the ensuing landslide.

Casting a great shadow into the ravine, Vajont now stands as a tomb to the megalomania of hydropower engineering.

Peering through the wire fence that encloses the walkway on top of the dam, it is impossible to see the bottom. Cold air rises from below as torrential sound draws your senses down. The feeling of vertigo and depth conjures the weight of all those cubic meters of water and mountain.

Lethe, Styx, Acheron, Phlegethon, Cocytus...

It would be impossible to name all the interlappings of water and death. Rivers have long been mythologized as the route to the underworld. In Greek mythology, to cross the waters of Lethe, Styx, Acheron, Phlegethon, and Cocytus, was to traverse the boundaries of life and death. Some of these rivers of the afterlife have real-world analogues; you can visit them. The meaning of these real/mythological rivers gains new weight, however, when they are not only the symbolic route into an afterlife beyond, but are the very medium of lethal conflict.

An element of paradox and contradiction: water navigates

Photograph of a scale model of the Vajont dam at the Museo del Vajont. Photo: Ifor Duncan, November 2021.

a fine balance between life-giving and life-taking. Communities, rural and urban, develop around and flourish with rivers. In turn, modes of control, extraction, and suppression organize around their flows.[1] Rivers are dynamic and processual archives of political violence and devastating environmental policies.

Carrying their contents elsewhere, traces of conflict and contaminants flood and seep into fields, irrigation systems, and water supply. Thinking with Achille Mbembe, we can train a necropolitical lens onto water, to understand the varying ways it has become a key weapon "in our contemporary world… deployed in the interest of maximally destroying persons and creating *death-worlds*, that is, new and unique forms of social existence in which vast populations are subjected to living conditions that confer upon them the status of the *living dead*."[2]

Hydrology is a vital space to intervene in the manifold forms of contemporary conflict and oppression. With the control of water in the service of large-scale extraction, it has become adversarial to life, producing a way of knowing and managing water at the transit zone between life and death—necro-hydrology.[3]

Necro-hydrology has some roots in the 1930s, when hydrologist Robert E. Horton pioneered an abstracted cycle that standardized the way water is known.[4] Although the water cycle had been described before, Horton outlined hydrology as a pure science that accounts for "natural waters" in circulation, those of precipitation, transpiration, streamflow, evaporation, etc. But Horton's hydrology did not account for "unnatural waters," or "waters which have been temporarily removed from such circulation while so detained and used." Those excluded from the discipline's concerns included water that had been "impounded and distributed for potable use or waters utilized in industrial processes or waters of crystallization or hydration in nature." In other words, water that has encountered or become entangled with human society. This emergent pure science was particularly concerned with preserving water as resource and held the belief that "non-use [was] waste."[5]

This abstraction of water occurred at a moment when hydropower was rapidly expanding.[6] Universalizing the division between "natural" and "unnatural" waters allowed it to become exploitable in ever increasing volumes. This has resulted in the proliferation of dam systems that transform entire river catchments like the Columbia River in Washington state, the Narmada in India, the Yangtze in China, or transboundary hydropower infrastructures on the Mekong, Nile, and Douro rivers into what have been called "organic machines" or "cyborg rivers."[7] Hydropower is an efficient source of energy production, but at the vast scale of the megadam it enfolds entire socio-cultural geographies and erases ongoing histories and politics. The ease by which dams and the waters in their reservoirs can be co-opted as weapons was further emphasized by Russia's destruction of the Nova Kakhovska dam in June 2023 (after a previous strike on the dam in November 2022).[8] Dams are not only technologies that transform ecosystems; they are infrastructures of conflict that convert water into a medium of war.

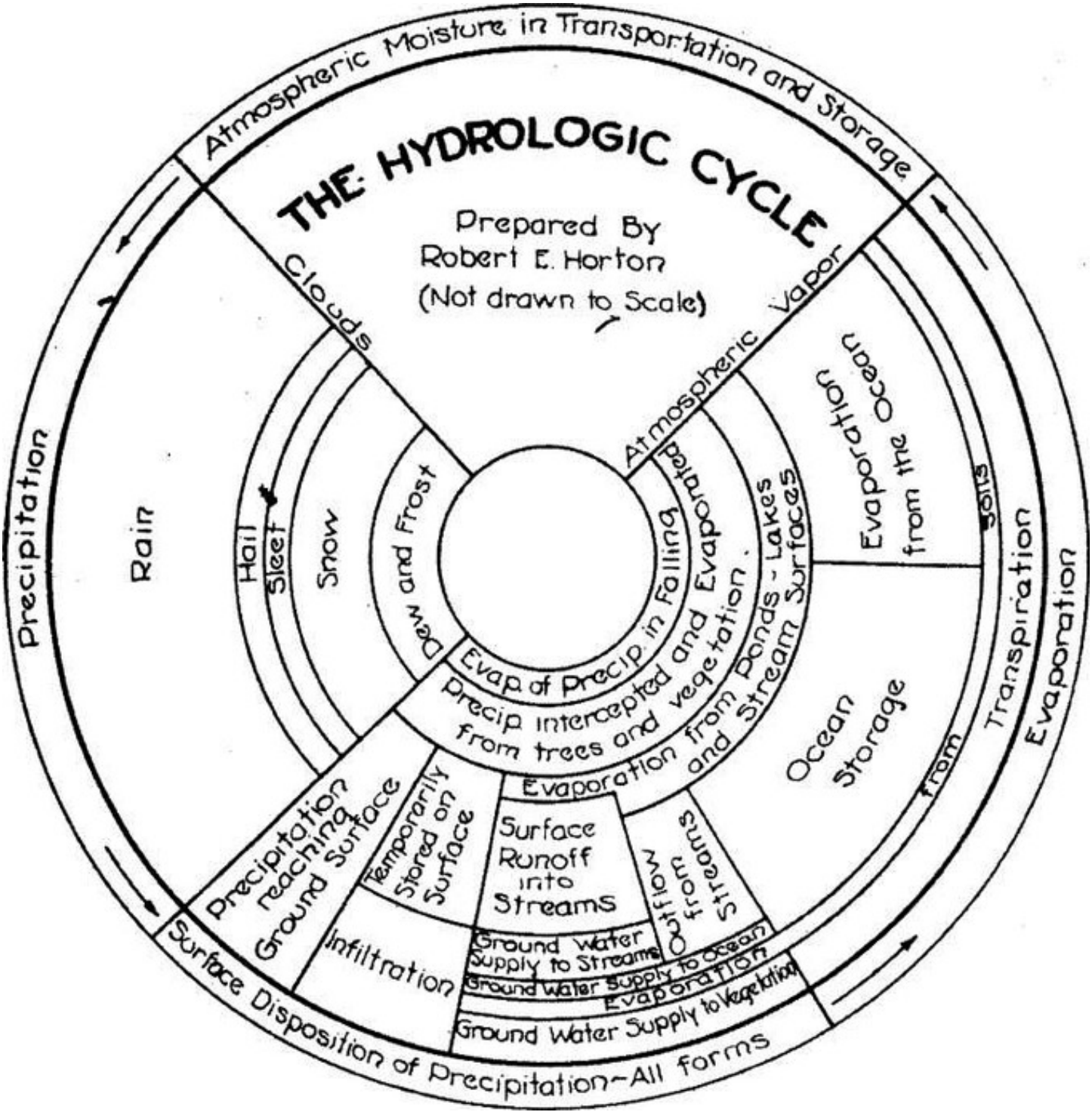
Necro-hydrology involves a set of processes and dynamics incorporated into the weaponization of water as part of the wider conflict waged by capital against those it makes poor. The distinction between "natural" and "unnatural" waters has facilitated wider social formations of inequality and violence whereby diffuse hydrological forms such as toxic rain, snow, fog, flood, drought, lowering reservoirs, dewatering, and the seeping contamination of grounds, muds, and drinkable water supply are made deadly rather than vital. The turn to perceive water's all-pervasive relationality with human and multi-species bodies as a political and ethical imperative,[9] or to think the world as constructed through water,[10] provides a crucial lens onto the uneven embodiment of these entangled conditions. Literature in this area importantly centers hope, and also provides important entry points to follow the pervasiveness of the death-worlds produced in hydrologic registers.

A global phenomenon, necro-hydrology is locally defined. Orthodox forms of hydrologic knowledge that universalize or naturalize water as separate from human intervention have contributed to the conditions where rivers have become deadly border architectures and complicit in other forms of political violence, including the slower environmental devastation of river systems.[11] The exclusion of the human from the hydrologic cycle reproduces liquid environments as abstract and naturalized alibis for the death of those frequently excluded from the category "human."

Extracting the Food for Life

In February 2019, as the first operational stage of the Hidroituango megadam on the Cauca River in Colombia reached completion, its gates began to close. While downstream waters receded, images began to circulate of the dry riverbed pulsing with stranded, dying fish. Their scales thrashed against damp pebbles as children scrambled to catch them.[12]

Hidroituango is a highly controversial 225-meter-high embankment dam estimated to eventually produce between 13–20% of Colombia's electricity needs. In May 2018, a partial failure of the incomplete dam led to flood waters cascading downstream, landslides, and the evacuation of more than 25,000 people. Despite known seismic activity and the risk of further disaster, including the displacement of thousands of people and the devastation of fish populations, Empresas Públicas de Medellín (EPM) closed the gates.[13] The pressure of water



Horton's hydrologic cycle. Robert E. Horton, "The Field, Scope, And Status of The Science of Hydrology," Transactions of the American Geophysical Union, 1931, 193.

accumulating behind the dam's wall further raised the potential for landslides in the poorly surveyed and already unstable terrain, threatening catastrophic flooding for hundreds of miles downstream.

Long before the closing of the dam's flood gates, the activist group Movimiento Ríos Vivos opposed the construction of the dam on four key points: first, Hidroituango's environmental impact; second, the construction's forced displacement of tens of thousands of people;[14] third, the radical change provoked by the dam to the ways of life of communities living alongside the

Fog, 2021. Photo: Ifor Duncan.

river; and fourth, the submergence of the sites, cemeteries, and remains of decades of paramilitary violence involving state collusion, including the massacres of June 1996 and October 1997 by the paramilitary United Self-Defense Forces of Colombia (AUC).[15] It has been argued that these massacres were intended to spread fear and clear the territory near to the site of the proposed dam construction.[16] Rivers, such as the Cauca, have been one of the prevailing methods of disappearance of the victims of the half-century long war in Colombia. The recovery and identification of those forcibly disappeared into the river and buried in its submerged banks near to the dam is now impossible.

Despite Colombia's 2016 Peace Agreement with the FARC and the demobilization of the far-right paramilitary forces such as AUC in 2005, new illegal armies have emerged and directed their actions against grassroots movements and political organizations, including local river defenders. These newly formed groups often operate in the interests of local elites who seek to secure their investments, infrastructure projects, and financial interests through the silencing of political opposition. Such violence has included the ongoing intimidation and assassination of members of Rios Vivos, a group founded to preserve the life of rivers and who describe the development as " *un proyecto de Muerte*" ("a project of death").[17] The deaths of river defenders who oppose the construction Hidroituango and its ecologically devastating aftermath only reinforces the perpetuation of violence in the Cauca valley in the interest of hydropower.[18]

In April 2019, the office of then Attorney General Néstor Humberto Martínez Neira formed an interdisciplinary team to respond to the unfolding socio-environmental crisis.[19]

Hidroituango Dead Fish. Credit: Alirio Uribe Muñoz (@AlirioUribeMunoz), February 6th 2019, Twitter.

During a crucial moment in a press conference to announce a set of measures to secure the safety of the river, the attorney general called on an ichthyologist (a scientist specializing in the zoological study of fish) to describe an underwater film produced to document the river's changing health. The Cauca is characterized by its highly turbid goldish waters that contain high amounts of iron resulting from soil erosion, as well as the suspended sediments and pollution from the industrial mining of gold, coal, and bauxite. The scientist claimed that, unlike the normal gold color of the water in the video taken above the

Stills from the April 10, 2019 press conference "'¡Viva el Cauca!': la segunda fuente hídrica más importante del país," demonstrating the change in water quality of the Cauca river above (left) and below (right) the dam.

Stills from the April 10, 2019 press conference "'¡Viva el Cauca!': la segunda fuente hídrica más importante del país," demonstrating the change in water quality of the Cauca river above (left) and below (right) the dam.

dam, visibly teeming with tadpoles, the water downstream was clear; its nutrient-rich sediments filtered by the dam.[20]

Neira used this submerged footage to indicate the material politics of hydropower, articulating that with the loss of sediments " *no hay alimientos para la vida*" ("there is no longer the food for life"). In doing so, Neira made a connection between water quality and the existing socioeconomic practices of the valley, including fishing and small-scale artisanal gold mining. By blocking the transportation of sediments and minerals, the dam prevents the nutrients required to sustain fish populations, and the fishing communities that subsist on them, from flowing downstream. The clarity of water downstream is symptomatic of its transformation into a timeless, placeless, extractable substance.[21] The image of turbid water, however, full of fertile nutrients, must be balanced against the threat of over-accumulating biomatter. Over-enriched with sediments, the water above the dam quickly became eutrophic. A carpet of water hyacinths grew rapidly across an area of 8.5 square-kilometers of the reservoir, further deoxygenating the water. The reservoir had become too thick with the food for life.

Hidroituango simultaneously attenuates and thickens the alluvial thresholds of life and death. Hydropower keeps the river in a controllable state to harness the power of its flows. In this socially exploitative and violent conversion of water into energy, the demand for electricity replaces the necessity of sustaining life. The extractive transformation of the Cauca folds together tens of thousands of gigawatt hours of energy with the devastation of the river's ecosystem, the dispossession and displacement of tens of thousands of people, the history and present of paramilitary violence, and fear of the dam's potential collapse. The entanglement of dead bodies disappeared within the river and dead fish on its banks shows hydropower to be an organizing force in the multi-species necro-hydrological order operating within the valley.

In the struggle against the dam, the rights of the living and the dead are at the mercy of the multiple parties wrestling for resources: the government, its subsidiary EPM, multinational funders, and paramilitaries. The dam fits into the drive for post-conflict development championed by the governments of Alvaro Uribe, Ivan Duque, and Juan Manuel Santos. As Hannah Meszaros Martin and Oscar Pedraza have shown, after more than half a century of war, the process of transitional justice since the 2016 peace accords has excluded the role of extractive industries, thus rendering "environmental violence in the context of war invisible."[22] Cases such as Hidroituango and many others, as Martin and Pedraza argue, show that bringing justice to "mass ecological destruction" necessitates a change in the understanding of what constitutes violence. Such questions are ongoing for the government of Gustavo Petro and its dual promises to end the environmental racism experienced by Black and Indigenous groups while achieving an energy transition that relies on inherited projects such as Hidroituango.

Megadams reduce rivers and valleys to places where all that can exist is the conversion of energy from the flow of water. In addition to processes that disappear, obfuscate, and enact violence, Hidroituango ruptures the connection between the Cauca and the people who live, work, and remember on its banks and amongst its flows. Within such spaces of extraction, human and multi-species life become surplus, a hinderance to the accumulation of profit and thus susceptible to violence.

As pervasive as water itself

The walls of Vajont and Hidroituango mirror each other across the temporality of past, present, and future disaster. Both harbor the loss of people, communities, and ecosystems at the price of hydropower capital. Since the 2019 press conference, Neira has been implicated in a major international corruption case involving the Brazilian construction giant Odebrecht, a builder of megadams. In such cases of performative environmentalism, agents of environmental devastation must be opposed in their search for absolution through environmental remediation, especially those where water is a medium of political violence.

Dams act as anchor points for a multitude of interlapping politics, but necro-hydrology is not the preserve of hydropower alone. Its processes are slow and diffuse; its impacts as pervasive as water itself. Today, the perishing of freshwater ecosystems abound: glaciers disappear; lakes evaporate and are dewatered; perennial rivers become intermittent and eventually dry year-round; unregulated extraction leads to toxic tailings entering water supply; irrigation systems collapse; saltwater encroaches further into estuaries and deltas; access to drinkable water is shrinking. These processes are the result of anthropogenic interventions and are a threat to life locally, regionally, and on a planetary scale.

The erosion of life through the watery world is slow and imperceptible for some, but acute for many. The imbrication of waters into political violence is not only a question of scalar extremes. Rivers are weaponized when floods are released by the intentional breaking of a levee or dam, or when a person is forced to cross as a means of necessity. In such cases, mud, temperature, turbulence, turbidity, submerged topography, vegetation, and inhabitants are all potentially lethal. Even a shallow, slow flowing section of river that may be considered a ford or a crossing point can be treacherous in the cold and dark when hunted at a border.[23]

To counter this, hydrology needs to be understood in its social frame, and water management in all its forms requires continual politicization. Resistance to the devastation of watery environments from groups such as

Movimiento Ríos Vivos and others involves dedication to the inextricable deep correlation of water and community in the face of violence. It requires a steadfast attention to the absences of community produced through water's abstraction. It also requires the celebration of existing and historic meaning, as well as future relations between people and water. Only then will the food for life be able to return.

X

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Achille Mbembe, *Necropolitics*, trans. Steven Corcoran (Durham NC: Duke University Press, 2019), 92. Italics in the original.

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12
For now, the dam is the last of its scale to be built in Colombia with popular opinion turning against major infrastructure projects that have been embroiled in corruption and fraught with ecological devastation.

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EPM are a subsidiary company of the Medellín Mayoral government. Directors of Hidroituango have been investigated for not properly insuring the dam.

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The Centre for International Environmental Law (CIEL), claim that the dam will have an impact on 180,000 people, with an estimated 700 families already being displaced. CIEL, 18 May, 2018, "Comment on Movimiento Ríos Vivos Antioquia"s Activism Regarding Hidroituango."

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Fiscalía General de la Nación – Colombia, "'¡Viva el Cauca!': la segunda fuente hídrica más importante del país," *YouTube* (April 10, 2019), https://youtu.be/K4LBxrpwpno?t=1260 .

20
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Emanuele Coccia

Don’t Call Me Gaia

I. The Mutual Revelation of Earth and Humanity

The present conditions we are experiencing—and trying to designate with different names, all equally inadequate: Anthropocene, climate crisis, Capitalocene, etc.—are unprecedented, not only from a historical or ecological point of view, but also and especially from a cognitive and political point of view.

For the first time in human history, we are experiencing not this or that ecosystem, not this or that place, but the planet as a whole.[1] It is as if, for the first time, the planet has revealed its true face. This experience is possible first and foremost because of technology: not only have we gone into space and retrieved the first photographic image of the planet; we have infinite sensors, scattered everywhere, that simultaneously provide data on the biological, geological, and meteorological condition of the planet, thus allowing us to see and feel Earth in real-time. But it is not only because of technology that we see and feel the planet in its totality. If that were the case, what we experience would only be a quantitative increase over the past. Instead, the quality of knowledge of the planet has changed, for even in the smallest and most local of events, we are forced to glimpse the totality of the planet. It is impossible to read the recent flood in Libya or the summer fires in Canada as local phenomena that only have local causes. Within these events, it is not the state of Canada or Libya that is expressed or manifested, but that of Earth. The climate crisis is the reunification of all geological, biological, and ecological manifestations, turning every event, even the most insignificant, into an act and behavior of the entire planet.

No culture or civilization in any other historical era has ever been able to experience this. This means that no culture, no civilization, no individual has the cognitive, technical, and political means to know what to do. No culture has ever had to deal with the planet as such and not simply with this or that ecosystem. No technology has had to relate to the planet as such and not to this or that place. None of the political devices invented so far will help us solve the climate crisis. We need to invent new ones.

Today, no culture and no people are in a situation of cognitive privilege in receiving the revelation of the entire planet. This is precisely because the revelation is not just a matter of knowledge that takes place by technological means, but is also an objective fact that no one can claim to perceive better than others. Further, no one place is better suited than others to perceive this kind of manifestation. Earth has never shown itself simultaneously to all of humanity in a similar and identical way. In the past, every culture and every people were limited to knowing only small portions of the planet. Even assuming Earth had shown itself entirely to one culture, it was a partial revelation—that is, the possession of a single

Bruno Novelli, Na Força, 2009.

people and not of all peoples. This situation of today effectively nullifies all of the cultural, ethnic, religious, and cultural divisions that humanity has produced and cultivated over millennia. If Earth appears to all humanity, humanity appears before the whole Earth without being able to cling to any difference. It is as if the planet is calling to us all, without distinction, beyond nations, ethnicities, traditions, and cultures.

The totality of the planet has appeared to the totality of humanity. This mutual manifestation and revelation of two totalities has enormous consequences. The ecological crisis is an incredible cognitive and political obligation. The fact that the situation arose from a process of violent domination, the planetary colonization of some peoples, and the uncontrolled exploitation of the planet in no way diminishes its unprecedented nature.

II. Earth is a Meteorological Entity

Climate change is the transformation of the entire planet into a giant storm. We are no longer faced with local, partial disturbances (this or that storm, this or that drought): now, Earth itself is weather. It is bad, and will be forever. Bad weather is no longer an exception but the norm. Said in more precise terms: climate is no longer a part of our lives; it is the substance of everything that happens on our earth. We should therefore stop talking about nature and shift our gaze towards the planet. Rather than biology, geology, or ecology, meteorology should become the preferred viewpoint for thinking about living

things. Life is climate, not metabolism. Geology has become a branch of meteorology. We have long been led to believe that the conditions of possibility on Earth derived from the condition of the lithosphere and hydrosphere—rocks, arable soil, and water, which related to each other in a stable, cyclical way. Instead, everything that inhabits this planet is a climatic accident, an ephemeral consequence of a series of weather events.

This transformation is important for two reasons. First, because every form of "bad weather" is the irruption of unpredictability into the natural world. Climate knows no ontological balance. Far from seeking equilibrium, life feeds on bad weather. From this perspective, the climate crisis is not so much the transformation of the climate as it is the visible manifestation of the profoundly and irretrievably erratic and untamable character of the world to which we belong.

Thinking of the planet as permanently bad weather does not just define a rupture, a hole in our cognitive mastery of the world, but also a break in the continuity attributed to time and the homogeneity of history. Nothing is more interpretable as a cycle, as nature, as substance. What we have called nature is only possible because of a very delicate climatic balance. But we have started to realize that we human beings, as well as all living things, are bad weather. We are the storm and the earthquake; we are the tsunami and the thunder of Gaia. Life has been the weather and it has been forced to live within the eye of a storm that never stops changing and striking its flesh. This was Jean-Baptiste Lamarck's insight. Questioning the influence of living organisms on the matter of the globe's surface, the father of modern biology recognized that living beings have occupied and permanently transformed the chemical and physical reality of the atmosphere, hydrosphere, and lithosphere.[2] We have changed the nature of the planet. Following a similar insight, at the turn of the twenty-first century, American geologist Robert Hazen showed that the richness of mineral species on Earth—the chemical and physical diversity of the planet's flesh—was produced by a series of chemical reactions triggered by the presence of living things and their metabolism.[3] This is precisely why the agreement, the balance, the peace—in short, the contract—among all species is not simply physical, chemical, geological, biological, or ecological, but climatic. Conversely, climate should be defined as the place where all living species and nonliving matter on Earth define their compatibility with each other, with no one having total control over the other.

III. Earth is an Ego

The climate crisis is the site of a paradoxical coincidence: the planet making itself known simultaneously as pure object and pure subject. Never before have we left more traces on the body and skin of Earth (what we call the Anthropocene). Never before have we objectified it so much, yet never has Earth made itself known as a subject to such an extent as it does today. In fact, the climate crisis is the sensitive emergence of Earth as a subject, one that acts freely beyond any possible control. We are no longer masters of its behavior, either cognitively or pragmatically. Earth has begun to do what it wants again. The climate is where we grant life a strange form of freedom. Unlike on the ground, where movement is slow and often interrupted by excessive resistance, in the sky everything is defined by its ability to move and transform. There are no lasting traces in the sky: movement ends without leaving any remains, and every action is a metamorphosis. It is for this same reason that winds and clouds have no face or history: it is impossible for them to separate the past from the present. Faced with weather, we are forced to momentarily step away from our modern common sense, which wants us to be exclusive and absolute holders of freedom and free will. To call the whole Earth weather is to grant it the same freedom, the same capricious will that we grant ourselves. A general meteorology would then be the science of freedom extended to the whole Earth. We must free ourselves from the hypnosis of the ground and see the planet as clouds or winds: free beings who never allow themselves to be foretold. Everything on the planet has the status of clouds and winds, and everything should be given the strange freedom that we recognize in the weather.

In one of the most decisive passages in the manifesto that founded the West's contemporary political reality, Thomas Hobbes likened the state of nature—characterized by a form of war of all against all—to a weather disturbance. He wrote:

> For WARRE, consisteth not in Battell onely, or the act of fighting; but in a tract of time, wherein the Will to contend by Battell is sufficiently known: and therefore the notion of Time, is to be considered in the nature of Warre; as it is in the nature of Weather. For as the nature of Foule weather, lyeth not in a showre or two of rain; but in an inclination thereto of many dayes together: So the nature of War, consisteth not in actuall fighting; but in the known disposition thereto, during all the time there is no assurance to the contrary.[4]

For centuries we have regarded bad weather as the opposite of politics, as what politics must eliminate. Instead, we must begin to think of politics itself as a form of bad weather: a climatic variation in existence that can no longer be explained in terms of necessity. Politics must not prevent or avoid the storm: on the contrary, it must accompany and protect it. For every earthly storm is the cocoon of future metamorphoses and the invention of a future life.

IV. A New Name for Earth

If the climate crisis consists of the mutual revelation of the whole planet to all humanity, the first problem to be solved is a logical one. We do not have a name for what we are observing. All the names we have used so far are partial, subjective, and improper. One example of this is the name contained in the term geology—Gaia—which comes from ancient Greek. This name is today undergoing a great revaluation. Now, beyond prejudice, beyond Eurocentrism, beyond even the fact that Greek culture was a sexist, racist, slave-owning culture, the real issue is the history of Gaia. Stories about the curious divine or proto-divine character that the Greeks called Gaia have nothing to envy from the worst American soap operas. The story goes that Gaia, alone and without any connection to anyone, begets (by parthenogenesis, or asexual reproduction) Uranus, whose name means "starry sky." Then, she begets, again by parthenogenesis, the mountains, the mountain nymphs, and Pontus (the sea). She then marries her son Uranus, with whom she has children, but asks her sons to kill their father (who is also her son). One of them, Chronos (time), succeeds in killing him. But a drop of Uranus's blood (or semen) touches Gaia's body, which causes her to have new children with the father-son, including the Erinyes, female chthonic deities of vengeance. Do we really want this toxic story to be our imagination of Earth?

However, the problem lies elsewhere. While it is interesting to collect, compare, and study the different myths elaborated by different civilizations at different chronological latitudes, it makes no sense to privilege one over another. This is because Earth, by definition, is a transcultural object, as well as obviously transgender: it has all genders and belongs to all ethnicities and cultures, even those that have never existed and never will exist. Every myth is the expression of a certain idea from the point of view of a certain culture, or, in the words of Claude Levi Strauss, every myth is the transformation of a parallel or previous myth.[5] But Earth does not belong to any of them; it is the disruption of every gender and cultural identity.

In fact, we should also stop calling our planet "Earth." The term "Earth" is an English/German name that simply means land. It derives from the Old English words "eor(th)e" and "ertha," the equivalent of the German "Erde." The term therefore suggests that the planet is primarily soil, the lithosphere, which is equivalent to saying that we define our identity by our feet. Geography is simply the result of this effort to translate our representations of the world—of where we are and what surrounds us—with our feet. But doing things with our feet is never a sign of great dexterity, and measuring the world and our faces with them is surely evidence of great stupidity. We could have chosen other organs and the world would have had a different face, a different name. Our head, for instance, never touches the ground. Instead, it lives in a space open to the sun (the sky), and more importantly, is able to see far beyond what it can touch. From the tip of our toes upward, the sky begins. We inhabit the sky just like the earth and the ground, and the planet is composed of both. Our planet's name should reflect the fact that it is a strange conjunction of the earth and the sky.

More than a name, however, perhaps we should come up with a nickname. Something like "guy," or "sis," or "bro," but transgender, trans-age, trans-ethnic, trans-linguistic. Or perhaps, some kind of planetary rosary or a new cabala should be developed to generate new names every day. Because the name of Earth is the name of everything; it is a kind of absolute and general name, or surname. Perhaps it is better not to find a new name, but an absolute pronoun, one through which everything, regardless of whether it lives or not, can say "I."

Whether noun or pronoun, it is important that there is a common name. One possible objection to this might be that to choose only one name is to prolong an imperialistic, colonial attitude that nullifies differences, pluriverses, and parallel worlds. Not having a common name to refer to the same reality means that everyone is forced to do the slow work not of translation, but of negotiation about the reference: about the fact that two names refer to the same reality. But if there is no agreement that we are talking about the same Earth, any action collapses.

The real reason why we need one and the same name is politics. This one planet is not only shared by all, but it is the condition of possibility for sharing names, things, and life. Translated into political terms, this means that the oneness of the planet is not only the main object of any future democratic politics, it is democracy's very condition of possibility. To seek a name to share (and thus a single name) is to emphasize this. Think about the experience we all have with our names: every time we multiply our names and create a nickname, we introducing a hierarchy of value and love into relationships. If you would call me not by my name but "babe" in public, you are making and flaunting the claim that you have more intimate relations with me than everyone else. That is, you would be introducing a hierarchy of value, of fondness, of stories into our relationship. We need one name because we need to reaffirm that there is no one who has more right to Earth than anyone else.

V. Earth as Theater

If we have a problem devising a single name for our planet, it is also because we do not know who this subject is that we keep calling by the wrong name. To know it, it is clear that science is not enough. In fact, science is not capable of perceiving reality as a subject. Further, the knowledge we may have of our own self, or of others—that is, the knowledge we have of a subject—is never certain and absolute: it is a form of divination, of interpretation, that is

always ready to transform. I do not mean that another's self (or one's own) cannot be known, nor that that is not certain knowledge: if it were so—if the self were unknowable—it would be impossible to live. But these knowledges are acquired through protocols other than those of experimental science; these are knowledges in which the issue is less certainty or evidence than faith and divination.

There is a form of divination that allows us to grasp subjectivity where only objectivity seems to exist. This is what we have been accustomed to calling "art" for centuries. This may sound absurd, but what if we forget everything we know about art and imagine that we are an alien anthropologist from the thirty-fifth century CE, who lands on our planet to study the significance our culture today attributes to those objects that are categorized as art. The answer we would find is that art is a strange protocol that requires people to relate to an object in the same way that they do to other human beings. In short, it is an unconcealed form of what the anthropology of the last century called animism.

A museum, after all, is a warehouse full of objects for which we have a kind of special veneration. Every day, millions of people enter these huge warehouses and come across more or less finished portions of linen cloth covered with layers of pigment, or structures of steel, marble, wood. Yet instead of seeing only geometric forms of extended matter (as the cultural attitude that Philippe Descola calls naturalism would presuppose), they discern in them the presence of a subject or a soul; they read in them opinions, feelings, or a worldview of someone who existed hundreds or thousands of years before.[6] Once they leave they museum, they might even tell you that they "met" Leonardo or Rubens. When we encounter an artwork (as well as books or the written page), we accept the idea that it contains a psychological, emotional, or mental intensity that transcends the mere material reality in which it exists. That is, in the face of art, we all become animists.

This was the insight contained within the posthumous book *Art and Agency*, by one of the greatest anthropologists of the last century, Alfred Gell. In it, he describes the cultural forms through which it becomes possible to attribute agency to artifacts and objects in Western culture.[7] We can see a common form of everyday animism in children and their relationship with dolls or stuffed animals, but also in adults when they talk to cars or computers. This is, however, an ironic and metastable type of behavior, in which the dominant attitude is often one of "as if," of play, or of pretense. However, there is another, deeper form of animism in which the recognition of the subjective character of objects is neither ironic nor unstable: art. Gell's book teaches us that, to think about the planet, it is better to make art, not ecology. Knowing Earth as a subject means knowing it through art. But it is not that art has to represent Earth, nor is it enough to bring plants into a museum to know the planet. It is about relating to Earth as we relate to art; that is, thinking of the planet itself as an art form, as a kind of open-air museum for contemporary nature—or, if you like, of immense theater. Earth must become a planetary theater: not in the sense of a building, but in the sense of a space in which everything—plants, animals, lichens, fungi, stones, winds, clouds, etc.—is perceived as an actor, as capable of acting, as a subject.

Moreso even than the construction of a building, theater should be considered as an exercise in the metamorphosis of space and its perception. It is, if you will, the opposite of exorcism: if the latter is a way of eliminating a form of excess subjectivity, theater is a matter of inoculating it; not ghostbusting, but ghostloading. To perceive the planet, as well as to name it, it is not enough to represent it; it is necessary to empathize with it, or conversely, to allow it to empathize with us. That is what every actor in a theater does. An actor is a psychic corridor and an initiator into the life of others; acting allows one to live from the point of view of another subject. Theater is an act of psychological gymnastics: living by saying "I" in the soul of another. Theater, in this sense, is the demonic art par excellence. The demon, in Mediterranean theology, was the mobile subject, the "I" insofar as it is able to bind itself to a body without needing to mirror itself perfectly in it and depend on it ontologically. The demon is a relatively autonomous "I" with respect to the form and nature of the bodies it inhabits, and, precisely because of this, it can go anywhere.

It might sound strange, but this is actually what we experience every time we hold a phone. The entire technological universe is defined by a demonological need. Every time we pick up a phone or computer, leave a voice message or write a text, we turn material reality into a demonic presence, into a {form of subjectivity that no longer has an immediate and isomorphic connection with an anatomical corporeality. Because of this, we can move anywhere, even thousands of miles away from our body, and vice versa; precisely because of this, our "I" has nothing immediately human about it.

It also happens every time we play a video game, like *Death Stranding* or *The Legend of Zelda*, where we experience a strange change in the relationship between our consciousness and the body through which we experience. We continue to be an "I," but, by literally occupying or possessing another body, we are experiencing someone else's sensory experience. In video games, even those not played from a subjective point of view, we perceive the world from the point of view of Link, or Mario, who themselves act through our ego. And thanks to this prosthesis, our consciousness becomes the mind of a body that does not coincide with our anatomy. It is this thrill—which is always accompanied by a feeling of alienation—that one can become addicted to: this strange

feeling of slipping into someone else's body, of becoming a mobile self, able to migrate from one body to another until I return to the one I know best, the one I have been in since I was born. When we play video games, our body becomes the vehicle of our demonic nature. We become the demon occupying an alien body.

Here, our relationship with Earth must become something like a kind of planetary demonism, a psychic transhumance that allows us to become and inhabit the soul of everything around us, as well as the opposite: to make the self the experience of the transhumance of all the demons of the planet. This new ecology will have to teach us to demonically inhabit every non-human entity. All animals, plants, fungi, and viruses will appear to us as subjective entities, life forms, and perspectives on the world; rocks, mountains, hills, wind, rain, storms, seas, and rivers will open up as spaces of subjective play and existence. Conversely, our own subjective play space, our consciousness, must become a place where we demonically welcome all other subjects on Earth. It is no longer simply a matter, as Aldo Leopold has suggested, of "thinking like a mountain," but of making thought the playground of all the elements of Earth.[8] Ecology must become a new version of *Zelda*, where it is never clear who is the player and who is Link.

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Hydroreflexivity is a collaboration between e-flux Architecture and "Fertile Futures," the Portuguese Pavilion at the 18th International Architecture Exhibition, La Biennale di Venezia curated by Andreia Garcia with Ana Neiva and Diogo Aguiar.

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Cf. Amitav Ghosh, *The Great Derangement* : *Climate Change and the Unthinkable* (Chicago: Chicago University Press, 2016); Dipesh Chakrabarty, *The Climate of History in a Planetary Age* (Chicago: Chicago University Press, 2021).

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Jean-Baptise Lamarck, *Hydrogéologie, ou Recherches sur l'influence qu'ont les eaux sur la surface du globe terrestre, sur les causes de l'existence du bassin des mers, de son déplacement et de son transport successif sur les différens points de la surface de ce globe, enfin sur les changemens que les corps vivans exercent sur la nature et l'état de cette surface* (Paris. 1802).

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R. Hazen, D. Papineau, W. Bleeker, R. T. Downs, J. M. Ferry, T. J. McCoy, D. A. Sverjensky, H. Yang, "Mineral Evolution," *American Mineralogist* 93, nos. 11–12 (November 2008) : 1693–1720.

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Philippe Descola, *Beyond Nature and Culture* , trans. Janet Lloyd (Chicago : University of Chicago Press, 2013).

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Eglantina Monteiro

Irrigation and a Critical Awareness of Land

The construction of the Santa Clara dam (1963–73) on the Mira River created a 12,000-hectare "irrigation perimeter" for hydro-agricultural exploitation along a 41-kilometer strip of Portuguese coast in the southwest of Alentejo, between Vila Nova de Milfontes and the village of Rogil. Located within the Vicentine Coast Natural Park, water within this zone is controlled upstream and distributed by a low-energy gravitational system. Given that water, once diverted, cannot flow back, the system requires careful monitoring of the water that goes into the general distribution channel. In line with the flow of the water, irrigation of various points in the network takes place according to a stipulated timetable: some points earlier, others later.

It is this water that supplies the "pluriurban areas" around the municipalities of Odemira and Aljezur. The water is used for domestic consumption, small-scale horticultural production, and extensive summer plantations of sweet potatoes and peanuts. These activities also occur in more "precarious areas," lands outside the irrigation zone that rely on water from the same reservoir. The management of this water supply system falls under the aegis of the Mira Beneficiaries Association (Associação dos Beneficiários do Mira, or ABM), which is made up of representatives from different "beneficiaries" and supervised by the Ministry of Agriculture. This model, which was first established in the 1970s, remained more or less stable until 2017, when Driscoll's, the world's largest producer of soft fruits, expanded its 30-hectare holding, first established in 2004, to 1,000 hectares. Together with other horticultural and flower businesses, the ultra-intensive agroindustry today covers a total of some 3,000 hectares in the area.

Agroindustry companies operating within the irrigation perimeter of the Mira River benefit from packages of "fiscal incentives" on top of the turnover they generate. When they set up new production units, they can usually count on the support of the current prime minister, whose manifesto guarantees state support for this production model. As a result, representatives of the agroindustry have come to control the ABM. Their crops have substantial water needs throughout the year, which have led them to substantially reduce the share of water allocated to small-scale farmers. In 2023, the ABM exacerbated the existing conflict between traditional farmers and the "beneficiaries" of agroindustry by trying to exclude "precarious areas" from receiving water. As a result, and in an attempt to assuage the social tension in the area, the Ministry of Agriculture replaced the ABM management.[1]

Because the region has cyclical droughts and scarce water supplies, Alentejo has always recorded the lowest water consumption in the country. It has historically been sustained by dry farming, the frugal use of water for irrigation, and the selection of seed stocks adapted to dry conditions. Traditional farmers in the region therefore

Stills from the film Mira-Rio, Southwest Alentejo, Portugal, 2023. © Francisco Janes

have a perspective on drought, climate change, and water scarcity that differs from that of both the government and the media. These farmers once supplied Lisbon with vegetables and dried fruit for export. Yet there has never been such a wide area under cultivation as there is today, nor has so much water ever been consumed. In 2023, summer wildfires consumed a 9,000-hectare area of houses, forests, and agricultural plots around the municipalities of Odermira and Aljezur. Only after this did the government, under pressure from business, local merchants, cooperatives, and local authorities, overturn its 2017 decision to authorize the expansion of the irrigation zone from 3,000 to 5,000 hectares.

Traditional societies, environmental awareness, and agribusiness

There is no diplomatic resolution for the tension between traditional societies and the socio-environmental complex of agribusiness.[2] On the one hand, hegemonic techno-capitalism evades dialogue with other modes of understanding and acting in the world, revealing a seemingly unlimited capacity to absorb and manipulate foci of resistance. On the other, local populations are often unable to perceive processes whose causes and aims are not themselves local. In the case of the soft fruit business, water and soil are the only local factors of production. The rest are, in the words of Paulo Barriga,

> Wholly imported under the strict provisions of the respective patents, from the plants and irrigation systems, through the metal and plastic frames used in the polytunnels, to the fertilizers and even the substrate where the raspberry bushes grow … to the agronomic methods, the fruit picking, the packaging … to the marketing of the product which fixes the market price.[3]

In other words, the entire machinery of this new, irrigated agriculture is shielded from local reality and in constant flux. Furthermore, the product of this labor is immediately exported (95% of the produce goes directly to markets in England, Germany, and Scandinavia) and the labor force is imported, mostly from Asia. Only the ground remains stable. Although the raspberries are not cultivated in the soil but, rather, hydroponically, their occupation of the land and their use of water breed anxiety.

Before the expansion of ultra-intensive agriculture around 2007, there had already been a marked change in the social make-up of the region. In the last two decades of the twentieth century, an impressive diversity of people

Stills from the film Mira-Rio, Southwest Alentejo, Portugal, 2023. © Francisco Janes

from urban communities around Portugal, as well as northern and central Europe, settled in the area. The restrictive construction policies of the natural park have largely left the Alentejan Southwest out of the circuit of mass tourism. As a result, the coastal area has gained the status of one of the best-preserved coastlines in southern Europe. This, in turn, has brought about an increase in so-called "nature tourism," which has been driven largely by new residents.

The relationships that have emerged between these new residents and local populations have brought changes to the territory. Apart from an appreciation of local products and the landscape through outdoor activities such as surfing, hiking, and cycling, new agroecological and permaculture projects have been developed that call on traditional agricultural knowledge and are rooted in a scrupulous respect for one's surroundings, a perceptive understanding of place, reading the cycles of the earth and crops, and selecting seeds that are well adapted to the local ecosystem.

This development has empowered traditional agriculture in the face of a more industrial one that, sustained by chemical and mechanical processes, rejects traditional practices as outdated and civilizationally backward. According to Manuela Carneiro da Cunha and Mauro W. Almeida, "the surprising change of ideological course" for traditional agriculture and its advocates, from laggards to the forefront of modernization and the guardians of the future, is accompanied by other conceptual changes.[4] The categories of "ecosystem" and "earth," so central to the corpus of biology, geology, and Earth sciences, here take on a political dimension. Knowing as we do that the system of mass production acts as a geological force, the Anthropocene calls into question not only our way of life, but the architecture of scientific knowledge that is based on the separation of natural and social sciences. The separation of nature and culture, and the idea of politics as centered solely on human power relations and decision-making processes, is no longer sustainable.

In 2009, activists in Alentejo, together with the local populace, created the *Juntos pelo Sudoeste* ("Together for the Southwest") movement to fight against the uncontrolled advance of extractive and intensive farming in the natural park, as well as against the construction of a desalination plant that industrial agribusinesses were demanding and the state was considering. The current irrigation system of the Mira is bolstered by a number of more or less illegal boreholes that pump water from the water table, but that cannot keep up with the exponential growth of business. With the desalination plant, the agroindustry sought to circumvent the perverse effects of its intensive practices, and render its destructive consequences productive.

This way of acting stems from the belief that a

Stills from the film Mira-Rio, Southwest Alentejo, Portugal, 2023. © Francisco Janes

techno-economic mutation generated by the system itself will not only save us from ecological collapse, but will generate an ecopolitical order of material abundance.[5] The argument for a substantial reduction in the area of industrial farming, for a slowdown in both consumption and economic growth, for a life less artificial—for a life rooted in the inextricable connection between human and non-human life—all of which are made by the activists of *Juntos pelo Sudoeste*, is the greatest ideological enemy of these agribuisnesses. Meanwhile, conditions on the ground show signs of changing even faster than technical superstructures or Earth's regenerative capacity. In the words of Deborah Danowski and Eduardo Viveiros de Castro:

> The willful acceleration of the capitalist machine posited as the solution to our present anthropological misery finds itself in a position of objective contradiction to a wholly unintentional response, the relentless process of environmental transformations. … There are serious grounds for fearing that a globalized post-capitalism will not arrive quickly enough to avert the slow collapse of the planet's ecology.[6]

Translated by Russell Shackleford.

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Carlos Dias, “Guerra pelo acesso à água intensifica-se no perímetro de rega do Mira,” *Publico*, July 8, 2023. See https://www.publico.pt/2023/07/08/azul/noticia/guerra-acesso-agua-intensificase-perimetro-rega-mira-2056112 .

2
The expression "traditional societies" does not mean adherence to a tradition, which is contradictory to current anthropological knowledge, but refers to the environmental impact of the ways of life of small rural communities whose agricultural and ecological knowledge is based on a detailed understanding of the place, as opposed to the model of industrial agricultural production generated by the explosion of the chemical and petroleum industries triggered by two world wars.

3
Paulo Barriga, “No mundo secreto das estufas (In the secret world of polytunnels)” *Sábado*, July 13, 2021.

4
Manuela Carneiro da Cunha and Mauro W. Almeida, “Populações tradicionais e conservação ambiental (Traditional Populations and environmental conservation),” *Cultura com aspas e outros ensaios* (2009).

5
On the different expressions of accelerationism and technological genius see: Deborah Danowski and Eduardo Viveiros de Castro, *Há mundo por vir? Ensaio sobre os medos e os fins* (Lisbon: Antígona, 2023).

6
Danowski and Viveiros de Castro, *Há mundo por vir?,* 117.

I'm carrying a stream on my back:
stones, vegetation, three or four plane trees,
the water flows so strong in the winter

There are worms that depend on me,
on my liquid memory, my apparent resignation.

—Teresa M. G. Jardim, "Liquid Memory"[1]

Study of the various documents ... [and] other signs left in the geological formations of the island over 7 million years all point us to naming Madeira "The Island of Alluviums."

—João Baptista Pereira Silva[2]

Ana Salgueiro

Water Flows, Stones Take...

Madeira: Garden Isle, Isle of Alluviums

On February 20, 2010, Madeira experienced one of the greatest (so-called) natural catastrophes in recorded history.[3] Heavy rains swelled stream headwaters in a landscape of rough terrain. The soil had already been saturated by the precipitation of the preceding months, and upstream water basins had been subjected to extensive deforestation and the abandonment of the old cultivated *poios* (terraces).[4] The south coast of the island is densely populated, with recently and extensively tarmacked areas. Towns were first established in the fifteenth century along streams and by the sea. This proximity to water favored easy communication and transportation of people and goods, as well as access to the freshwater fundamental to human survival and Madeiran economic life. Only a few hours after the heavy rain began, water and detritus overflowed and destroyed the stream banks of the island's principal localities. Taking back areas of unduly occupied flood plain, torrents of water swept away everything in its path.

An island group situated in the North Atlantic 660 kilometers west of Morocco, Madeira is frequently promoted by the tourism industry as the "Garden Isle," "The Pearl," or "Paradise in the Atlantic" due to its mild, humid, subtropical climate and lush, exuberant landscape. But the 2010 alluvium revealed the lack of adequate safeguards against the island's ancestral risks.[5] The 43 deaths, 8 disappearances, 120 injuries, 600 displaced persons, 800 seriously damaged homes, and €1.4 billion euros of total material damages cannot reflect the full impact of the catastrophe.[6] Emotional and psychological trauma is always difficult to measure, as are damages to the ecosystem. Huge quantities of debris ended up in seafaring areas near the stream mouths, and

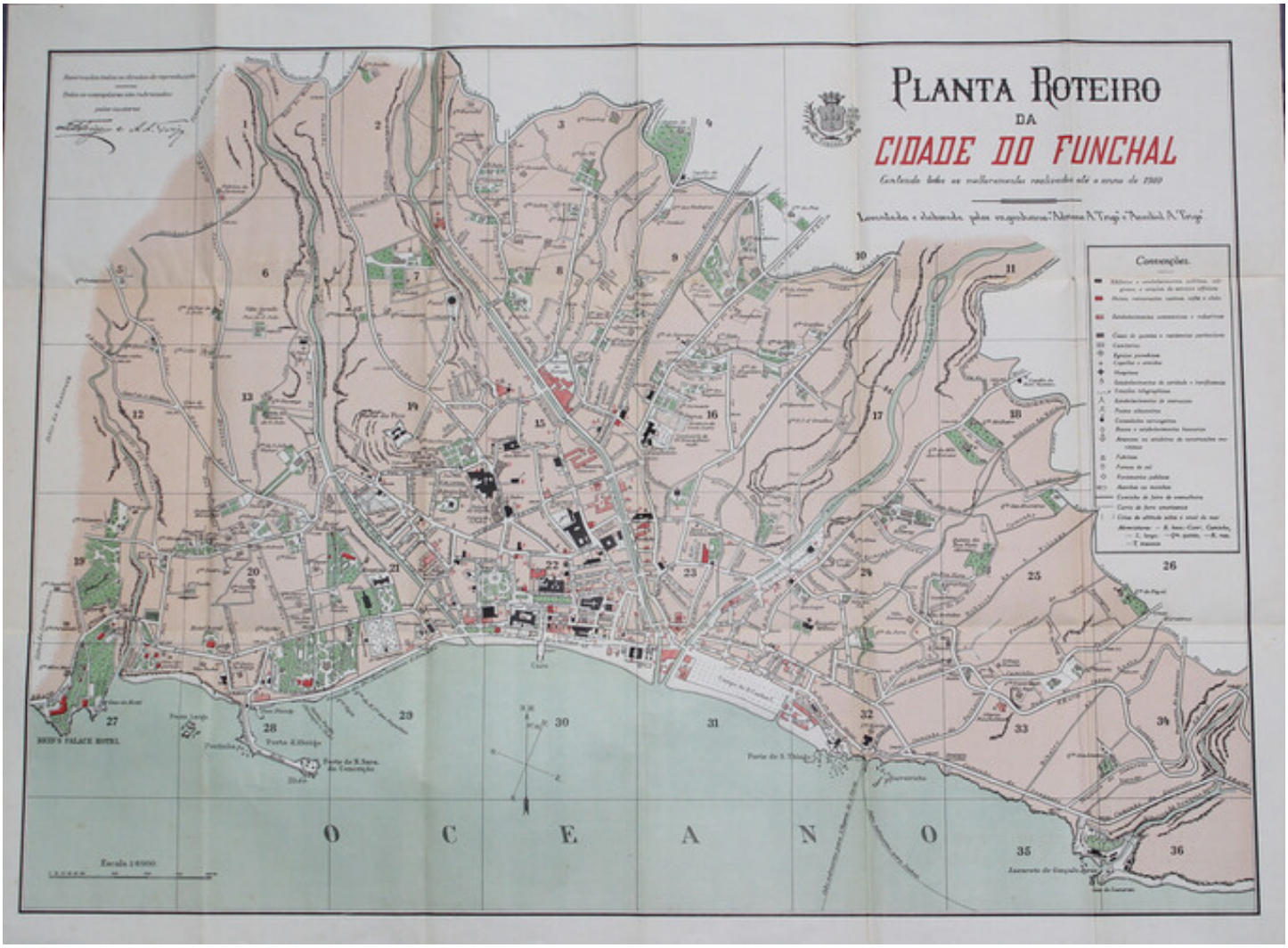
Alluvium of February 20, 2010 in João Gomes stream (Funchal), near the then-existing fuel station built over the stream bed. Photography by Elvio Fernandes. Courtesy of Empresa Jornalística da Madeira (EJM).

approximately 530,000 cubic meters of solid material was "dumped onto the lower courses of the streams and in the city streets" of the capital city of Funchal.[7] Without consulting the city council, the local community, or any multidisciplinary team, this material was moved by government decree to a landfill site next to the mouths of the Santa Luzia and João Gomes streams to create a sizable new urban area reclaimed from the ocean.[8]

Both the local population and political decision makers were unprepared for the disaster. They were perplexed by the traumatic devastation it wrought, both on the land and on the idealized image of Madeira as the "Pearl of the Atlantic." In response, a narrative was constructed as if the disaster had been an exceptional episode in Madeira's history. Nature (intense rainfall and stream overflow) was blamed as the prime cause of the catastrophe.[9] This is surprising, given the fact that Madeira's landscape is constantly being (re-)drawn by the transformative power of water: of the sea, which surrounds and erodes it, and of the fresh water that, in its liquid, gaseous, and solid states, makes up a dense circulatory system that crisscrosses and shapes the island.[10] With volcanic origins, and in spite of its basalt geology, Madeira is a fluid and unstable land, subject to the elements. Human efforts have been taken since the fifteenth century to attempt to tame the destabilizing actions of nature on the island group, and flash floods and landslides have been recorded since at least the seventeenth century. Memory of this history was erased throughout the twentieth century, but was dramatically brought back to light along with the debris and destruction of 2010.[11]

Memories for Resilient Futures

According to Aleida Assmann, both individual and collective memory is "highly selective … limited by neural and cultural constraints such as focus and bias … [and] by psychological pressures, with the effect that painful or incongruent memories are hidden, displaced, overwritten, and possibly effaced."[12] This means that "when thinking about memory, we must start with forgetting," insofar as mnemonic construction "consists in a perpetual interaction between remembering and forgetting." Real



Map and tourist itinerary of Funchal (1910), with the city's three main streams: São João stream, Santa Luzia stream and João Gomes stream. Hors-texte published at Adriano A. Trigo & Annibal A. Trigo, Roteiro e Guia do Funchal (Funchal: Typographia Esperança).

problems and their solutions can be found in what has been forgotten.[13] What is remembered and what is forgotten about Madeira's flash floods and alluvial mudslides are therefore not just fundamental for understanding the dynamics of the disaster and for assessing the degrees of accountability to which individuals, institutions, and collectives should be held. These remembrances and forgettings also allow potential and unremedied traumas and growing levels of vulnerability to be identified.

Amnesia of traumatic experiences involves mechanisms of avoidance or repression, which can occur at both individual and collective levels. What the Portuguese philosopher José Gil calls "non-inscription," or collective self-defense mechanisms that attempt to erase traumatic episodes in a group's common history, can bring about dramatic consequences.[14] Subject to continuous and unstable tension between remembering and forgetting, erasure and (re-)writing, memory is no stranger to manipulation. It is for this reason that technocracy and science often belittle and are suspicious towards it. Memory should therefore be subject to a plural declension, despite all the aporias that this plurality might imply. Dominant narratives have a propensity to standardize and silence the polyphony that true and complex narratives of the past and the present are always made of. This is particularly evident in the case of Madeira's flash floods and mudslides, the consequences of which result from the human tendency (certainly not only in Madeira) to ignore and resist the very flux and instability inherent both to this island territory and to the local memory of its hydrogeographies.

Infrastructural mechanisms for "smoothing the stream beds" have long served a dual purpose in Madeira: to optimize human consumption of fresh water and its use in many important socioeconomic activities, and to protect built-up areas that are exposed to alluvium risk. These efforts have been bolstered in recent decades by the

availability of significant European Union funds, which have largely been distributed without consulting local communities or involving multidisciplinary teams and critical discussion. As a result, Madeira has effectively ignored memories and knowledge of the past as well as the systemic and complex nature of alluviums, generating an illusion that the risk of disaster has always and only been averted by great engineering works.

This technocratic response has been present since at least the beginning of the nineteenth century, but overlooks more effective measures for mitigating the island's vulnerability to catastrophe, such as reforesting headwaters, regenerating plant cover in water basins, eradicating practices that weaken hillside stability, and promoting a local culture of adaptation that is resilient to flood risks.[15] Instead, large-scale hydraulic works have consistently endangered ecological sustainability as well as the historical, social, and anthropological density of Madeira's hydrogeographies, particularly since the middle of the twentieth century.[16]

In addition, traumatic images of the many disasters that have happened in Madeira as well as narratives that recall previous models of human cohabitation in these hydrogeographies have largely been obstructed or erased. As a result, Madeira continues to be idealized as a "Garden Isle," a paradise wherein catastrophe has no place. This dangerously encourages a lack of awareness of disaster risk and impairs the best efforts of local communities to prepare for future alluviums. Meanwhile, and even after 2010, heavy engineering works are legitimized by political decision-makers as the only safe response to the threat of catastrophe, hindering chances of finding or (re-)inventing alternative, sustainable, just, and resilient models of response.

On the Nature of So-called "Natural Disasters"

Far from being extraordinary or one-off events caused by exclusively natural phenomena, disasters such as alluviums are multidimensional systemic crises resulting from complex processes over time that sometimes even happen in places far beyond where their destructive impact is manifest. In Madeira, this includes changes to the climate on a global scale, as well as local and translocal political and economic dynamics, such as tourism. Although triggered by geophysical and/or biological phenomena that at a given moment and in a specific place manifest themselves in extreme terms, natural disasters equally stem from social, political, economic, cultural, and even psychological vulnerabilities.[17] Thus, the memory of disasters and past responses to them constitute an important mechanism for increasing or mitigating future vulnerabilities.[18]

Before 2010, it was not just the threat of catastrophe that had faded from Madeiran memory, but also the efforts undertaken in the past to mitigate the destructive impact of the alluviums. The greatest natural disaster to have occurred in Madeira took place on October 9, 1803, when flash floods devastated Funchal and other towns on the south of the island, leading to the deaths of around 1,000 people. In response, the Portuguese Crown sent the French military engineer Brigadier Reynaldo Oudinot to Madeira with a brief to conceive and execute a disaster relief plan. Developed with teams of locals over three years (1804–07) and based on studies of the streams' hydrogeomorphological behavior and their relationships with the island communities, Oudinot's plan is surprising in its precision and in the apparent modernity of his systemic, holistic, and participatory approach. Yet it was only made widely accessible when it was first published as a book in 2018.

Beyond mere disaster recovery, Oudinot's plan sought to mitigate the risk of future catastrophes. Drawing on experience he had gained working in other vulnerable water basins across the Portuguese kingdom, as well as knowledge collected locally, Oudinot addressed the risk of alluviums through a number of diverse but complementary measures, including: rebuilding bridges and access points to water courses; erecting dykes and new, stronger, porous stone and lime retaining walls constructed from mudslide detritus; widening, deepening, and straightening stream beds; stabilizing the land and solidifying the retaining walls by rehabilitating upstream groves and planting aquatic trees, reeds, and indigenous bushes along the banks of streams and rills; transferring neighborhoods situated in high-risk zones to areas further from the streams; prohibiting land clearance on the upper reaches of the streams, "squatter farming" in the stream beds, and intensive logging in the hills above; and being attentive to the risk of fires and the dynamics of both irrigation channels and the streams themselves by cleaning and shoring up the banks whenever necessary.[19]

Many of these measures were never executed in Madeira, particularly those requiring complex social and cultural adjustments with immediate economic impact, such as transferring neighborhoods, forbidding further development in high-risk zones, and ending extractive activities and squatter farming in stream beds and the hills above. Reforestation, as well as a political program to develop an attentive, responsible, and adaptive culture to the risk of disaster, were also indefinitely postponed. Instead, what drew greater attention and investment were hydraulic works, such as deepening and straightening stream beds, stabilizing the land, and solidifying walls. Nevertheless, Oudinot's plan demonstrates the extant risk of alluviums in Madeira by identifying many of the geophysical and sociocultural vulnerabilities that remain even today. It also highlights that such catastrophes are never exclusively "natural," and proposes measures that would still constitute an effective response to mitigating

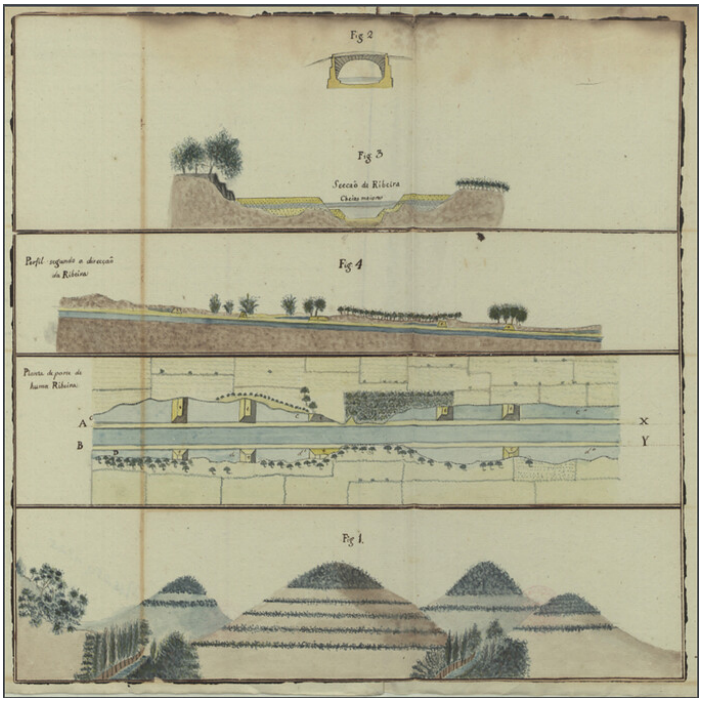
Banda d'Além street, Machico, after the alluvium on November 3, 1956. Photography by Perestrellos Fotógrafos. Courtesy Museu de Fotografia da Madeira - Atelier Vicente's and Direção Regional do Arquivo e Biblioteca da Madeira (inventory nr. PER/3754).

the risk today.

The Impact of Tourism

The tourist image and narrative of Madeira, as well as architecture's role in that paradisiacal image, were both instrumental to the amnesia of Madeira's history of alluvium. Madeiran epithets of "Garden," "Paradise," or "Pearl of the Atlantic" have been ruthlessly exploited by

(Left) “Planta da Cidade do Funchal q Representa o Estado em q Ficou depois da Aluvião de 3 de Outubro de 1803”. Map at Paulo Dias de Almeida, Descripção da Ilha da Madeira em Geral e Cada huma de suas Freguezias, Villas e Lugares em Particular, manuscript at National Library of Portugal. (Right) Guideline drawings for the interventions in Madeiran streams after 1803 alluvium, at Reynaldo Oudinot, 1804 manuscript, Plano para Reparo da Ilha da Madeira (National Library of Portugal reference code 1831227).



(Left) “Planta da Cidade do Funchal q Representa o Estado em q Ficou depois da Aluvião de 3 de Outubro de 1803”. Map at Paulo Dias de Almeida, Descripção da Ilha da Madeira em Geral e Cada huma de suas Freguezias, Villas e Lugares em Particular, manuscript at National Library of Portugal. (Right) Guideline drawings for the interventions in Madeiran streams after 1803 alluvium, at Reynaldo Oudinot, 1804 manuscript, Plano para Reparo da Ilha da Madeira (National Library of Portugal reference code 1831227).

the tourism industry since the nineteenth century, to the point that tourism has become the prime economic driver of the island group. Funchal, the island’s main city and port of call for visitors, has been transformed into an idealized modern tourist resort and serves as a replicable model for other towns and cities in Madeira. Simultaneously idyllic and civilized, this urban ideal demanded the eradication (or at least concealment) of whatever landscape elements were deemed unaesthetic, insalubrious, or dangerous, including the streams.

Demands for an idealized Funchal were voiced in various recorded descriptions of the city by tourists who visited Madeira during the nineteenth century, such as the Briton Isabella de França in her travelogue of 1853–54:

> Two rivers pass through the City nearly in the centre, and another, that of [Saint] João at the west end. Beyond the rivers to the Eastward, was once a very respectable part of the town, as may be seen by the remains of fine houses there, but of late years it has been abandoned to the lower classes, and has become a perfect rookery … Up the sides of the rivers are roads, and rows of plane trees … These roads will be a delightful walk, but the poor people who live near have chosen to deposit there all manner of abominations, which render them all but impassable to anyone possessing a nose. The rivers … in ordinary times they are nearly, if not quite dry, but after heavy rains they bring down large quantities of water, sufficient to roll along stones of many tons weight. They have sometimes broken down the walls and committed sad devastation.[20]

Narratives such as this travelogue, many of which were accompanied by visuals, like the drawing by the Irish John Horatio Robley of the 1803 alluvium, demonstrate that in the middle of the nineteenth century Madeirans and their visitors still had an acute memory of the risk of natural disasters. By the same token, they demonstrate the pressure to embellish and clean the city in a way that is largely ignorant of its potential social and psychological impact, as well as of the historical, economic, cultural, and political causes that brought poor people to live near streams in the first place.[21]

Throughout the nineteenth century and into the early twentieth century, Madeiran streams, tributaries, and riverfront areas were dynamic urban places.

(Left) Alluvium in Madeira. Lithograph from John Horatio Robley (1811-Cork, Irland, 1870) drawing. Printed by Hulman Hulmandel & Walton , ca. 1845. Courtesy of Casa-Museu Frederico de Freitas (inventory nr. CMFF 161;4) and Direção Regional da Cultura. (Right) Santa Luzia stream panorama, with bougainvillea over the channel bed (ca. 1929). Illustrated Postcard published by the German Athen & Haupt. Courtesy of Direção Regional do Arquivo e Biblioteca da Madeira (inventory nr. BPI-ARM/1024).

(Left) Alluvium in Madeira. Lithograph from John Horatio Robley (1811-Cork, Irland, 1870) drawing. Printed by Hulman Hulmandel & Walton , ca. 1845. Courtesy of Casa-Museu Frederico de Freitas (inventory nr. CMFF 161;4) and Direção Regional da Cultura. (Right) Santa Luzia stream panorama, with bougainvillea over the channel bed (ca. 1929). Illustrated Postcard published by the German Athen & Haupt. Courtesy of Direção Regional do Arquivo e Biblioteca da Madeira (inventory nr. BPI-ARM/1024).

Machico stream, inert extraction and other social social activities (before 1905) Photography by Joaquim Augusto de Sousa. Courtesy of Museu de Fotografia da Madeira - Atelier Vicente's and Direção Regional do Arquivo e Biblioteca da Madeira (inventory nr. JAS/1122).

Washerwomen working at Machico stream, with their children nearby (before 1905). Photography by Joaquim Augusto de Sousa. Courtesy of Museu de Fotografia da Madeira - Atelier Vicente's and Direção Regional do Arquivo e Biblioteca da Madeira (inventory nr. JAS/1570).

Disadvantaged social groups lived their daily lives in those risky but fertile areas. Indeed, the ancestral and close relationship between residents of Funchal and the streams is widely illustrated in Madeira's historical iconography. Bolstered by the construction of *levadas* (irrigation channels), streams ensured a steady and reliable supply of fresh water for domestic use and irrigation.[22] Streams were also used for water-powered saws and grain and sugar mills, which were fundamental to the livelihoods of working and poor people, not to mention to the economic development of the island. Aside from these more practical uses, when their flow was less torrential, the streams served as pedestrian access routes

Last section of São João Stream, at Funchal (between 1920-1940), the stream bed being occupied by risky housing and plantations. Photography by Alvaro Nascimento Figueira. Courtesy of Museu de Fotografia da Madeira - Atelier Vicente's and Direção Regional do Arquivo e Biblioteca da Madeira (inventory nr. ANF/3-80).

Water mill at Madeira (before 1906). Photography by Russell Manners Gordon. Courtesy of Museu de Fotografia da Madeira - Atelier Vicente's and Direção Regional do Arquivo e Biblioteca da Madeira (inventory nr. RMG/557).

to backwoods isolated by the rugged terrain.

In 1939, however, António Salazar's Estado Novo government sent a mission to Madeira to study the

Estrada Real 26, connecting Serra de Agua site and Ribeira Brava town, following the stream (before 1899). Stereoscopic photography by Joaquim Augusto de Sousa. Courtesy of Museu de Fotografia da Madeira - Atelier Vicente's and Direção Regional do Arquivo e Biblioteca da Madeira (inventory nr. JAS/1073).

technical and economic potential for harnessing hydroagriculture and hydroelectric power on the island. The conclusions of the mission's report led to the passing of Decree-Law No. 33158 on October 21, 1943, which founded the Administrative Commission for the Hydraulic Exploitation of Madeira. Under the auspices of the General Council of the Autonomous District of Funchal, it fell to this commission to bring about and execute a general plan for new hydroagricultural and hydroelectric exploitation. Not without local opposition, this plan not only modernized the island but transformed its inhabitants' relationship with water. The pace of these changes intensified after the 1974 Portuguese Revolution and Portugal's entry into the EU, when policies for Madeira's modernization began being financed by European funds.

The expansion of basic sanitation provision throughout the twentieth century made obsolete many of the activities that had previously demanded direct contact with streams. Simultaneously, urban transformations blocked access to the stream beds; channeled, narrowed, and shored up the streams; and concealed and/or occupied the stream beds, both by constructing new buildings and by planting bougainvillea to beautify the city.[23]

All of this served to gradually alienate the Madeirans from the dynamics of the water courses and, consequently, to devalue them. Deprived of their sociological, anthropological, and biogeographical complexity, the streams were transformed into panoramic scenes of multicolored vegetation. Both the terrain itself and the imagination of Madeira were reconfigured. As picturesque, decorative icons of Madeira, there was no place for signaling any risk of the disaster that these areas

(Left) Bouganville covering Santa Luzia stream (after 1939). Photography by Foto Figueiras. Courtesy of Museu de Fotografia da Madeira - Atelier Vicente's and Direção Regional do Arquivo e Biblioteca da Madeira (inventory nr. PHF/1949). (Right) BP fuel station, built over the stream bed (after 1963). Photography by Perestrellos Fotógrafos. Courtesy of Museu de Fotografia da Madeira - Atelier Vicente's and Direção Regional do Arquivo e Biblioteca da Madeira (inventory nr. PER/7539).

(Left) Bouganville covering Santa Luzia stream (after 1939). Photography by Foto Figueiras. Courtesy of Museu de Fotografia da Madeira - Atelier Vicente's and Direção Regional do Arquivo e Biblioteca da Madeira (inventory nr. PHF/1949). (Right) BP fuel station, built over the stream bed (after 1963). Photography by Perestrellos Fotógrafos. Courtesy of Museu de Fotografia da Madeira - Atelier Vicente's and Direção Regional do Arquivo e Biblioteca da Madeira (inventory nr. PER/7539).

harbored.

According to architect Rui Campos Matos, the guiding matrix for these urban re-plannings of Funchal and other Madeiran islands throughout the twentieth century was the 1915 General Improvement Plan for Funchal, by the Portuguese architect Ventura Terra.[24] Far from Oudinot's plan, Terra's plan was the result of a commission from the new Republican regime, which sought to transform Funchal into one of the main tourist cities in Europe.[25] Terra was therefore chiefly concerned with safeguarding an aesthetic arrangement that would ensure tourists' delight and islander's pride in the "natural" beauty of the island. This did not include the streams, however. Ignoring the ecological, cultural, and socioeconomic value of watercourses in Madeira, as well as the danger of their natural dynamics, Terra saw them as "filthy and disgusting," an urban problem that needed to be eradicated—or at least hidden.[26] He therefore proposed to realign the riverbed and cover Funchal's central stream, the Santa Luzia stream, with a reinforced concrete vault, over which a large avenue for cars would be built with wide and beautiful tree-lined sidewalks.

Terra's proposal to cover the Santa Luzia stream in concrete was never executed. The subsequent Estado Novo plan, however, substituted concrete for bougainvillea, blocking access to the waterline, cutting off the community's historic relationship with the streams, and creating a false sense of security. The plan exacerbated the vulnerabilities of the population, making it unable to see or know, and therefore prepare for, a risk it was exposed to.

Cultural Memory and the Usefulness of the Useless

Despite its risks, most Madeirans are understandably resistant to revising the pristine, idealized image they have of their islands. Contemporary artists from the island, however, have sought to create a *remedial* memory that questions the relationship Madeirans have with nature, their self-image, and their view of the island. They do this by rescuing forgotten and/or obliterated images and recording them in new narratives. Working with the archive of Madeiran cultural memory allows them to reveal the eco-socio-cultural complexity of the island's streams and the risks (of alluviums and others) that they bring.

In *Protesto e Canto de Atena* (*Protest and the Song of Athene*, 2001), Irene Lucília Andrade rehabilitates the violent and catastrophic history of the streams, as well as the intimate relationship that the women of the island once had with them. Washerwomen worked and carried on with their daily family lives along the watercourses, which constituted community hubs, but were broken up and forgotten about in the island's modernization and the subsequent change in perception of the streams. Women lived hard lives and inhabited bathhouses like the "Vapor," which was perilously suspended over the Santa Luzia stream. While their existence has not been sufficiently

Funchal plan (1915), including Ventura Terra projected improvements, namely the streams plumbing reinforcement and covering for aesthetic reasons.

recognized or studied, Andrade claims:

> If it wasn't for the streams
> we wouldn't know about the women
> and the muddy water wouldn't reach us here
> with the rumble of immense tragedy
> ploughing the furrow where mystery flows
> the uterine flow of the hills.[27]

The Waters' Revolt by Sílvio Cró is a public artwork created in 2007 for the Esmeraldos Manor House in the village of Lombada in Ponta do Sol. The work evokes the revolt staged by the village in the summer of 1962 against the Estado Novo's Administrative Commission for the Hydraulic Exploration of Madeira and their plan for diverting the flow of the *Levada do Moinho* away from the town, despite its importance for the irrigation of subsistence agriculture.

Replicating an artificial pipe system and installed next to an irrigation channel, Cró's sculpture (which has recently disappeared from its plinth) is inoperative because it is blocked. The golden tone of the pipes emphasizes the incalculable value of water, while the rusted copper parts remind visitors of the water-related violence and death on the island. On top of this, a bell—a signal of danger and a call for vigilance—and two accusatory inscriptions—one of which reads "Blood and water flow along this irrigation channel," dated August 21, 1962—recall the day when the police charged at local protestors, causing multiple injuries and the death of a seventeen-year-old.

Luminu: Story of a Harvest, an installation by Martinho Mendes in a disused Mannerist chapel in Funchal, commemorates the tenth anniversary of the 2010 alluvium and addresses the metaphysical and sacred dimension of the disaster. Mendes represents the story of an old sacristan of Funchal Cathedral who disappeared in the 2010 floods while trying to help a neighbor who had been swept away. A monumental oil-painted basalt rock hangs somberly inside the chapel, reminding us of the geophysical cause of the catastrophe and the deep anguish of his family and friends' inability to end their mourning. Alongside this, dried husks of lamp grass/false dittany (*Ballota pseudodictamnus*) are strewn pyre-like across the floor. These dried flowers were piously collected by the disappeared sacristan for the cathedral before the catastrophe. Burned in a thurible, they would typically illuminate purification rites and commune with the sacred. But ten years after the catastrophe, sitting in a disused chapel still without answers, the lamp grass no longer shines.

In 2013, the group exhibition "The Labyrinth of Memory" was presented at the Rector's office at the University of Madeira with the intention of eliciting critical reflection on the risk of natural disasters on the island. Fátima Spínola's contribution, *It's Never a Good Time to Do the Laundry*, transforms a common garden or construction

Santa Luzia stream, presenting woman daily life at the “Vapor”, the red and unsteady aerial house over the stream, where washerwoman created a working community. Watercolour by W. Carpenter, 1866. Courtesy of private collection holders and Martinho Mendes.

"A Revolta das Aguas" (The Water Revolt), copper sculpture by Sílvio Cró (2007). Photography by Marco Livramento. Courtesy of Marco Livramento.

Detail of “Luminu. História de uma Colheita” (Luminu. The Story of a Harvest), an artistic installation by Martinho Mendes, presented at Capela da Boa Viagem, Funchal, in 2020. Photography by Joana Sousa. Courtesy of Martinho Mendes.

wheelbarrow into a wash tank, where a dyed piece of blood-red fabric sits, stagnating in the water, waiting to be washed. The installation highlights the delay in establishing civic and political responsibility for the catastrophe. Furthermore, the intense rainfall that triggered the alluvium is represented by a rain-filled plastic cloud that is connected by cord to the wheelbarrow. Spínola thus squarely attributes some responsibility for the disaster to the construction industry, which has long been associated with corruption and the abuse of power.

Ana Marta contributed to the exhibition with *Sorry for the Inconvenience*, a series of small photographs of the controversial work undertaken by the regional government at the mouths of two Funchal streams after the 2010 mudslides, which was hidden from public view with high barriers surrounding the site. Marta’s photographs show a pile of concrete tetrapods forming a breakwater that fills the horizon. Taken through cracks in the barriers, the photographs appear as if they are from a criminal investigation. Presenting evidence of what developers tried to obscure—the triumph of concrete in such a vulnerable water basin—they reveal the lack of environmental sustainability safeguards, as well as the lack of transparency and public debate about these projects’ impact on the city.

Anchored in the ever-unfinished work of memory, contemporary artworks such as these foresee forgotten or silenced susceptibilities and injustices that demand redress as an unconditional guarantee for a safer and more sustainable future. There are those who, by dint of their daily experiences of living in these hydrogeographies, know the secrets of Madeira’s streams. Architecture, in Madeira, cannot eradicate once and for all the risk of fast floods and mudslides. But experimenting in an interdisciplinary fashion, creating dialogue between the natural science, the arts, and the lore of those who know these hydrogeographies best, can contribute to the repair of at least some of the vulnerabilities. Thus, architecture can contribute to the construction of a more fertile, sustainable, resilient, and just future for the island.

“Nunca é tempo de lavar roupa suja” (It's Never a Good Time to do the Laundry), an artistic installation by Fátima Spínola, presented at the collective exhibition The Labyrinth of Memory (University of Madeira, 2013). Photography and courtesy of José Zyberchema.

"Desculpe o Incómodo" (Sorry for the Inconvenience), one of the photographic set by Ana Marta, presented at the collective exhibition The Labyrinth of Memory (University of Madeira, 2013). Photography and courtesy of José Zyberchema.

X

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1
Teresa M. G. Jardim, "Memória Líquida," in *Jogos Radicais* (Lisbon: Assírio & Alvim, 2010), 45. Translator's translation.

2
João Baptista Pereira Silva, "Brigadeiro Reinaldo Oudinot: o Engenheiro Visionário," in *Um Olhar sobre as Obras e Providências de Reinaldo Oudinot* , eds. Danilo Matos et al., (Funchal: Imprensa Académica, 2018), 81. Translator's translation.

3
The title of this article, "Water Flows, Stones Take," is a popular Madeiran saying signalling the transformative power of water in a landscape that is always at the mercy of its destructive force.

4
Poios is the name for terraces in Madeira, engineered to optimize the agricultural cultivation of the sloping soils; their maintenance contributes to the stability of the hillsides.

5
In this text, the word "alluvium" is used to refer to the combination of a flood and mudslide.

6
Davide Baioni, "Human Activity and Damaging Landslides and Floods on Madeira Island," *Natural Hazards and Earth System Sciences* , no. 11 (2011): 3039; Sílvia Maria Sepúlveda, *Avaliação da precipitação extrema na ilha da Madeira,* master's dissertation (Lisboa: IST-UTL, 2011), 97. The author notes that the data presented in these studies do not necessarily coincide.

7
Silva, "Brigadeiro Reinaldo Oudinot," 81.

8
Ibid.

9
Gonçalo Pereira Rosa, "Gestão narrativa num desastre natural: A sobreposição do discurso político no enquadramento jornalístico da enxurrada de 2010 na RTP e no jornal *Público*"/"The Narrative Management of a Natural Disaster: The Overlap of Political Discourse Within the Journalistic Framework of the Floods of 2010 As Shown on RTP and in the *Público* Newspaper" in *(Dis-)Memory of Disasters: A Multidisciplinary Approach* , eds. Sara Bonati et al., (Funchal: UMa-CIERL, s.d.), 108 -118.

10
The exhibition "Circulatory system," 'by Martinho Mendes and David Oliveira, was presented at Galeria EspaçoMar (Funchal) in 2022. It tried to recover the importance of water-memory on Madeira island.

11
Various authors have surveyed the occurrence of registered landslides in Madeira since the seventeenth century. However, the data collected is merely indicative of the true scale and impact of these flash floods on the island, in that they are not systematic or ongoing long-term investigations. Quintal identifies 21 landslides of varied intensity occurring during the twentieth century and eight in the nineteenth century. See Raimundo Quintal, "Aluviões da Madeira.Séculos XIX e XX"/"Alluviums in Madeira, 19th and 20th centuries", *Territorium* 6 (1999): 36-44. See also: Fernando Augusto da Silva and Carlos Azevedo de Meneses, "Aluviões," *Elucidário Madeirense* , vol. 1 (Funchal, SREC, 1978): 51-55; Mariela Justina Pio Fernandes, *Riscos no Concelho da Ribeira Brava movimentos de vertente cheias rápidas e* (Coimbra, Universidade de Coimbra, 2009): 136-203.

12
Aleida Assmann, "Canon and Archive," in *A Companion to Cultural Memory Studies* , eds. Astrid Erll & Ansgar Nünning A (Berlin/New York: De Gruyter, 2010), 97.

13
Assmann, "Canon and Archive," 97.

14
José Gil, *Portugal, Hoje: O medo de existir* (Lisbon: Relógio d'Água, 2012).

15
See Reynaldo Oudinot's proposal of 1804 below.

16
In response to the February 10, 2010 alluvium, for instance, the Regional Government developed a project to concrete over Funchal's streambeds and historic retaining walls. However, a group of citizens protested, claiming that its risk-management strategies were unjustifiable and detrimental to the environmental and historical heritage of the city, stopping the project. Silva, "Brigadeiro Reinaldo Oudinot," 84-86. For more on this, see IGOT/GEG, "Troços terminais das ribeiras do funchal: Obras marítimas e portuárias, Obras

hidráulicas e barragens, Pontes," (April 2011), . For images of the partial execution of the project by norvia 2011–2014, see .

17
For the different conceptions of disaster see: Ronald W. Perry & E. L. Quarantelli eds., *What is a disaster? New Answers to Old Questions* (International Research Committee on Disaster, 2005); Greg Bankoff, "Time is the Essence: Disasters, Vulnerability and History," *International Journal of Mass Emergencies and Disasters* 22, no 3 (2004): 23-42. For the importance of sociocultural vulnerabilities inherent in disaster risk in Madeira see: V. Nuno Martins, "A Ecologia Política dos Desastres na Ilha da Madeira: Vulnerabilidade, Adaptação e Risco, no Século XIX," *Arquivo Histórico da Madeira, Nova Série* 1 (2019): 231-262; and Sara Bonati, *I Paesaggi Vulnerabili tra Percezione e Resilienza: l'Isola di Madeira e le Cinque Terre come Casi di Studio* , doctoral thesis (Università degli Studi di Padova, 2014).

18
For the importance of knowledge of the past (memory and history) in studies and the management of disaster risk see: David Alexander, *Confronting Catastrophe: New Perspectives on Natural Disasters* (Hertfordshire: Terra Publishing, 2000), 105-128.

19
Reynaldo Oudinot, "Plano para o Reparo da Ilha da Madeira," in Matos et al., eds., *Um Olhar sobre as Obras e Providências de Reinaldo Oudinot* , 31-44.

20
Isabella de França, *Journal of a Visit to Madeira and Portugal (1853-1854)* (Funchal: Junta Geral Do Distrito Autonomo Do Funchal, 1970), 55.

21
Maria dos Remédios Castelo Branco, "Testemunhos de Viajantes Ingleses sobre a Madeira," in *Actas do I Colóquio Internacional de História da Madeira* (Funchal: SRTCE/DRAC, 1989), 198-246.

22
The Levadas are an ingenious network of aqueducts dug out of the Madeiran uplands, complemented by tunnels, underground chambers, and wells, which, since the beginning of the fifteenth century, have ensured the collection and controlled transport of water to the lower slopes, where the climate and relief are more conducive to human habitation. Today, they stretch about 1400 kilometers.

23
In 1939, Funchal City Council ordered the planting of bougainvillea to beautify the city's streams. In time, these plants grew to cover a considerable area of the now largely obscured stream beds, which, in turn, became an ex-libris of tourist Funchal, and were adopted by the local populace as the identifying brand of the city. The upkeep of the bougainvillea was one of the issues raised during the civic mobilisation against concreting over the stream beds after the 2010 mudslides, when their heritage value was vaunted, despite their being a very recent innovation and that they actually aggravated some of risks.

24
Rui Campos Matos, "Funchal Urban Planning in the 20th Century: Tradition versus Modernity," *Translocal: Culturas Contemporâneas Locais e Urbanas* 2 (2019): 82–92.

25
Ventura Terra, "Memória Descritiva e Justificativa," Plano Geral de Melhoramentos do Funchal (1915), 1.

26
Terra, "Memória Descritiva e Justificativa"," 3. Translator's translation.

27
Irene Lucília Andrade, *Protesto e Canto de Atena* (Leiria: Editorial Diferença, 2001), 18-23. Translator's translation.