Biosemiotics (2024) 17:67–92
https://doi.org/10.1007/s12304-023-09551-w

RESEARCH

Atacama Desert's Solastalgia: Color and Water for Dumping

Carolina Sánchez De Jaegher[1,2]

Received: 6 July 2023 / Accepted: 5 December 2023 / Published online: 11 January 2024

Abstract

The blooming desert or '*El desierto florido'* in Spanish, is a millenarian climate pattern caused by *El Niño* that warms the surface waters in the eastern tropical Pacific Ocean and creates the conditions for rain in the Altiplano and the *Atacama* Desert, north of Chile. After some millimeters of abundant rain, a rich biotic community emerges, and in a matter of hours or days, the driest surface on Earth becomes an impressive colorful habitat for more than two hundred different species of eye-catching flowers that host the desert biotic life.

Unfortunately, this breathtaking display of colors coexists with less appealing but equally astonishing landscapes. The *Atacama* Desert harbors the largest accumulation of discarded clothing worldwide and the largest pools of lithium mining which require vast amounts of water for their production. Every year, approximately 56,000 tons of used clothing, predominantly consisting of fast fashion polyester products, water-intensive cotton fabrics, and equally polluting material scraps, are deposited, forming toxic mountains of waste.

This article presents an interpretation of these distinct landscapes as interconnected realities of the dump that illustrate the impact of biocultural semiocides, whereby the loss of relationships and meanings with Earth materials is shaped by glocal forces. By making this argument, the article contends that the *Atacama* region replicates the conditions of the Earth as a global dumping and solastalgia, namely 'the pain caused by the loss of solace and the sense of desolation connected to one´s home and territory.'

Keywords *Atacama* · *Aral* Sea · clothing · dump · techno-body dumping · biocultural semiocide · solastalgia

✉ Carolina Sánchez De Jaegher
carolina.sanchez@uclouvain.be; c.p.sanchez@uu.nl

[1] UCLouvain Centre de Philosophie du Droit de l'UCL (CPDR), Louvain-la- Neuve, Belgium

[2] ICON Institute for Cultural Enquiry at Utrecht University, Utrecht, the Netherlands

Introduction

Mainstream western scientific theories assert that human activities are causing irreversible harm to the planet. Terms like species loss, mass extinctions, life-threatening scenarios, and catastrophic environmental events, including references to 'Armageddon-like events' (Wilson, 2002: 43; Barnosky, 2014), are currently widespread in Western discussions about the ecological crisis resulting from human's overconsumption of Earth´s resources. However, critics argue that many of these extinction theories are flawed because they rely on a vague concept of humanity's agency, which tends to obscure accountability for the ways and processes that have accelerated climate change (Davis & Todd, 2017; Haraway, 2015; Mitchell, 2016). For instance, Mitchell points out that invoking an abstract idea of humanity's accountability in the ecological crisis 'masks the vast inequalities of harm and suffering that attend global patterns of ecological rupture' (Mitchell, 2016, p. 914).

Biosemiotics assumes a pivotal role in unraveling the environmental crisis by identifying the Anthropocene as an era shaped by human influence on diverse ecosystems and their communication networks (Sharov & Tønnessen, 2021, Chapter 11). Within this narrative, Indigenous perspectives underscore the breakdown of human relationality with all life as the primary catalysts for the environmental crisis (June, 2022; Burkhart, 2019; McGregor, 2018; Mills, 2016; Pichinao Huenchuleo, 2015; Serres et al., 1995; Wall Kimmerer, 2013; Whyte, 2017). This article delves specifically into this latter perspective and its intersection with biosemiotics and culture in the Atacama Desert. Harmonizing with both articulations on the Anthropocene, the article challenges the notion that the causes of the environmental crisis lie merely in the human overconsumption of Earth materials. Instead, the argument posits that an important root of the environmental crisis resides in an unrelated ethos—the Anthropocene—an approach to being and existing in the world in negation of the reciprocity principles and complementarity with the more-than-human worlds. Failure of reciprocity, namely neglecting to give back to the land what is taken from it and overlooking the inherent human complementarity to all life without exception, can thus serve as explanatory tools and pedagogies beyond extinction theories (Sánchez De Jaegher, 2023).

In developing this argument, the article integrates insights from *Pachasofía* to demonstrate that a biosemiotics analysis of the dump in the *Atacama* Desert cannot be divorced from the global and local erosion of relationality with Earth's materials. Put differently, the waning relationships with Earth materiality that leads to the depletion and eventual collapse of ecosystems' essential ability to communicate and sustain life is subjacent to the interests and focus of biosemiotics on culture (Hendlin, 2019). To underscore this point, the article widens the discussion by integrating seemingly unrelated geographies in a metaphorical interpretation that connects the *Atacama* Desert in Chile, (in Latin America), as the burial ground for the *Aral* Sea disaster in Central Asia. This approach aims to articulate the geographical configurations influenced by both the dump and the techno-body.

The article expands further in this metaphorical view establishing links with the water scarcity in the *Atacama* Desert and the production of lithium for the

green energy transition as examples of the article's main argument. In doing this, section 2, the "*Pachasofía* and the Andean *Buen Vivir"* offers a description of the *Pachasofía* as the orature of land in opposition to glottocentrism to establish the first connections towards the relations between culture, biosemiotics and Andean ethics; section 3, "Dispossessions embedded in the concept of biocultural semiocides" develops a thesis of dispossession expanding Puura's concept of semiocide into biocultural semiocides driven by the techno-body; section 4, "Mourning the Aral Sea in the Atacama Desert dump", speculates in the metaphor of Atacama Desert clothing dump as a burial place of the Aral Sea, the intention of this metaphor is to illustrate further the concept of biocultural semiocide developed by Puura and its significance in shaping accountability in ecocide crimes. The section sheds light in the relations between international law and biosemiotics evidence; section 5, " The Atacama polyester dump: as a site for the planet largest hydrocide" explores further the manifestations of semiocide as biocultural hydrocides where the production and use of polyester is seen as important pollutant and an obstructor of desert hydro-mechanisms like the ocean mist thereby significantly helping to deteriorate *Atacama*'s ecosystems; section 6, " Interrelated landscapes of a larger problem: the territorial orderings of the dumping era" offers a reading of the clothing dumps and the Atacama blooming desert as intricately interconnected representations of the territorial orders created by the dump, where two sharp contrasting realities coexist under similar exploitative principles; section 7, "*Atacama*'s *solastalgia*, pain and joy: the loss of the flamingos' *umwelten* and the *talatur* cultural practice of relationality" looks at the etymology of the word 'desert' to develop an argument that still depicts *Atacama* as barren terrain whereby the exploitation of mineral needed for the green transition happen at the cost of the deterioration of culturally and emblematic ecosystems like the *Salar de Atacama* and its flamingo populations. By showing the loss of the flamingos umwelt-ecosystems through human intervention, it is also suggested that the cultural relationships with the desert weaken as the flamingos' populations are vital for the *Pachasofía* of the desert in general, yet in contrast, the cultural practice of talatur is described to offer the other side of solastalgia, namely the joy in resisting destruction by reconnecting to water, sacred entity in the *Pachasofía*; section 8, "*Atacama* Desert's gardeners, polluters and the *Chacu* ancient practice of textile production" presents a reading of the dump exploring the etymology of the word *Wanaku* and the practice of the *Chacu* contrast with the technological waste dumping, both performing dumping actions which have different consequences; section 8, the conclusion offers a reflection taking into account all the sections.

The *Pachasofía* and the Andean *Buen Vivir*

The concept of *Pacha* encompasses multitude of meanings and dimensions that cannot be fully explored within the scope of this article. However, to delve into the main argument, it is crucial to highlight certain interpretations that associate the term *Pacha* with the cosmic order observed in different aspects of Andean

reality and its expression in the *Pachasofía*. Inherent to the concept of *Pacha* is the notion of Andean times and the spaces of the house (land) and universe (cosmos), where the life-sustaining energy exists embedded in the manifestations of salt flats, water springs, hills, mountains, the blooming desert, the flamingos and so on. Accordingly, the *Pachasofía* (Pachasophy) can be articulated as the orature of the land hence, it means the act of philosophizing the *Pachamama* along the Andean cordillera, which is not Earth but just a portion of the whole network of lives dwelling the Andean worlds. The *Pachasofía* emphasizes the role of the Andean *runa/jaqi* (Andean way of being) as caretakers of the house (the *arariwa* task /guardianship) and as co-creators of all that exists and make the Andes an extraordinary umwelt of particular and diverse ecosystems that exists in highly harsh climate conditions (Estermann, 2013, 2021, pp. 183–202). In the realm of Andean philosophizing, specifically within the *Pachasofía* as practiced by the Quechua and Aymara Indigenous communities, the concepts of time and space are interwoven into a cultural symbiosis with the intricate web of existences that thrive in the Andes landscapes.

Put it simply, the existence of the *Pachasofía* is inseparable from the cyclical presence of the Andes Umwelt, which is not an environment in general, but 'the environment which holds' cultural 'significance for any particular species' encompassing all tangible and intangible existences within it (Wheeler, 2006, p. 101).

The *Pachasofía* (*Pachasophy*) asserts that time and space are inherently linked to the multitude of temporal dimensions within the land and the cosmos. This connection forms a cyclical reciprocity that embraces the complementarity of all forms of life, leaving no exceptions. Thus, the *Pachasofía* is a cosmovision that emerges from the 'nurturance of life' founded in the harmonic movements of the *pacha* as the life sustaining energy connecting the runa/jaqi (the Andean way of being), the-more-than-human which is not nature, and deities who are considered equal beings in a joyful reciprocity and complementarity interaction (Gonzalez & Gonzalez, 2010, p.83). The *Pachasofía* is manifested in traditional *Atacameño* rituals and in ties that these communities have maintained with Earth beings like water and the flamingos to name a few that are considered sacred, living entities playing a major role in the life cycles of people (Parra & Moulaert, 2016). To give an introduction of the way culture and biosemiotics intersects with the *Pachasofía* and the idea of Earth beings, the *Kunza* Indigenous communities residing near the *Atacama* salt flats hold the flamingos or *Parina* in *Quechua* and *Parihuana* in *Aymara* as playing a crucial role in the symbiotic relationships of knowledge with the desert hydric cycles. For instance, the *Kunza* first nation utilizes flamingo feathers as offerings in ceremonies devoted to water (Yánez, 2021).

The concept of *Pachasofía* (*Pachasophy*) encompasses two fundamental aspects. On one hand, it serves as a broad term that underscores the philosophical traditions of the pre-Inca and Inca civilizations that thrived and still thrive along the Andean Cordillera, known generically under the term *Atacameños*. On the other hand, *Pachasofía* serves as a critique of the Eurocentric concept of philosophy, emphasizing that the predominant reliance on written texts from individual thinkers as the primary sources of philosophical discourse tends to marginalize alternative modes of engaging with philosophy. This approach implies that cultures lacking written

texts and attributed authorship are hindered in the cultivation of authentic philosophical thought.

The focal point of this critique revolves around the common perspectives held by Indigenous and African critics regarding the concept of orature (oral traditions), which has often been used as a Eurocentric framework to explain non-Western philosophical thought (Burkhart, 2023; Jackson, 1991; Passeri, 2011). '*Orature*' signifies a unique form of literacy and wisdom, serving as a critique of the colonial erasure and dismissal of alternative modes of thought and doing philosophy that do not primarily rely on written text to validate philosophical ideas (Barber, 1995; Na'Allah & اذ 'ديبشرلا ديبعملا, 1997). The *Pachasofía*, as the orature of the Andes lands, embraces this crucial standpoint, endeavoring to reclaim and authenticate their ancestral philosophical roots[1].

The *Pachasofía* expresses interpretations of lived experiences in several practices, ceremonies, and communal thinking, some of them like the *chacu* and the *talature* will be later discussed to further illustrate the intrinsic relationships between biosemiotics and culture. The orature of the Andes lands also manifests through intricate non-linguistic pictorial semiotic worlds, such as carvings and ideograms, architecture, and even hydro engineering design (Estermann, 2009, 2013; Herrera Wassilowsky, 2019; Villaseñor-Galarza, 2021). Remarkably, many of these ideograms and carvings can be observed amidst the *Atacama* Desert, tracing the paths of the blooming season, the lithium deposits, and even along the remnants of discarded clothing hills (Valenzuela et al., 2018).

Within the *Pachasofía*, the focus is placed on interpreting lived experiences rather than assessing whether a culture possesses a written tradition or the notion of individual authorship. The central focus is to comprehend and interpret the essence of these experiences, irrespective of whether they are expressed through written symbols or other forms within a culture (Estermann, 2013). Therefore, it is crucial to emphasize that while ideograms play a role in intertwining the *runa/jaqi's* time (the Andean way of being)[2] with the desert, the pictorial representations are not an absolute prerequisite preceding the experience of belonging to the desert. Still, the Andean pictorial legacies hold significant importance as knowledge heritage and testimonies that arise from alternative forms of existing, expanding the horizons of what is traditionally regarded as philosophical discourse.

[1] It is important to highlight that both traditions, Indigenous and African, critically engage with their colonial legacy, yet steer clear of the colonial trap of determining what qualifies as genuine or inauthentic philosophy, recognizing the profound colonial underpinnings of this query (Burkhart, 2023).

[2] I deliberatively avoid the term 'human being' due its deep colonial connotations to translate the runa/jaqi. Runa is the Quechua word for person, people and Jaqi is the word for person/people in Aymara. Yet, it is important to emphasize that there are several other pre-existing Andean nations with their respective languages that were influenced by the pre-Colombian empires in the Andes area. Ckonti for instance denotes the word person/people in Kunza, the language of the Lican Antay. The translation I offer here for the Runa Jaqi denotes belonging in a broad sense to the Andes and their different landscapes of which one is the Atacama Desert. For literal translations in Quechua and Aymara see online dictionary: https://www.katari.org/diccionario/diccionario.php. For Kunza language see the only existing dictionary of this almost extinct language: http://www.bibliotecanacionaldigital.gob.cl/visor/BND:9884

In this context, *Pachasofía*'s critique of the Eurocentric notion of philosophy aligns with the biosemiotics critique of glottocentrism and the exceptionalism that comes with perceiving the world solely as a constructed discourse (Cobley, 2016). In other words, the relationships between culture, biosemiotics and the *Pachasofía* show that symbiotic worlds are also constructed through ceremonies and practices of relation that involve not only humans but also the-more-than-human which is not nature. Glottocentrism lays the groundwork for the exceptionalist fusion of language and text, asserting that only language shapes our comprehension and material representation of the world. But, as Cobley points out, 'while culture rests on language, the implication is not that culture is to be understood through language alone; such glottocentric focus is a forgetting of 'the dual verbal/nonverbal heritage of human modeling... as humans and their culture cannot be divorced from nature' (Cobley, 2016: 126).

Accordingly, the *runa jaqi*/Andean way of being and *Pachasofía* are inseparable from the Andes umwelt and its biosemiotics systems, which serve as the primary foundation for the *runa/jaqi's* own cultural expression and knowledge of the desert. And just as human culture relies on the land, spaces, and universes that shape human semiotics systems, the natural worlds of the Atacama Desert depend on the climate interactions and undetermined encounters that have contributed to the formation of their species communication signals. An illustration of this is the Atacama blooming desert, a phenomenon that only happens if specific climate conditions meet every seven or ten years to activate the signaling systems of dormant life in the desert for further reproduction and dispersion of seeds through pollination (Campos Nazer et al., 2022).

An assessment inspired from the *Pachasofía* about philosophical *Glottocentrism* may be articulated as colonial form of silencing rooted in the Anthropocene and necessary condition of the dumping era. Glottocentrism disregards the crucial relationship between humans and the environment, and the loss of these relationships are inescapable characteristics of the dump. The dump is the 'result of persistently devaluing and trashing the world here-below, treating it as a vast wastebasket' (Marder, 2019: 81). Further, the *Atacama* Desert dump stands as a vivid representation of *Pachasofía*'s critique inserted in the Indigenous *Buen Vivir*, which emphasizes significant human responsibility in preserving balance and condemns the behavior of individuals who prioritize their personal moods of existence over the delicate and interconnected equilibrium of the multiple times of the land[3].

To wrap up this section, numerous works delve into Andean ethical principles such as *Suma Kawsay* and *Suma Qamaña*, which Western academia has translated as *'Buen Vivir'* or 'Good Living.' However, a more nuanced understanding can be found in the term 'living well together,' as advocated by Albó (2011, 2018). Both conceptualizations represent critical Indigenous contributions in response to the dump era spawned by economic development reliant on unsustainable exploitation of natural resources. *Suma Kawsay* originates from Ecuadorian Indigenous

[3] This statement is not an essentialist view of Indigenous ethics; Indigenous worlds are not immune to the dump. Yet, it highlights ancient ethics of relation and complementary with the land.

communities and has been enshrined in the Ecuadorian constitution. This constitution, known as the *Montecristi* constitution, notably became the world's first to recognize the rights of nature. Similarly, *Suma Qamaña* is a concept rooted in the *Aymara* communities of Bolivia and is an integral part of the constitutional framework in that country. The *Buen Vivir* stands as a profound critique from Indigenous communities of *Abya Yala* (Latin America)[4] toward the concept of development, which has faced significant discredit among those who have experienced extractivism's effects firsthand (D'Alisa et al., 2015).

The notion of Buen Vivir, often presented with an elevated romanticism and lacking in-depth comprehension of Indigenous wisdom, should not be regarded as a one-size-fits-all recipe for success. The *Buen Vivir* encloses Indigenous scientific knowledge condensed in practices of good coexistence of which one is the guardianship of the web of life. The *Buen Vivir* is not a political mainstream concept unrooted from the territory but a concept of Indigenous land ethical governance (Albó, 2018, Chapter 21; Albó, 2011). Indigenous *Buen Vivir* stresses the importance of acknowledging and honoring interconnectedness agreements with the land, while also recognizing the potential consequences of violating them. One example of this is the concept of co-ownership of the space-land-universe with the more-than-human entities that extend beyond the division lines of the human and non-human held by the idea of nature (Sánchez De Jaegher, 2023).

Dispossessions Embedded in the Concept of Biocultural Semiocide

As human lifestyles increasingly detach from the temporal and spatial aspects of all life, the emergence of massive landfills as the Atacama one, is parallel to the techno-body that consumes and emits techno-excrement, further contributing to the dispossession of the Atacama Desert from the Andean *runa/jaqi* (the Andean way of being, its ethos and landscapes). The dump reinforces the colonial notion of land as empty places without people and only with biological life, a doctrine that was known as *Terra Nullius* to dispossess aboriginal first nations from their lands (Lindqvist et al., 2014).

Extractivism and the techno-body are indispensable prerequisites for the existence of the dump (Marder, 2019; Marder, 2022). In alignment with this, the temporalities of the techno-body signify the dominance of the dumping era over Earth's materiality, exemplified by clothing discharges and overextraction of the desert subterranean water resources to produce lithium, which leads to huge water waste and human-induced drought in a place where water has always been scarce.

The domain of biosemiotics emphasizes the inseparability of humans from their semiotic systems (Cobley, 2016). The erasure of the *runa/jaqi's* temporality (the Andean way of being in its temporality) and the life in the desert at large can be comprehended through dispossessions evident in the occupation of the Atacama Desert by the colossal dumps and extractive activities, causing significant harm to

[4] Abya Yala corresponds to the Indigenous notion of the Latin American continent.

biosemiotics systems established in the desert. This section presents an interpretation of these dispossessions as biocultural semiocides driven by the techno-body, a force that enables the transformation of Earth through the excessive production and alteration of Earth materials without due consideration for the impact or jeopardizing of vital temporalities within ecosystem cycles. With this perspective, submerging the Atacama Desert in the dump culture entails acknowledging it as a locus for manifestations of biocultural semiocides. Such an assessment calls for a broadening of the conceptual tools put forth by Puura's notion of semiocide.

According to Puura's, a semiocide occurs when the semiotic connections forming the foundation of an ecosystem's perceptual environment are irreparably and permanently damaged. Semiocide extends beyond the scope of simply describing species extinction or attributing the main cause of global warming and climate change solely to an undefined humanity. In looking at accountability in Puura's definition, two actions are highlighted: "stealing a part of a former landscape identity and relations" and the "banishing of people from their home signscapes" through "a situation in which sign and stories that are significant for someone are destroyed because of someone else's malevolence or careless[ness]" (Puura, 2013: 152; Uslu, 2020). This paper extends Puura's concept of semiocide by exploring its biocultural dimensions and using it to develop further in the act of 'stealing' the forms of dispossession that encompasses the stealing of cultural relationships with the land through the disappearance of biosemiotics systems from multiple *umwelten* that inhabit the land[5]. Umwelt is understood here as the-more-than-human world's modelling of its surroundings (Sebeok, 2001: 195)[6].

Biocultural semiocides involve the loss of relationships with Earth's materials and the *glocal* repercussions of it which involve a dual form of accountability: the local and the global. The *glocal* inverts the order of the global and underscores the responsibility of the local in global situations attaching climate security, environmental destruction by industrial countries and the unnecessary overconsumption and waste of raw materials (Gupta et al., 2007). Biocultural semiocides anticipate the loss of Earth and its solastalgia which cannot be conceived as extinction insofar as biocultural semiocides drive the attention to the processes and increasing separation of human semiotic systems from the fabric of the world. A biocultural semiocide is made by the damage and vanishing of the cultural relationships established with the different ecologies of the land but also by the abandonment of traditional and sustainable techniques of production embedded in the reciprocity and complementarity principles. Biocultural semiocides are defined by their glocal repercussions on an

[5] A better translation for Earth in Indigenous cosmologies would be land and the knowledge rooted in and from the land and the multiple universes that inhabit it. Land is Earth embedded in local epistemology. As a mode of example, the *Pachasofía* is the orature that emerges from the Andes, hence the concept of land is best equated with the idea of multiple universes or the '*pluriverse*' or a world where many worlds fit (Escobar, 2017). The universe transformed in the pluriverse is conversable with the idea of *unwelten* but it is beyond the scope of this article to enter in this conversation (see Burkhart cited in the bibliography).

[6] Sebeok uses the world 'animal', this article uses the-more-than-human as an inspiration from the *Pachasofía*.

equal level of accountability. An illustration of this is the disaster of the Aral Sea where people and large ecosystems-unwelten were literally stolen. Another important component of biocultural semiocides is the concept of *solastalgia.* Extending Glenn Albrecht's term, the solastalgia experienced by the land represents the pain embedded in the loss of continuity in the cultural relations that the unwelten allow through the reproduction and regeneration of landscapes, as illustrated in the intricate relation of the blooming desert and Andean culture of Atacama (Albrecht, 2019, p.217).

Biocultural semiocides operate in the erasure of the semiotic worlds and the reduction of time to the capitalist time and modes of production. Cotton and polyester offer a striking example of these operations and their impact on a global scale. These materials are conspicuous in the clothing landfills that copiously dot the Atacama Desert. Ironically, although cotton fabrics are abundant in these dumps, cotton crops cannot be grown in the desert because they require vast amounts of water that are not available in the driest place on Earth. Polyester, as a synthetic material, is not biodegradable and it takes hundreds of years to decompose, altering Earth cycles for centuries. Piled in landfills, polyester garments can potentially discharge toxic chemicals into the environment, escalating the pollution created by textile dumping.

Deviating from the land's delicate balance signifies within various Indigenous communities a type of illness that is inherently linked to the body and the land itself. An illness that can be coupled to the decease of the ecosystem umwelt where the perceptual worlds of Earth beings that inhabit these ecosystems are damaged in their functionality and reciprocal services to maintain the ecosystem-umwelt, as it will be shown later in relation to the Atacama flamingo population, lithium pools and water extraction. In *Pachasophy*, the concept of illness is linked with disharmony and the collective, presenting the opportunity to perceive a cultural biosemiocide also as a malady that engulfs the natural cycles of the Earth. The presence of the colossal clothing dumps serves as evidence of biocultural semiocides, representing symptoms of a broader ailment that can become chronic and lead to the decline of life and ultimately the Earth (Estermann, 2022).

Mourning the Aral Sea in the *Atacama* Desert

The mass production of cotton has both global and local impacts. The excessive demand for this material by the apparel industry, leading to its ultimate destination at the Atacama clothing dump, tells poignant tales of destruction. The false promises of development and the negligence associated with this process are evident in the pollution, soil degradation, health issues, and severe water scarcity left behind by monocultural cotton production. These issues are particularly observable in countries where cotton manufacturing was introduced as a development model to alleviate poverty. (Khurana & Muthu, 2021). Yet, despite numerous years of cotton production and the assurance of economic growth, the fast-fashion industry has had a devastating effect on the countries that implemented these recommendations as a form of development. For example, while cotton is the fourth largest pesticide crops, peasants in central Asia republics, where textile production has been an ancient

commercial activity, have abandoned sustainable moods of production like crop rotation in favor of cotton monocultures contributing to soil degradation (Khurana & Muthu, 2021).

The most emblematic case of a biocultural semiocide to date, rooted in the breaking of relations with Earth's materials, can be found in the Aral Sea basins of some Central Asian republics. Once acknowledged as the fourth largest lake on Earth, it was even referred to as a sea. Promoting and expanding cotton plantations in Uzbekistan had a devastating impact on the Aral Sea Drainage Basin, which is shared by several countries that were part of the ancient silk road: Kazakhstan, Kyrgyzstan, Uzbekistan, Afghanistan, Tajikistan, and Turkmenistan (JarsjÖ et al. 2008; Lioubimtseva, 2014). To meet the worldwide demand for cotton, extensive cultivation fields were necessary, leading to the immense consumption of water resources. Consequently, the Amu Darya and the Syr Darya rivers, which supplied water to the Aral Sea, were redirected to irrigate a staggering 8 million hectares of these cotton plantations. Such a severe change in the use of the hydric flow to the Aral Sea resulted in the loss of almost 90% of its original water volume (Loodin, 2020: 2497).

On 2014, a NASA satellite took pictures of the Aral Sea, declaring it completely dried up. The fast-fashion industry was linked to this environmental devastation by the fact that the crop being grown to meet the international demand of cotton required the re-rerouting of the rivers that supplied the Aral Sea with its normal water volume. To date, the fast-fashion industry, which is believed to have benefited from the cotton and water resources of the Aral Sea, has not publicly accepted responsibility for the biocultural damage that played a role in the Aral sea's decline. Tracing individual accountability in the fast-fashion industry is a very difficult step since the supply chain of the fast-fashion industry involves multiple stages and countries, making it difficult to ensure and trace all the stakeholders involved in the production (García-Torres et al., 2022). Despite efforts to promote fashion-business sustainability, the lack of transparency complicates the identification and allocation of accountability, ultimately overlooking the genuine responsibility of crucial stakeholders implicated in the Aral Sea disaster (García-Torres et al., 2022; Dzhengiz et al., 2023; Pal & Gander, 2018). These stakeholders encompass the corporations and individuals reaping substantial profits, along with the consumers[7]. Just to give an idea, in 2022, the global apparel market generated a revenue of 1.53 trillion U.S. dollars, experiencing a slight decrease from the previous year. Nevertheless, projections for 2023 anticipate a rise, surpassing 1.7 trillion dollars (Smith, 2023). In rethinking accountability some extra data may be useful. If about "84% of the water footprint of cotton consumption in the EU region is located outside Europe, with major impacts particularly in India and Uzbekistan" (Chapagain et al., 2006: 186–187), then accountability can be speculated through the intentional and malevolent human agency that Puura's work describes.

To reinforce Puura's ideas and the concept of biocultural semiocide, a contrast with extinction theory is needed. Western extinction scientists still theorize environmental catastrophes in the margins of 'unintended result of desirable, if destructive

[7] For more information about fast-fashion stakeholders see RiverBlue movie, cited in the bibliography.

human activities' (Mitchell, 2016: 910). Yet, until the present, there has been no statement from the fast-fashion and cotton industry in the area for the ('unintended?') destruction of relationships involved in such a massive banishing of meanings from people's lives, nor of the fact that no living system, neither human nor the more-than-human, can survive the death of its biosemiotics relations. Extinction is thus not only the demise of Earth beings and the exhaustion Earth's materials, but it also involves the loss of relations, attachments, and biocultural meanings (with) and to the land due to destructive human activities. In this respect, extinction renders only a reduced interpretation of the loss of Earth through the actions of human conduct.

In this context, accountability might be rethought through the fashion-catwalks and the loss of relations involved in the fast-fashion overconsumption clearly illustrated in thousands of images and documentaries available of the *Atacama* clothing landfills and the demise of the *Aral* Sea. One can also say that after all, the fast-fashion highly lucrative business share accountability with the 25,000-mile-away *Aral* Sea's biosemiocide and ecocide and the destructive occupation of *Atacama*'s ecosystems. Accountability encompasses various layers of involvement and numbers and images should help to make people conscious about the biosemiocides rooted in consumption and the loss of relations with Earth materials. The subsequent section will provide a more detailed exploration of these aspects[8].

At this juncture, it is crucial to pause and establish a distinction between these three interconnected terms: biosemiocide, ecocide, and semiocide. While biosemiocide refers to the loss of habitat for a living being, ecocide has gained recognition as a legal concept in international law. The concept of ecocide initially emerged in relation to war crimes, as outlined in the Rome Statute and the Additional Protocol to the Geneva Conventions. According to Article 35(3) of the protocol, if the environmental damage caused is deemed excessively disproportionate to the anticipated military advantage, it constitutes ecocide. This definition, still in effect, solely applies to acts committed in the context of war. Additionally, ecocide has been conceptualized as a 'crime against humanity' within the framework of genocide, condemned by international law through the UN International Law Commission's draft Article 26 of the Code of Crimes against the Peace and Security of Mankind. More recently, the criminalization of ecocide has involved the consideration of intentionality and negligence as defining elements of ecocide crime (Crook et al., 2018; Gray, 1996; Short, 2016). Ecocide and Pura's concept of semiocide share the effort for conceptualizing humans' misconducts that lead to environmental disasters. They are distinct but related concepts and can further contribute to the mingling of biosemiotics and law to strengthen the liability for the criminalization of ecocide through biosemiotics evidence at a glocal scale[9].

[8] For legal accountability tools and corporativism see this page: https://www.business-humanrights.org/en/big-issues/corporate-legal-accountability/guidance-for-lawyers/

[9] I will not develop further here in the mutual benefits that biosemiotics and international law could mean for each but the article provides full of examples to develop in this direction.

Concluding this section and integrating the concept of biocultural semiocide into the landscapes of the dump, it is not unfounded to suggest that the Aral Sea might be metaphorically resting within the Atacama Desert, concealed beneath mountains of discarded clothing. Consequently, one could assert that the *Atacama* Desert serves as the burial ground for the *Aral* Sea. While it is nearly impossible to trace the origin of each item found in the 56 tons of clothing dumped annually in *Atacama*'s landfills, the literature suggests that China, the US, India, Vietnam, and the European Union have a significant involvement in the disastrous development of the apparel industry, each with varying levels of responsibility (Alvarado, 2021; País, 2022). Speculating further, it is not unreasonable to consider that the cotton produced in Uzbekistan to supply the apparel industry may have contributed to the dumps of the *Atacama* landfills through decades. In this context, one can also suggest that the cotton and water from the *Aral* Sea have been symbolically accumulating in the form of desolate mountains of overproduction in the desert, serving as end destination for the solastalgia (desolation and pain) suffered by the *Aral* Sea and all the Earth beings (human and the-more-than-human) that surrounded it and constituted its biocultural existence.

The presence of clothing dumps in the Atacama Desert is a poignant reminder of the tragic fate that befell the Aral Sea and the peoples of this geography, who lost their biocultural signscapes in a devastating manner. Once vibrant areas for recreation, offering swimming and fishing opportunities, they now stand as deserted remnants, with anchored boats amid a landscape of destruction and abandoned towns. This serves as a haunting testament to the biocultural semiocide that unfolded, leaving behind a legacy of forgotten Aral Sea communities, their memories, hopes, and joy now piled up in desolate landfills of clothing overconsumption far away but still inflicting damage on the biocultural relationships of the runa/jaqi and all Earth beings of the Atacama Desert. In this context, both the Atacama Desert landfills, and Aral Sea are a reminder that 'the dump is both outside and within us' and closer to our dwellings more than ever (M. Marder, 2019: 183).

The Atacama Polyester Dump: a Site for the Planet's Largest Hydrocide

Glocally, the apparel industry is responsible for the consumption of 79 trillion liters of water annually, contributing to about 20% of industrial wastewater globally (Niinimäki et al., 2020: 189); in other words, it is one of the worst water-intensive consumption industries. As a practical example, it has been estimated that just one kilogram of fiber, including the spinning, dyeing, and finishing of cotton, polyester and other materials requires 100 to 150 liters of water (The Sustainable Business Group, 2015: 17).

The excessive and unsustainable use of water resources at the expense of people's health, food chains and even cultural-spiritual practices with rivers, has the characteristics of a biocultural hydrocide[10]. In 2016, the documentary film River Blue

[10] hydrocide, is aldo an ecocide crime against humanity embedded in the rights to water and a clean environment stated in the universal declaration of human rights.

produced by Angelo and Priestley, exposed the profound impact of the fashion and textile industry on rivers and streams systems. The production of cotton and polyester, which are the dominant fibers used in apparel and textiles, was linked to the depletion of local water supplies and the release of pollutants into nearby streams and rivers by dye houses in countries such as India, Bangladesh, and China. Scientific evidence suggests that the toxic materials discharged into these rivers are also being found miles away in coastal areas of different continents (Jamieson et al., 2019). Parallel to the dumping of pollutants in rivers, tons of secondhand polyester garments are brought by commercial cargos to the Atacama free trade and taxes zone (ZOFRI) to be sold as bales of different levels of quality clothing to local market providers that do not pay any tax for the pollution. It has been estimated that only 20 percent of the secondhand clothing that arrives in the ZOFRI, mainly from Europe, China, Bangladesh, Vietnam, and the US, is put into the market for reselling. The rest, 80 percent, is discharged in illegal landfills (Muñoz et al., 2022; País, 2022).

The roster of biocultural hydrocides is extensive. However, the Buriganga River situated in Dhaka city, Bangladesh; the Ganges River located in Varanasi city, India; the Citarum River in Indonesia; the Li River in China, and the alarming reality of 70% of all Chinese rivers and water sources being contaminated by water pollution, are among the most striking instances that possess glocal ramifications for international legal accountabilities, as illustrated by the Atacama landfills, the disaster of the Aral Sea and the microplastics found in distant oceans (Angelo & Priestley, 2018). The convergence of these factors – water consumption, contamination from chemical agents utilized in dyeing processes, and the discarding of significant quantities of unsold merchandise through incineration or accumulation in landfills, with the most considerable one located in Atacama – has placed squarely the blame on the apparel industry for destroying the planet's water systems for the sake of production and market profits (Pal & Gander, 2018).

While there is increasing concern from the apparel big branding names about this disaster and the need for sustainable methods of production, the literature suggests that the fashion industry is still the second most polluting industry, contributing 8% of all carbon emissions and 20% of all global wastewater, with an anticipated 50% increase in greenhouse gas emissions by 2030 (Bailey et al., 2022:1). But there is even greater cause for concern regarding the use of polyester by the fashion industry. Polyester is an Earth material derived from fossil fuels. It possesses useful insulation properties for certain applications, but its production is highly energy-intensive and requires substantial quantities of crude oil. In addition, polyester manufacturing processes produce volatile organic compounds and acid gases, including hydrogen chloride, which have been shown to exacerbate respiratory diseases such as lung cancer (Claudio, 2007: 450).

Polyester is largely produced in China, whose energy supply infrastructure comes mainly from coal mining. It has been estimated that the coal consumption of China accounts for almost 70% of the energy structure of this country. About 80% of electric energy, 70% of chemical energy, and 60% of civilian commercial energy are provided by coal (Han et al., 2018: 293). These percentages literally show that polyester's production comes from the dirtiest forms of energy. And,

unlike other materials, polyester promotes accumulations of non-biodegradable microplastic particles in the sea which are difficult to detect. Particularly, due to its highly flammable properties, in the Atacama Desert landfills polyester piles have ignited several times, releasing lethal and toxic particles into the air close to Iquique city, capital of one of the Chilean northern regions.

The microscopic impacts of polyester are only starting to be known. Recent research has shown that chemical additives leach out from polyester fiber in unsuspected and unseen ways. For instance, daily clothes washing routines in a city the size of Berlin (population 3.5 million) "may be responsible for releasing the equivalent of 540,000 plastic bags into the ocean per day" (Siegle, 2017, para. 5). Thus, even when repeatedly used, clothes made from polyester become a significant source of waste, releasing microplastics in ocean waterways globally, where they can be ingested by aquatic life and contaminate aquatic systems (Palacios-Mateo et al., 2021; Stanes & Gibson, 2017:29).

Attached to the problems of microplastics is also the problem of natural biodegradation of materials, which in the case of polyester takes more time than cotton to disintegrate, but only partially, because it's microplastic components will not disappear within perceptible timespans. Yet, the present overview of the environmental impact of polyester falls short of accounting for the multifaceted implications of overproduction and disposal of clothing waste within the biosemiotics systems of the *Atacama* Desert. Specifically, and due to the lack of studies in this field, it falls short in considering the adverse effects of the overproduction and disposal of polyester and combined polyester-cotton garments which, when accumulated in landfills, persist in a non-biodegradable state for more than 200 years, contributing to long-term post-consumer environmental effects.

Finally, the landfills in the *Atacama* Desert receive a substantial share of the global polyester production, and the accumulation of such waste in these landfills poses a significant threat to the already threatened ecosystems, primarily due to the harsh climatic conditions that are characteristic of the *Atacama* Desert. For instance, polyester is a highly waterproof textile that if accumulated in clothing hills, like in the *Atacama* Desert, may redirect water from rain or of the desert mist into other areas by chance. However, on a speculative note, due to its water-repelling properties polyester could substantially obstruct the infiltration and absorption of water into the soil, especially if it accumulates in mountains of clothing waste, whereby water can become trapped in polyester clothing basins, which eases water evaporation without ever reaching the soil. Understanding the far-reaching implications of the polyester intrusion should not be excessively challenging, particularly when considering its impact on the *Atacama* Desert and its miraculous blooming season, which paradoxically occurs in the driest place on Earth. The presence of polyester signifies yet another instance of biocultural semiocide, an act of harm towards a living entity, as recognized in the *Pachasofía*, specifically referring to the *Atacama* Desert.

Interrelated Landscapes of a Larger Problem: the Territorial Order of the Dump

At first glance, the clothing dumps and the *Atacama* blooming desert may seem like two distinct and contrasting realities. Yet, upon closer examination, it becomes clear that the landfills and the flourishing desert, while distinct, are intricately

interconnected representations of the territorial orders created by the dump, where two sharp contrasting realities coexist under similar exploitative principles. On one hand, the *Atacama* clothing dump represents the continuous and globally connected instances of biocultural semiocides that converge locally to shape the global dump territorial orderings. On the other hand, the flourishing desert not only depicts a biosemiotic phenomenon that responds to distinct climate indicators in the Pacific Ocean and the Altiplano rainy season to activate dormant life (Gobierno Regional de Atacama, 2015), but the vibrant colors and scenic views of the blooming desert have also evolved into a lucrative tourist activity.

The Atacama Desert contains a seed bank of over 200 flower species that flourish during the desert's rainy season. The flowers, bushes and plants provide a haven for multiple endemic insects and their larvae that only come out with the phenomenon of the blooming desert, as they can remain dormant for years until suitable water conditions arise, enabling them to pollinate and spread native plants and flowers (Cerda Medina & Mercader Arriagada, 2020). In the last two decades, the beauty of the flowery desert has developed a tourist industry seeking to exploit the phenomenon. Anthropic activities, including but not limited to rallies, car racing, vehicular transportation, seed collection, reptile capture and commercialization, geophyte species extraction, accidental killing of guanacos and foxes due to vehicle collisions, illegal hunting of guanacos, cutting of flowers for ornamental purposes, and unregulated tourism, have all impacted the blooming desert. More recently, there have even been reports of airplanes landing near or in desert areas to allow visitors to witness this natural phenomenon closely, with individuals walking among the flowers and domesticated dogs being allowed to roam freely on the land (Escobar Salinas, 2022). These dogs have been dubbed Lama killers as there have been reports of dogs' attacks on these undomesticated animals, which are ancestral and nourishing visitors of the blooming desert (Pizarro [Cesar], 2022: Min. 17.56). These examples are among the most detrimental events cited that have helped to rethink the commercialization of the blooming desert's colors (Gobierno Regional de Atacama, 2015).

Ancestral Indigenous roads in the Andes, still in use by communities and people, like the *Inca* Road or *Qhapag Ñan*, are living testimonies of the relationships established by Indigenous communities with the Atacama Desert and phenomena like the blooming desert. Along the paths the *Qhapag Ñan* many geoglyphs depicting desert gardeners, like the *Guanaco*, attest that the blooming desert was a well-known phenomenon for the Atacama's first nations, which still worship the arrival of the water in several biocultural practices like the *talatur* further analyzed in this article (Valenzuela et al., 2018).

The blooming desert extends beyond designated national parks like *Llanos de Challe* and *Pan de Azúcar* across hundreds of kilometers. In a western scientific depiction of the blooming desert, the phenomenon is the result of climate conditions that allow for the activation of various abiotic and biotic factors that enable dormant seeds to germinate despite harsh desert conditions. Ecological networks in the desert rely on seeds that cannot penetrate the soil deeply, as they require nutrients and water, which is scarce. This also applies to insect larvae, which remain near the surface where there is a chance for favorable life conditions to occur, like humic soil and rainfall (Pizarro, 2002). Yet, for Indigenous communities, the blooming desert

signifies multiple relations of reciprocity and complementarity with the-more-than-human. Within the realm of *Pachasofía*, the blooming desert holds profound ground for spiritual biosemiotic observation, hence it is not merely a phenomenon or a tourist attraction, but a manifestation of the *Pachamama*'s *pacha* (Andean Earth energy) herself and as a conscious and sentient entity (Roncancio, 2020; Sánchez - De Jaegher, 2023). Unlike the colorful clothing that dot the Atacama's landfills, the flowers' hues only come to life when millenarian climate conditions in the Altiplano allow them to thrive and become gifts from the *Pachamama* to the desert.

Atacama's *Solastalgia*, Pain and Joy: the Loss of Flamingos' *Umwelten* and the *Talatur* Practice of Relationality

English origin of the word 'desert' traces back to a 'waste land' or something abandoned (Liberman, 2007). Over time, the *Atacama* Desert has been interpreted primarily through this etymology, depicting it as an unproductive and barren terrain, mainly prized for its mineral resources and exploitable wealth (Philippi, 1860). Unfortunately, this extractive perspective on the desert has inflicted considerable harm on the communication models of species reliant on the delicate *Atacama* ecosystems for their survival.

This enduring viewpoint has lately manifested in the declining populations of native species like flamingos and the deterioration of emblematic ecosystems such as the *Salar de Atacama*, posing another layer to the concept of biocultural semiocide, but now seriously disguised within the capitalist transitions to green energies and lithium extraction. Saline flats and altiplano lagoons are harsh environments with high levels of salt. Such habitats have few permanent species of animals and plants, but they are rich with nutrients and microbial life for those species that can tolerate the salt and its fluctuations (Montague, 1999).

The saline flats represent the umwelt of flamingos and various other species. They embody a phenomenal presence in the world that transcends the human perspective, characterized by vibrant hues and meanings that together create a cohesive entity. The *Salares* umwelt are intricately regulated in every aspect by the significance they hold for every observer and part of it (Maran, 2013, 2023). Flamingos, known for their innate migratory tendencies, have exhibited a remarkable adaptation by selecting the Atacama Desert as their ancestral home for certain periods throughout the year. This extraordinary choice is made even more significant by the fact that three out of the six known species of flamingos have become regular inhabitants of this unique desert environment (Bonelli & Dorador, 2021).

Yet, the flamingo's umwelt faces a significant threat due to the excessive exploitation of lithium, a mineral abundant in the salt flats where flamingos breed, feed, and rear their chicks. Lithium extraction requires huge amounts of underground and mountain spring waters that feed the altiplano lagoons and the saline flats. Just to give an idea, the extraction of one ton of lithium requires the extraction of 400,000 liters of water, which is five times more than the underground and surface basins can sustain (Gutiérrez et al., 2022). To put this into perspective, it

is akin to filling one and a half bathtubs with water every second of the day. This lithium extraction process resembles the biocultural semiocide of the *Aral* Sea.

The shared use of water resources for lithium extraction leads to an escalation in salt concentrations, disrupting the populations of microalgae and microcrustaceans, which are essential components of the flamingos' diet. Consequently, flamingos are compelled to migrate in search of food to other habitats, creating an ecological imbalance in their natural *umwelten*, the saline flats. 53 species coexist around the water bodies of the salt flats, lagoons, and wetlands of the *Atacama* Desert, and the Flamingos are an essential part of the trophic cascade that secures the life of these ecosystems; hence their decline can result in the upsurge of harmful cyanobacteria, which also constitute a significant part of the flamingos' diet. These bacteria, due to their metabolic activities, cause oxygen depletion in water, leading to the death of biological life in the *Salar* (Wanger, 2011).

Additionally, the extraction of lithium has led to the creation of visually striking pools of green, yellow, and blue colors, which serve as reservoirs for the lithium mineral. These pools add another colorful layer of the glocal injustices embedded in the biocultural semiocide rooted in green capitalism. Put it differently, the Flamingos are no longer finding refuge in the magnificent salt flats of the *Atacama* Desert, they have become 'ecological refugees' that need to adapt to new places due to intense mining activity in the *Salar de Atacama*. The disturbances caused by trucks, the incessant noise, and, most notably, the creation of artificial pools for lithium extraction have disrupted their biosemiotic modelling of the salt flats as their ecosystems, leading them to mistake these pools for their natural habitat (Lopez, M., 2019: min. 4.50; Observatorio Plurinacional de Salares Andinos [OPSAL], 2021). While the salt flats have long served as a haven for these birds, providing them with a home, reproduction and food sustenance, the artificial pools present a stark contrast; they offer nothing, but concentrated salt, lithium, and water stolen from the fragile desert ecosystem.

At the core of Atacama's solastalgia lies the erosion of its intrinsic cultural connections with the very materials it comprises. The presence of flamingos in the *Salares*, along with the flourishing desert, serves as a representation of the Andean way of life, emphasizing its biocultural connection within the realm of *Pachamama*.

This world is rich with signs, and their significance lies within the broader concept of 'semiosis,' contributing to our understanding of the cultural-ecological *umwelt* of the *runa/jaqi* (the Andean way of being). In this context, it is essential to continue emphasizing that 'nature and culture' are not distinct entities; instead, culture represents the way in which nature has evolved within humans (Wheeler, 2006: 105).

While *solastalgia* implies the pain of seeing natural habitats vanishing, the other side of *solastalgia* points to the joy of repairing the damage humans inflict on their habitats and on the beings that dwell in them. Ancient practices of reciprocity and complementarity within the *Pachasofía* can illustrate this other side of *solastalgia*.

The *Talatur*, also known as waterways cleansing, is a sacred practice observed every August 1st by the *Lican Antay* first nation where the fusion of nature and culture is rooted in a deep reverence and appreciation for the Pachamama's provision

of water and fertile lands. The goal of the communal cleanup endeavor is to ensure the unhindered flow of water originating from the mountains but also to reinforce the belief in the inseparability of the spiritual relation of water and land (Parra & Moulaert, 2016). The Andean waterways are age-old structures that continue to be actively utilized, functioning as channels for Andean spring waters to reach the Indigenous communities residing near the salt flats. The *Talatur* spans approximately three days and requires the Indigenous communities to prepare diligently several weeks in advance (Bolados García & Babidge, 2017; Mora Rodríguez & Cayo Rivera, 2017)

In 1950, Grete Mostny compiled a singular text that documented the cultural biosemiotic heritage connecting the Andean culture, the altiplano waterways, and the Pachamama in the *Talatur* ritual. Mostny's transcription provides a comprehensive account of the *Talatur*, beginning with the invocations of the Puri, meaning *water* in the *Kunza* language of the Lican Antay, and naming the diverse locations from which it originates, including slopes, salt flat springs, and rocks. Each site is attributed significance as a living entity, with tutelary hills, such as the protective *Mallkus*, considered companions and guides of the life in the *Pachamama* that holds the *Atacama* Desert (Mostny, 1954)[11]. Towards the conclusion of the text, the prayers focus on the fertility of the *Pachamama* and the cultivation of crops for the Andean diet. The *Talatur* ritual is conducted by a *Yatiri*, a revered individual esteemed by the communities for their spiritual preparedness and profound understanding of the desert and its interconnectedness with all existence. The *Yatiri* assumes the responsibility of offering tributes to the land and water, expressing gratitude for the bountiful harvests they bestow upon the community.

The *Talatur* holds immense biosemiotic importance as it constitutes a cultural identitarian reaffirmation intricately connected to Andean way of being with the *Pachamama*, and the sustenance of life, which are all central to the *Pachasofia* and its ethical principles of the Andean governance in coexistence with the-more-than-human. The *Talatur* is a sumbiocentric practice that considers 'the totality of life interests in the biosphere at all scales which also invokes decisions about human needs' (Albrecht, 2019: 200). Within the context of lithium extraction, the waterways cleansing endeavor to establish strategies of both connection and resistance, while also fostering the identification and reinterpretation of the community's identity in relation to the *Atacama* Desert.

The *Talatur* takes place amidst a backdrop of intense pressure for resources resulting from the capitalist-driven green energy transition imposed upon the *Atacama* region. It is important to note, however, that this statement does not imply that the *Talatur* ancestral practice symbolizes a direct opposition to mining activities, as mining practices were already well-known and practiced in the pre- dumping-Columbian era of the Andean worlds. Further, many members of the Indigenous communities still work for mining and lithium extraction companies. The *talatur* in this sense illustrates the other side of *solastalgia*, an effort to joyfully revive

[11] The singing of the Talatur can be listened here: https://www.youtube.com/watch?v=kC5o0TGv2d0&list=PLskK2GaMxQjr7TGUiyTwrocLSMRtB8AmH&index=8

practices of reciprocity and complementarity within the dump and a highly scarce Earth being, namely water which is more than an element in the *pachasofía* of the *Atacama* Desert.

Atacama Desert's Gardeners, Polluters and the *Chacu* Ancient Practice of Textile Production

The exact origins of the word *Atacama* are unclear, but it is believed to have *Quechua* roots, potentially meaning 'gathering of people'. The translation makes sense as the desert has been home to various indigenous groups over time, including the *Lican Antay*, *Aymara*, *Quechua*, *Diaguita* and *Coya* people, as evidenced by the numerous cave and rock paintings found throughout the three regions that the *Atacama* Desert crosses[12] (Briones et al., 2005; Larraín, 2015). Despite its harsh conditions, such as extreme temperature oscillations between day and night, high soil salinity and low nitrogen content, the desert's biotic resilience has intrigued scientists who are studying the underlying mechanisms of adaptation of its ecosystems to recreate models for food production in the face of climate change.

Nevertheless, the increasing interest on the desert´s resilience has also brought negative effects, as there have been accusations of biopiracy with *Aymara*'s ancestral agricultural practices. Much of the agriculture in the area is done without chemical fertilizers in soils that are very poor in nutrients and irrigation. These chemically free and clean ancestral cultivation practices have generated bacteria that have adapted to extreme saline conditions and desert temperature oscillation. Andean agricultural knowledge has attracted companies interested in the life and adaptation of microorganisms in extreme conditions. One of these companies took soil samples from Aymara communities and patented them as their own without any recognition of the ancestral *Aymara* knowledge and practices of land management related to the *Guanaco*'s dung fertilizing properties (Observatorio Ciudadano Chile & Orador, 2021).

The desert is home to *guanacos*, *llamas*, and *vicuñas* that provide the soil with nitrogen and promote the growth of plants and beneficial bacteria in the absence of rainfall (Dussarrat et al., 2022; Eshel et al., 2021). From these members of the camelid family, the *guanaco* has been referred to as the main 'desert gardener of the blooming desert' due to its important role in dispersing nutrients for plants, bushes, and flowers. The etymology of *guanaco* comes from the Quechuan word '*wanaku*', which means fertilizer and to fertilize. It is derived from the words *wanu* or *huanu*, meaning dung. The intriguing story behind its origin involves the wife of *Huayna Cápac*, the eleventh governor of the Inca civilization. As the story has it, the *coya* (wife) observed that some people were sowing in the pampas without using fertilizer, so she gave them manure and instructed them with the verb *wanaku*, which means 'fertilize the land'. These instructions led to the association of the *guanaco* with the properties of a natural fertilizer. In other words, the association of the

[12] https://pueblosoriginarios.com/sur/andina/atacama/geoglifos.html

guanaco as a gardener derives from the verb *wanaku*, the action of fertilization of the soil (Triviño Oliveros, 2020, paras. 3-4).

This narrative emphasizes the significance of agriculture and fertilization in traditional Indigenous agricultural practices that are still actively employed in *Atacama* Desert. These practices of organic disposal in the soil are in sharp contrast with the discarding of what Michael Marder calls 'human technical excrement' (Marder, 2020). While the verb *wanaku* means to fertilize to prepare the revitalization of the land for life, the act of transforming the planet itself into a dump carries wide-ranging and long-lasting consequences, impacting the cycles of material degradation and enabling the dispersal of global toxicity. These effects extend beyond individual instances and have collective and intergenerational implications for the planet. To be more precise, while the guanaco's dung serves as a natural fertilizer for the Atacama Desert's soil, thereby enhancing the potential for biological life in one of Earth's most unforgiving environments, the introduction of human technological excrement, encompassing not only manufactured objects but also polyester textiles, disrupts the potential for organic life to thrive and germinate.

The *llama* and the *vicuña* require extensive territories to forage for food, with only the llama being able to undergo domestication. The *vicuña* is the smallest species of wild Andean South American camelids, but it is famous for producing the world's finest fiber, known for its exceptional qualities of softness, shine, natural color, and high warming value. This makes it highly sought after in the textile market for creating premium-quality fabrics. Andean Indigenous communities have established a longstanding relationship with the *vicuña*'s wool. The fiber of *vicuñas* is obtained using an ancestral pre-Hispanic technique called *Chacu* (Quispe Coaquira et al., 2018). The *Chacu* technique involves the participation of a lot of people who form a human fence, walk, and herd the wild vicuñas to capture and shear them. The *vicuña* wool was the preferred choice for clothing among the ancient Inca rulers and their high priests. Still today, the production of *vicuña* wool involves several delicate processes, including hand washing, the use of natural Andean dyes, drying, and weaving.

The practices of *vicuña* shearing (*Chacu*) and the ancestral cleaning of Andean water passages (*Talalur*) compel us to reflect upon the swift transformation of our world, where territories are increasingly becoming dumping grounds for human technological waste (excrements in Marder's words). Additionally, these practices also serve as an invitation to reestablish our lost connection with Earth's materials from our unique positions. In this regard, *solastalgia* is a term that evokes the pain and distress caused by current terracide, but as Glenn Albrecht points out, *solastalgia* is not irreversible. The concept also suggests that through the repair and satisfactory restoration of a place, solace and comfort can be regained for those who seek it (Albrecht, 2019, p. 60). Following Albrecht's perspective, the *Chacu* and *Talatur* remind us, that even within the dump, when we engage in relationships with the Earth, rehabilitation begins, and *solastalgia* starts to fade, just like the arrival of rain ends a prolonged drought. The *talatur* and the *chacu* are deeply woven into the intricate web of connections within *Pachasofía*, encompassing all forms of life, in the *Atacama* Desert. These are practices rooted in resilience and wisdom passed down

generationally through the orature of living well with all the beings of *Pachamama*, as embraced by the Andean philosophy of *Buen Vivir*, the *Pachasofía* in action.

Conclusion

Water, linked to the loss of Earth, acts as poignant reminder of the imperative to reinstate production equilibrium grounded in reciprocal and complementary relationships on a glocal scale. The *Atacama* Desert dump and the *Aral* Sea disaster, as presented here, serve as sites for these global reflections inviting further exploration into the definition and legal application of the concept of biocultural semiocide outlined throughout the article.

The *Pachamama* and the living desert hold valuable lessons in resilience, starting with the biocultural importance of the *vicuña* and water for the communities in *Atacama*. The *vicuña*'s resistance to domestication has fostered a cultural symbiotic practice between the people and the habitat this being has helped to create in the desert near the altiplano lagoons. This symbiosis extends to other flora and fauna, including flowers, insects, *guanacos*, *llamas*, Andean foxes, birds, and pumas, among others. Water, for these communities, holds a significance beyond mere human consumption and the revenues of lithium extraction. It is an integral part of the Andean way of life and the *Pachasofía*, intertwined with their knowledge, beliefs, hopes, and communal joy for the continuation of life in the driest region on Earth. While the *Atacama* Desert serves as a vivid reminder of the era of dumping, it also serves as a testimony of the Earth's resilience, demonstrating that life can thrive in the open banks of biotic generosity, patiently awaiting better conditions for germination.

Therefore, the focus is not solely on conserving specific life forms or elements valued as important resources, nor is it merely about managing destruction, or resisting extinction with conservation policies. It is about reclaiming glocal relationships—both local and global—through and for the Earth from the realization of the dump within the waste of technological excrement.

Funding None

Declarations

Conflict of Interest The authors declare no competing interests

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