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

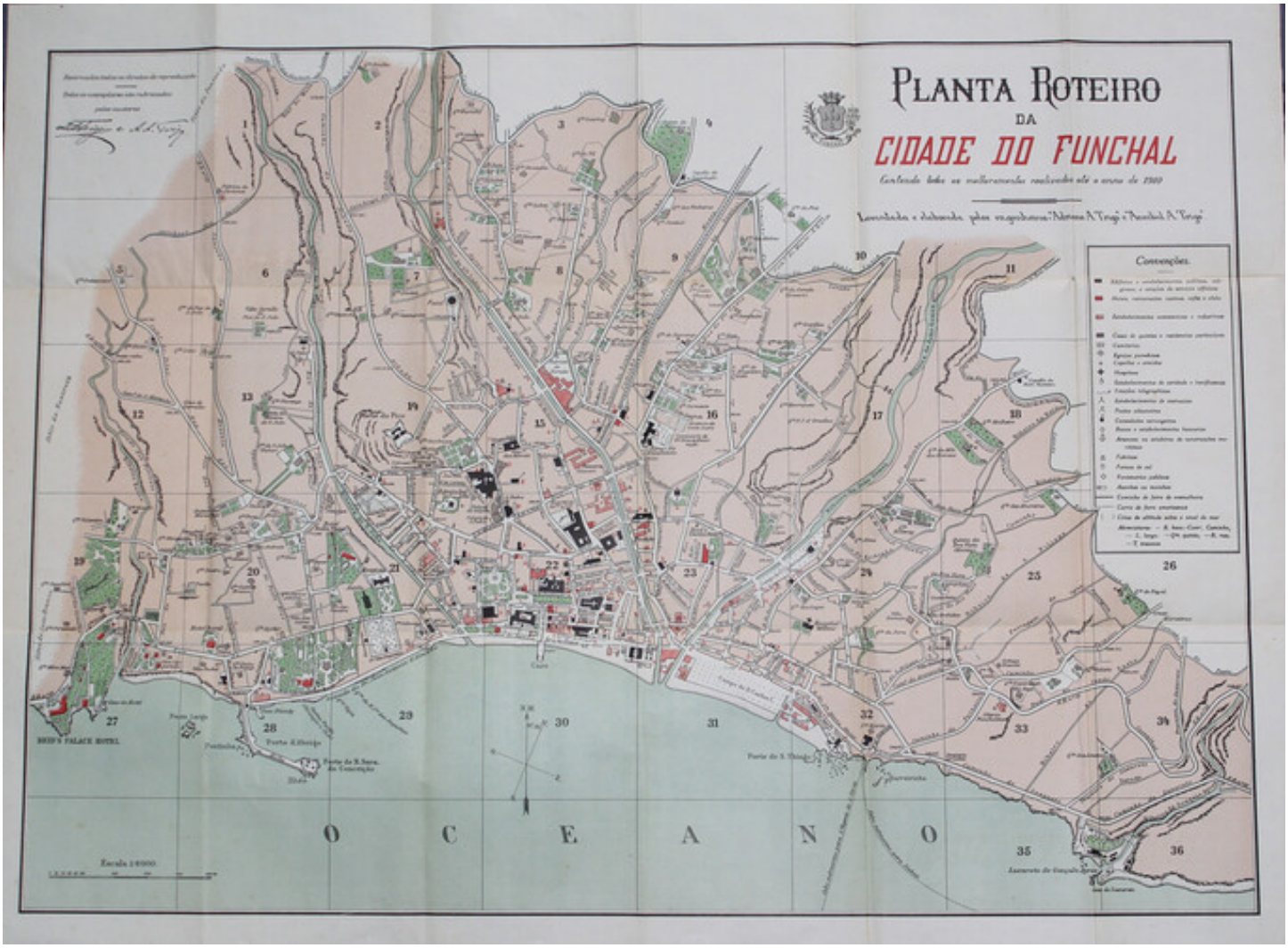
Alluvium of February 20, 2010 in João Gomes stream (Funchal), near the then-existing fuel station built over the stream bed. Photography by Elvio Fernandes. Courtesy of Empresa Jornalística da Madeira (EJM).

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

Translated by Russell Shackleford.

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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.