# *Art, Data and Climate Change: Investigations Between Image, Science, and Ecology*

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**Abstract**
In recent years, artistic expressions exploring the interactions between technology and nature have gained increasing prominence as they incorporate the political and social transformations associated with Anthropocene theory. Within what has been referred to as the 'Information Age' (Castells, 1996), artistic experiments have been unfolding with an increasingly heightened awareness of environmental crises and their connection to the capitalist economic agenda. Notably, collaborations at the intersection of art, science, and technology (ACT) with ecology have strategically employed creating artworks that explore multispecies relationships and incorporate non-hegemonic world perspectives. In this study, we aim to investigate the activities that connect art, science, and data visualization analyzed by artworks that include climate change in their discourse with the awareness of environmental crises and their connection with information systems and the capitalist economic program. The activities of artist-scientists will be explored. Also, an investigation that endorses the concern with the low entropy of Earth systems and recognizes in art the role of enabling new hybridizations with informational systems (data) and power systems analyzed through the activities of Florencia Levy (Argentina), Dillon Marsh (South Africa), and Claudio Filho (Brazil).

Keywords: Art, Data Visualization, Climate Change

## Introduction

The Global South experiences the most significant consequences of climate change, where activities like extraction, deforestation, and the disposal of toxic substances create an uninhabitable landscape. Consequently, socially vulnerable communities, including immigrant and peripheral populations in countries with widespread economic, political, and cultural marginalization, are increasingly exposed to more frequent and severe climate events (Dunlap & Brulle, 2015). The preliminary sections of this study will present three illustrations to substantiate the abovementioned claims: (i) Jargersfointein Mine activity, (ii) The ecological damages of large Data Centers, and (iii) extraction of rare earth minerals commonly used to produce technological devices.

In the center of South Africa, on a vast plain with rich soil and a mild climate, you'll find the Free State region. This area was one of the world's largest open-pit mining complexes for gemstones, including gold and diamonds. Mines like Kimberly, Koffiefontein, and Jagersfontein have achieved some of the highest levels of productivity ever recorded (Philip, 2016). Jagersfontein is historically significant for being the site where two of the ten biggest diamonds ever discovered. The mining activities back in 1870, although it wasn't until 1878 that the potential for productive extraction was fully recognized (Philip, 2016). Following this realization, Jagersfontein became the epicenter of the 20th-century "diamond rush," attracting a large number of people and yielding diamonds of exceptional quality, including the Excelsior and Jubilee diamonds:

> In June 1893, one of the largest diamonds in the world, the “Excelsior,” was discovered in Jagersfontein. It weighed 9713⁄4 carats (uncut), and until the discovery of the Cullinan Diamond in 1905, it remained the world's largest diamond discovered. (...) Two years later, in 1895, another large diamond weighing 634 carats (uncut) was discovered and initially named “Reitz” in honor of the then President of the Free State, FW Reitz. However, it was later renamed “Jubilee” in honor of Queen Victoria's 60th birthday. (Phillip, 2016 p.92-93)

The underground mining operations in Jagersfontein were initiated in 1910, and they ran almost continuously until 1971, except for two brief interruptions during the 1930s Depression and World War II (Phillip, 2016). The decision to close the mine was primarily attributed to diminishing diamond content at greater depths and the escalating mining costs. Throughout its history of exploitation, Jagersfontein has left behind a legacy of social and environmental destruction, which is emblematic of the broader region. Unfortunately, environmental impacts were frequently overlooked due to policies prioritizing extraction, driven by the high commercial value of gemstones.

Dillon Marsh, a photographer from Cape Town, is directly interested in examining the landscape transformations resulting from human activities. In his series *For What's It's Worth* (2014-2016), Marsh employs graphic manipulation to virtually integrate the quantities of materials extracted and the visible environmental consequences into the landscape. The South African open-pit mining complex was one of his artistic research. Especially Jagersfontein Mine, where 9.5 million carats of diamonds were extracted. Marsh's photography technique reveals the environmental damages left behind by human activities on the Earth's surface (Figs. 01 and 02). Marsh's photography manipulation serves as a direct indictment of the environmental impacts, which have long been acknowledged by scientists dedicated to studying contemporary activities of this nature. In Marsh's photographs, we can readily

observe a small amount of extracted material contrasted with the extensive devastation inflicted on the environment.[1]

Figures 01 and 02 (detail) - Jagersfontein mine, where 9.5 million carats of diamonds were extracted. Courtesy: Dillon Marsh Studio, For What It´s Worth (2014-2016). Available: http://dillonmarsh.com/fwiw.html

[1]Dillon Marsh *For What It's Worth* series includes the extraction of Cooper, Diamonds, Gold, and Platinium Group Metals. See: https://dillonmarsh.com/fwiw.html

In 2022, Jagersfontein reached global attention again, though this time not in the context of a diamond rush but due to a catastrophic event that caught international media headlines. On September 11, a series of technical incidents led to the crack of the mining company's tailings dam, resulting in a trail of devastation extending over 8.5 kilometers. The calamity entailed ruining homes, river and pasture flooding, injuries to considerable people, and harm to water systems used for humans and agriculture. The press reported that the flood had devastated over 160 houses, claimed at least one human life and the lives of hundreds of animals, and inflicted damage on more than 26 square kilometers of pastures (figs. 03 and 04).



Figures 03 and 04 - NASA Earth Observatory images by Lauren Dauphin, using Landsat data from the U.S. Geological Survey. Free access.

Emerging technologies driven by the availability of the World Wide Web in the early 1990s and globalization principles were celebrated as the forerunners of a 'new era' with great expectations of fostering democracy, connectivity, and opportunity (Crary, 2023, p. 91). Over time, technological media have gradually come to be seen as 'naturally established' (Crary, 2023), growing more distant from their underlying structural foundations. Technical objects are symbolic tools that 'emphasize diversity and promote the sharing of ideals with ease of assimilation' (Crary, 2023, p. 27). According to Baio:

> As even the simplest technical object becomes a symbolic machine, the ideas of media and technology clash, and these terms can sometimes become almost synonymous. A profound change then occurs that makes critics rethink their conceptual bases, and it requires the artist to reinvent his place and his action strategies. (Baio, 2015, p.40)

The internet complex[2] cultivated a broad imagination regarding the immaterial nature of digital technologies. However, contemporary literature is progressively focusing on another dimension of technology. The prevailing perspective on contemporary technologies as detached from material reality needs increased consideration of the consequences of the processes sustaining their development. As Crary notes, material and environmental realities are 'conveniently veiled by miniaturization, the apparent intangibility of wireless setups, the placelessness of data, and terms like virtual or cloud (Crary, 2022, p. 31).

James Glanz[3] uncovered the ecological consequences of energy consumption by large North American data centers. The report 'Power, Pollution and the Internet' (2012) elucidated that the problem was not only the energy required to sustain the system ─ around 6 to 12% ─, but also the energy spent on server maintenance, cooling, and accident prevention. Given the exponential data growth, the demand for energy and water to support the global digital infrastructure is rapidly becoming unsustainable. Glanz stressed the remarkable complexity of the physical infrastructures of data centers, which demand alarming amounts of energy to control the high heat levels. These levels damage the system's proper functioning, in addition to consuming millions of liters of water daily for cooling:

> Most data centers, by design, consume vast amounts of energy in an incongruously wasteful manner, interviews and documents show. Online companies typically run their facilities at maximum capacity around the clock, whatever the demand. As a result, data centers can waste 90 percent or more of the electricity they pull off the grid, The Times found. To guard against a power failure, they further rely on banks of generators that emit diesel exhaust. The pollution from data centers has increasingly been cited by the authorities for violating clean air regulations, documents show. In Silicon Valley, many data centers appear on the state government's Toxic Air Contaminant Inventory, a roster of the area's top stationary diesel polluters. Worldwide, the digital warehouses use about 30 billion watts of electricity, roughly equivalent to the output of 30 nuclear power plants, according to estimates industry experts compiled for The Times. The estimates show that data centers in the United States account for one-quarter to one-third of that load. (Glanz, *Power, Pollution and Internet,* 2012)

[2] Jonathan Crary introduced the term 'internet complex' to encapsulate the result of evolving arrangements that had been developing for several years, reaching a critical turning point with the internet (Crary, 2022)
[3] A New York Times journalist.

In 2016, the Argentinian artist Florencia Levy researched the extraction of minerals commonly used to produce batteries and screens, common in technological devices like smartphones, computers, and tablets. These minerals are also used in sustainable manufacturing technologies such as solar panels and wind turbines.[4] *Tierra de Ciervos* (2017) exposes the ambiguity of the immaterial narrative surrounding technology and its tangible consequences for ecosystems. The piece's title is the translation of *Baotou* (包头), which corresponds to the Chinese region of Inner Mongolia. A hyper-complex mining station located in 包头 is used mainly to extract the so-called 'rare earth.'[5] These rare earth elements are found in approximately 85% of smartphones manufactured worldwide (Landgraf, 2012). The region is responsible for approximately 44% of global rare earth extractions, and it was formerly known for its overgrown, cultivable prairies and resident deer population. At the center of 包头, as Levy observed, lies a 36 km² lake formed by 'radioactive sludge, nourished by toxic waste generated by a significant portion of the world's technological production' (Levy, 2023). 包头, often called the 'land of deer,' was once considered one of the most contaminated places in the world.[6]

*Tierra de Ciervos* (Figure 05) is also the artwork title of a photograph of the radioactive lake made by Levy. This photograph records an instance of censorship the artist faced while documenting rare earth mining. The photo is complemented by a QR code, providing documentation of the censorship incident.[7] Levy makes a compelling point when she states: 'We all carry a piece of China in our pocket.' The statement emphasizes that access to the internet through cell phones, computers, and other devices is only possible due to the extraction of these minerals.

Figure 05 - Photography by Tierra de Ciervos (2017), Florencia Levy. Open Acess.

[4]https://stopthesethings.com/2021/01/31/out-of-sight-out-of-mind-counting-the-colossal-cost-of-wind-solars-toxic-legacy/

[5] Rare earths constitute a group of 17 chemical elements essential to producing electronic devices. These elements are part of the *lanthanide* family. Despite their misleading name, 'rare earth,' they are relatively abundant in nature, with known reserves. These mineral resources are primarily found in bastnaesite and monazite but can also be found in xenotime apatite, and other minerals.

[6]https://www.news.com.au/travel/destinations/asia/baotou-is-the-worlds-biggest-supplier-of-rare-earth-minerals-and-its-hell-on-earth/news-story/371376b9893492cfc77d23744ca12bc5

[7] vimeo.com/172744571

Levy presented her research in the exhibition 'The Last Architecture' (2023), hosted at ARTHAUS in Buenos Aires. The artist explores how particular ecosystems are reshaped in the name of technological development, often leading to devastated environments. The exhibition includes documentary footage, photographs, sculptures, and documents, collectively exploring the expansion of extractive activities on land and ocean soils. The exhibition's title conveys 'architecture as a project and design that constructs the human habitat' (Levy, 2023), acting as an analogy for creating spaces that stand in contrast to the natural environment. Architecture performs as a mediator between the human and the non-human, embodying a system and structure of power (Levy, 2023). In the exhibition, *Lugar Fóssil* stands out as an immersive large-format installation video on three channels, presenting a dystopian narrative founded on testimonials regarding environmental and economic phenomena. *Lugar Fóssil* received the Trabucco Award and has been added to the National Museum of Fine Arts collection in Buenos Aires.[8]

The mining activity in 包头 exemplifies numerous social and environmental implications, bringing attention to its extensive devastation of ecosystems. It is especially concerning the impact of the use of technological devices on the lives of Global South communities. As Levy states, 'it is a system that encourages the extraction of resources regardless of the consequences' (Levy, 2023). However, as Crary (2023) points out, 'and yet most smartphone owners, social media users and Netflix addicts in the US have no idea of where Papua or Peru[9] are and have no interest in the lives of their peoples'. Most of us remain unaware that we carry traces of unprecedented destruction in our homes and pockets.

The examples above illustrate different aspects of a common issue: climate change and technological development are intrinsically connected to mechanisms of exploitation and the capitalist agenda. Nonetheless, there is a demand for broader awareness regarding technology's impact on ecosystems. Technological advancement relies on exploiting anything that benefits the capital, including 'demolition, clear-cutting, mountain-top leveling, mining, hydraulic fracturing, and the murder of civilian populations to secure resource-rich territory' (Crary, 2022, p. 43). Even though public discourse may have emphasized the advantages of technology, it is clear that environmental issues surround global production, power, and technology (Moore, 2015; Tsing, 2019; Haraway, 2016).

In the 21st century, addressing issues related to social, political, cultural, technological, and economic change without considering environmental factors has become increasingly challenging. Alliances between sciences, like climatology and biology, together with the

[8] https://www.youtube.com/watch?v=eM9dxyABXeA

[9] Crary stresses the capitalist extraction agenda through the example of open-pit mining: "Nothing better epitomizes the grim persistence of those ideals than the worldwide expansion of open-pit mining, mining on a scale of magnitude and savagery that dwarfs comparable activity during the so-called Industrial Revolution or during the twentieth century." In Crary's analysis, Papua and Peru are examples of Global South communities directly influenced by digital-capitalistic agendas. Quoting Crary: " (…) The Grasberg mine in the Indonesian province of Papua, The owner of the Grasberg mine, Freeport-McMoRan, manages dozens of comparably destructive mines all over the planet, including in Peru, Chile, Bolivia, Mauritania, South Africa, Zambia, and New Mexico. The operations of hundreds of other companies looting lithium for electric vehicle batteries, neodymium for wind turbines, coltan for Predator drones, nickel, molybdenum, and other elements for digital devices and networks, multiply this immeasurable scale of sociocidal extraction, especially in the Global South. In Peru, a Chinese company is in a decades-long process of literally leveling 15,000 ft Mt. Toromocho to recover several billion tons of minerals—another small instance of the capitalist cannibalization of the planet in the service of prolonging the imploding "digital age." The toxic methods of removing rare metals from mined ore cause irremediable harm to land, water, and human lives" (Crary, 2022, p.33)

humanities and technology, can strategically foster multidisciplinary collaboration to explore Earth's vulnerabilities while considering the well-being of populations and the economic systems. Addressing common to these issues is the challenge of handling the risks posed by our highly industrialized, globalized society (Ferreira, 2018).

Jason Moore introduces a world-ecology framework to address the gaps in the research of historical changes and interconnections between systems of domination, exploitation, and environmental history. World-ecology considers the role of ideology and cultural domination in describing history, emphasizing that history is inseparable from capitalism's impact on the environment. Embracing a world-ecology perspective is the 'claim that modern modes of thought and culture, power and accumulation constitute an evolving totality' (Moore, 2019, p.10). The objective of world-ecology is not to establish a fixed ideology to defend; instead, it seeks to foster conversations that generate emancipatory knowledge for planetary justice.

> That means, among other things, that we have given up the certainties of past knowledges. Those past knowledges are important and indispensable. At the same time, the modes of thought that have created today's planetary crisis will not lead us towards planetary justice. (Moore, 2019, p.10)

The world-ecology perspective places humans as an integral part of nature, and capitalism does not act upon nature but instead develops within its intricate web of life. Nevertheless, the perception of the relationship between humans and nature has continuously evolved in recent years, urged by technological progress and climate change. The initial decade of the 21st century saw the solidification and proliferation of technology's daily use, coinciding with the increasing prominence of the Anthropocene concept in discussions regarding the interaction between life sciences, society, economy, art, and ecology. Such movements, paradigms, and cultural practices have roots in modernity and, as in the most recent artistic production, collaboration between artists, biologists, and scientists has allowed creative speculation on new approaches to deal with this problem comprehensively.

**Uncertainty as a Starting Point: The Anthropocene**

The Anthropocene is the key concept surrounding this area. But more than just a term, I think of the Anthropocene as an operative way to explore the complexity of emergencies involved in the global systems. The term 'Anthropocene' was initially introduced into the geological community through an analysis conducted by the Stratigraphy Commission of the Geological Society of London (Zalasiewicz et al., 2008). A group of geologists presented to the International Stratigraphic Commission the suggestion that, due to evidence of contamination present on rock sediments, the Earth was entering a new era: the Anthropocene. This period is characterized by its strong interdependence with human activity, particularly the excessive accumulation of toxins resulting from capital expansion, which would be preserved in geological records for millions of years, even in the event of the potential extinction of the human species.

The issues surrounding the Anthropocene are not limited to contemporary academic research. The discussion of the limits and hazards of the post-industrial production model became a significant area of study in the mid-1970s, with many authors devoted to examining environmental and social challenges resulting from the fast growth in production (e.g., Illich, 1979; Dupuy, 1980; Hannigan, 1995; among others). In a subsequent but equally reflective context, the German sociologist Ulrich Beck explores the intricate interactions between the

environment and society. Beck introduces conceptual terms such as 'risk', 'uncertainties', 'changes,' 'territory,' and 'reflexibility' to the academic lexicon of that period. Beck (1998) posits that climate change can be comprehended as one of the several risks from technological and scientific progress. He points out that these risks possess distinct characteristics compared to those from pre-industrial and industrial societies. Similarly, in 'The Sociology of Environmental Issues: Theoretical and Empirical Investigations' (2018), Leila Ferreira emphasizes:

> These new post-industrial risks are characterized by their global reach, the incomplete knowledge of their causes and consequences, and by the fact that they are incalculable and impossible to be compensated and invisible most of the time (that is, phenomena that require specialized knowledge for both their recognition and their measurement). Therefore, these risks are uncontrollable and difficult to assign responsibility, in addition to being often irreversible. (Ferreira, 2018, pg.10)

The environmental crisis is one of our era's most pressing global emergencies. It is a planetary issue with profound social, political, and economic consequences. Hence, it is pertinent and logical to contemplate our environment through the lens of the technologies and socioeconomic frameworks that envelop us. Our motivation lies in creating endeavors that interlace art, ecology, and technology, aiming to harness their combined potential as a catalyst for collective engagement. This aims to broaden the dialogue surrounding the challenges the climate regime poses.

**Visualizing the Climate Change**

Artists' exploitations are crucial in elucidating the intricacies of the Anthropocene and its connections to climate change. In the swarm of working with the Anthropocene, data visualization is a tool to enhance actions to address climate change. Data visualization is the presentation portion of large-scale data, characterized by its volume, variety, velocity, and value (Mayer-Schönberger & Cukier, 2013). It involves transforming numerical data into a model, which is then visually rendered, facilitating the statistical analysis of the information. Data visualization is perceived as a dynamic intermediary that incorporates the rationality and objectivity of science with the creativity of the arts. This intersection refers to a longstanding tradition of visual representations encompassing perspective drawing, photography, cinema, television, and computer graphics (Kominsky et al., 2019).

The challenge of working with Art, Science, and Data Visualization lies in absorbing and translating data into other perceptions beyond its graphical representation. Doris Kominsky (2019) underscores the necessity for critical engagement with data visualization. Kominsky argues that visualizations are not mere reflections of reality but are interpretations akin to other forms of media or representational tools (Kominsky et al., 2019, p. 43). Acknowledging that data are filtered through the perspectives of those who collect and present them—whether scientists, researchers, politicians, journalists, or artists—reveals an inherent subjectivity and potential for bias.

A significant barrier to climate change awareness is scientific denialism. Déborah Danowski characterizes this movement as 'a complex and grave phenomenon, widespread in contemporary society, essential in the cognitive, emotional, and political stagnation confronting global warming' (Danowski, 2018, p. 4). Danowski identifies political denialism of environmental data, influenced by economic powers granted in continual growth, as a

contributor to the problem. This stance often leads to disregarding the impact of climate change and focusing on insular preservation rather than engaging in global mitigation efforts (Danowski, 2020).

For these reasons, a discussion between art, science, data visualization, and climate change emerges, making it necessary to structure different pathways of projects to make visible and more approachable information and public policies. There is an urgent need to raise awareness around environmental measures and alternative modes of actively contributing to the discussion. With climate change consciousness, we believe that multidisciplinary research can create accessible ways for the general population to take part in decisions around the severity of the current climate scenario. Therefore, it also becomes the role of artists to deal with data mapping, decode, and translate them for better recurrent communication.

> Art has always been related to the materials and technologies of its time and its social and political moment. But how can information be converted into art? For some time, visible forms no longer represent the world. A new perception is offered today based on data visualizations, capable to make the invisible visible. If data comprises the texture of our routine, perhaps its visualization can lead us to new stances and attitudes. It is time to listen to the voice of the numbers to trace the strategies needed for navigation amidst this tsunami of data in contemporaneity. It is time to transcend the utilitarian aspect of this representation to find poetics in the data. (KOSMINSKY et al., 2018, p. 25)

**Visualizing the Lichens: What Do They Say About Climate Issues?**

Data visualization can be an intersection point between Art and Science. However, what is the capacity of data to describe climate change or even if data can create new world perspectives? What can non-human organisms teach us about inhabiting the Earth? What narratives do world-making data hold? Additionally, in collaboration with artists and scientists, how can data contribute to speculations about intricate systems beyond the human-centric logic? These questions may sound unconventional, but they aim to foster human-nature relationships where "man" no longer occupies the central role in every interaction, whether with nature, technology, science, or the arts.

Data visualization in bio-hybrid experiments can challenge human exceptionalism, recognizing the complexity of shifting away from human-centered logic in every form of analysis, knowledge creation, and social engagement. Based on multispecies studies, many descriptive scientific narratives of nature depart from emphasizing the intricate and sometimes contradictory ways of understanding, valuing, and coexisting with diverse life forms. The most distinct life forms demonstrate diverse modes of existence in various collaborative contexts.

Non-human organisms, including fungi, bacteria, lichens, and mosses, in unconventional collaborations, showcase remarkable synergy. Illustrating the microbial richness beneath our feet, even in small spaces like gardens. A tiny tropical forest plot reveals a staggering abundance—approximately 1 trillion bacteria, 10 thousand protozoa, 10 thousand nematodes, 100 million actinomycetes, and 25 kilometers of fungal hyphae. Notably, these numbers exclude macro and microarthropods, surpassing the total human population that has ever inhabited our planet (Young & Crawford, 2004).

Nonetheless, understanding the agencies of organisms like lichens and mosses can be complex. It requires speculation, as stated by Stephen Shaviro: "The world doesn't fit in our own cognitive paradigms and narratives modes of explanation, and this is why speculation is necessary" (Shaviro, 2016, p.11). With a specific focus on these organisms, I conducted the Lichens_(2021). This initiative is committed to addressing issues related to ecology, and climate change with linches investigation through poetic data visualization methods.

The methodology developed from capturing, cultivating in vitro, cataloging, and composing descriptions of lichens and mosses in a specific landscape. This approach draws inspiration from the work of anthropologist Anna L. Tsing, who uses the spores of a mushroom as a methodological tool. Tsing's work with spores acts as a reflection on the ideas of Marilyn Strathern. The spore launches on a journey "beyond the life worlds imagined by her, even as it engages in a Strathernian mode of analysis: reification for the work of comparison" (Tsing, 2019, p.65). By guiding us through the life of a spore, Strathern disrupts the "somnambulistic lull" of conventional analytical methods. It's important to note that this creative approach to reifying an object does not compromise scientific rigor; instead, it unlocks boundaries.

Lichens are organisms assembled through symbiotic mutualism between an alga (or cyanobacteria) and fungi. This association, which has been in existence for approximately 2.5 billion to 543 million years, typically involves a single-celled green alga like Trebouxia, Pseudotrebouxia, Myrmecia, or cyanobacteria such as Nostoc or Scytonema. The fungal partner may belong to the Ascomycete (about 98%) or Basidiomycete (about 2%) groups. However, the appearance of the fungi within the lichen differs significantly from its morphology when growing independently. Each lichen species corresponds to a specific fungi species, which forms the basis of lichen classification. There are 15,000 to 20,000 described lichen species in various classification systems. Lichens can be found in mixed habitats, ranging from glaciers, rocks, trees, and leaves to deserts. Lichens often colonize harsh environments with limited nutritional resources, such as rocks. Lichens exist as organisms only through mutual association; the alga provides sustenance, while the fungi offer protection that enables the alga to survive even in terrestrial environments. The study of lichens reflects fostering a collective survival marked by mutualism, symbiosis, and interdependence among systems. It beckons us to delve into the narratives woven by these organisms, shaping our world. Collaborating with artist speculation lichens provides fresh approximations about intricate systems beyond conventional objectivity and human-centric perspectives. In doing so, they invite us to reimagine our relationship with the Earth and its diverse inhabitants.

Linchs_(2021) (Fig.06) is rooted in artistic exploration while upholding a commitment to scientific rigor. The artwork incorporates images of degraded environments—specifically, the Atlantic and Cerrado forests—with carefully crafted texts and poems. The objective was to stimulate reflection on the integration of lichens with photographs and texts about damaged environments, nurturing alternative forms of symbiosis.

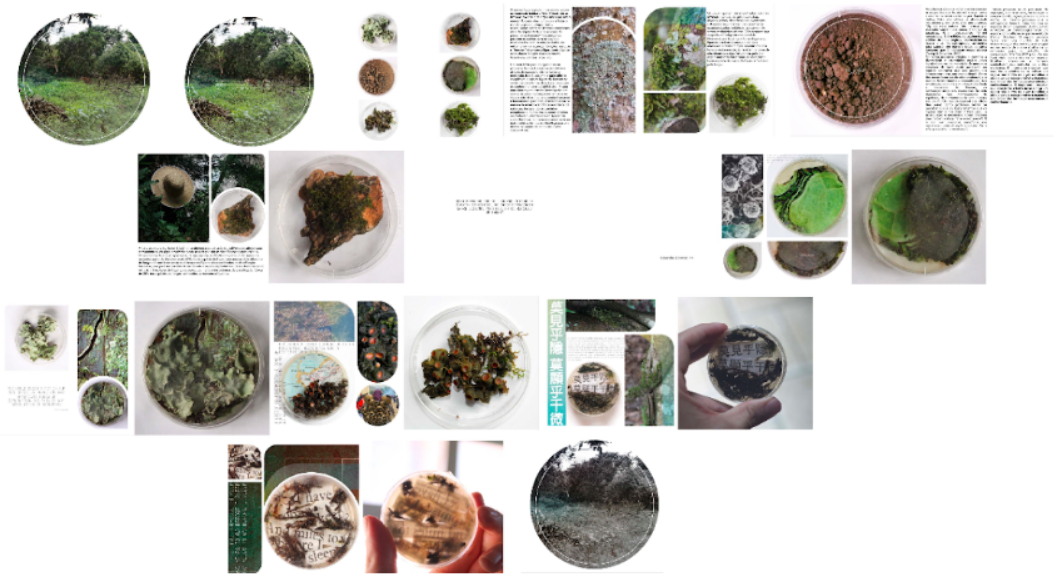

Figure 06 - Visualization of Lichens research and artistic experimentation.

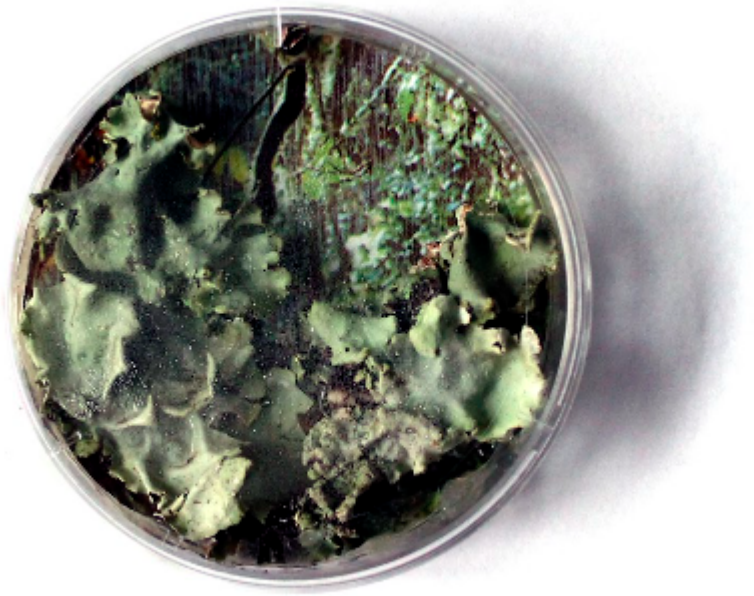

Figure 07 - Lunches with Atlantic environment photo association (detail).

**Conclusion**

Susana Dias, a professor at Labjor-IEL (University of Campinas, Brazil), offers a crucial insight into climate issues and the Anthropocene. She emphasizes our role as creative agents in shaping new models of the world. Referring to the differentiation between Humans and Terrans by Latour in Onde aterrar? (2020), Dias perceives our presence on Earth as that of

refugees. Dias suggests that we should recognize that Terrans inhabit a damaged planet with limited refuges, fully aware of the imminent climate catastrophe. They work towards an effective Earth policy, which is how they navigate the Anthropocene. As Latour puts it, "What could have been good for Humans, it lost all meaning for Terrans" (Latour, 2014, p.7). Occupying the Earth as a refuge adds another layer to the Anthropocene debate: Who among us will be the exiles seeking refuge on Earth? It is essential to acknowledge the vast cultural differences on Earth, including among Amerindians, aborigines, Orientals, and Indians, each of whom possesses unique conceptions of nature and distinct relationships with organisms and non-human entities. But the climate issues of this century are a common factor.

Given the intricate relationships within organizational systems involving humans and non-humans, leveraging both technological and natural data structures, this article explored the possibilities of Art, Science, and Data Visualization. Drawing on data from reports like the IPCC, the increasingly complex nature of these interactions necessitates multidisciplinary and collaborative efforts. Artists and scientists, as strategic mediators, contribute to creating knowledge challenging the Anthropocene project. This collaborative fusion operates under a new perspective, actively engaging with the environment and problematizing the Anthropocene through traditional interfaces or technological systems. The resulting art forms act as powerful agents of contestation, reshaping our understanding of organisms and technologies capable of transforming the global landscape structure.

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