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To Reenchant the World's Matter
Foundations for Scientific-Ecological Mediation

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Abstract

The persistence of an apocalyptic tone in contemporary sensibility keeps the myth of the end of the world alive as a shared existential ground, transcending cultural and ideological differences. Yet in the context of the climate and ecological crisis, this horizon of collapse appears not only as a threat, but also as a possible space for articulating agreements and links between science, ethics, and cultural work in the pursuit of overcoming this crisis. This text explores, in a philosophical-aesthetic register, the need to move beyond catastrophe through a profound transformation of our vision of reality and of our scientific-ecological praxis.

From this framework, wonder is proposed as a primordial affect and methodological principle for a situated scientific-ecological mediation. More than a mere emotion, wonder is understood here for its potential to generate a perceptual and cognitive opening, capable of reconnecting subjects with the non-human forces and sensitivities that compose their environment.

To this end, it draws on Simondon's notions of magical unity and transduction, as well as Morton's concept of hyperobjects, in order to rethink the relation between technics, affect, and territory in a time marked by eco-anxiety. Thus, through situated scientific-ecological practices, the planetary crisis could come to signify a collective space for developing a sense—here called magical meaning—of belonging, in relation to the ecological units and geological processes of which we are a part, and which have historically fascinated humanity in different epochs.

Finally, concrete cases are analyzed from scientific mediation workshops held at the Museo Interactivo Mirador (MIM) in Santiago de Chile, where wonder operates as a methodological tool that interweaves knowledge, body, and territory within a situated ecopedagogy.

Keywords: "Climate Crisis", "Posthumanism", "Ecopedagogy", "Wonder".

1. Introduction

More than a technological problem or a political-administrative challenge, the climate crisis can be understood as a physical and affective transformation of the habitable world—an ongoing structural shift in the regimes and perceptions of life. This transformation of the vital ground, which alters seasonal rhythms, water availability, ecological balances, and the conditions of habitability for human and non-human beings, reconfigures not only the materiality of ecosystems but also the ways in which subjectivities are constituted, connected, and oriented in time.

Within this framework, the present essay puts forward a central hypothesis: climate change does not stem solely from a geophysical mutation of the planet, but rather from a transformation that cuts across the material, sensitive, and cultural dimensions of existence, reshaping the collective perception of the environment. From this perspective, we can say that what is altered is not only the ecosystem, but also the web of meanings that sustains human agency in the world. Climate change must be studied as a problem of collective individuation, where the technical, the natural, and the sensitive are co-implicated in new forms of existence. Its effects, already under study, point to a progressive complexification; an ontological shift in the categories of the human that irrevocably reconfigures the very ways in which the world is perceived, known, and inhabited—opening the way for new forms of sensitivity.

Therefore, this affective-epistemic change also requires a transformation in the practices of knowledge transmission. It is no longer enough to disseminate scientific data about global warming; it is necessary to configure spaces in which that data can be lived, felt, discussed, and—ideally—collectively transformed into situated practices.

One possible setting for such practices is scientific mediation—something that, in this essay, will be developed through the analysis of various artistic and scientific educational initiatives carried out at the MIM (Museo Interactivo Mirador) [10], with the intention of deepening ecological subjectivation.

In the face of this scale of destabilization, the question is no longer only how to mitigate the effects of climate change, but how we inhabit, know, and relate to a world that is transforming faster than our capacity to represent it. This essay proposes to think of scientific mediation (and scientific-aesthetic practices) not as mere strategies for content transmission, but as situated practices capable of configuring worldviews and activating sensitive, ethical, and cognitive relations between humans and non-humans.

2. Displacements Between the Biosphere and the Self An Ontological Turn in Twenty-First Century Experience.

What we are witnessing is not an end in absolute terms, but an irreversible passage between one biological era and another, in which environmental alterations are progressively rendering organic life as we know it unviable. Morton suggests that the end of the world has already occurred. In this reading, the term does not refer to a sudden collapse, but to a silent transformation that infiltrates everyday life: the emergence of global warming and an unprecedented environmental crisis as signs of an ontological transition.

The current ecological crisis—particularly climate change—has been characterized by the author as a hyperobject: a phenomenon of such vast temporal and spatial scale that it exceeds ordinary human understanding [1]. These hyperobjects cannot be apprehended all at once; rather, they manifest as diffuse presences, as atmospheres or climates that affect perception, language, and imagination. The crisis of the Anthropocene is one among many geological transformations the planet has undergone—transformations that have extinguished entire ecological units and will likely do so again. What distinguishes this particular climate change, as we can already glimpse, is that it stems from human agency. In this sense, knowledge about these immeasurable phenomena carries with it an existential background that "forces us to recognize the immanence of thought in relation to the physical" [1]. It confronts us with a massive force composed of innumerable non-human entities—geological, biological, and climatic processes—that are dismantling the seemingly stable stage of our anthropocentric existence.

This transformation demands a reformulation of the notion of the subject, which can no longer be sustained on the idea of autonomy, but rather on that of codependence.

The thought of Simondon is key at this point, as he proposes that individuation is not a given fact, but a continuous process of transduction [2]; a dynamic relationship between the individual and its milieu, in which both are mutually transformed, "so that, in this transductive chain, each of the elementary tools is at once operative and operated upon, nature-object and subject-operator" [2]. From this perspective, subjectivity emerges from the relation with the other—the technical, the natural, and the social, respectively—revealing the need to reconstruct our bonds with the world.

3. Bodies that narrate, worlds that tremble Narratives and affective consensuses in the face of collapse

Some centuries begin with teleological promises; others open as fissures. In the twenty-first century, a structural rupture becomes perceptible—not only in glaciers or terrestrial systems, but in the languages with which we inhabit the world and in the symbolic frameworks through which we organize reality. In this new regime, subjectivity can no longer be thought of as isolated or sovereign, but as intrinsically co-implicated with the ecological, technological, and symbolic systems that constitute it. The experience of the world—that tacit background that sustains everyday life—is affected by the climate crisis, revealing its precarious and transindividual nature. This colossal threat, far from being a simple dystopian fantasy, becomes present through a series of visible changes across the Earth's surface, with a catastrophic mid- and long-term forecast as a result of a 3.2°C rise in planetary temperature [17].

The consciousness of the Anthropocene emerges as a philosophical category within a fragmented landscape, where no shared horizon remains to orient the notion of progress. In its place, a transversal and collective figure arises: the imaginary of imminent collapse. Thus, while the future is no longer conceived as a collective promise of improvement, what begins to universalize is the expectation of an end—an apocalyptic horizon that operates as an affective backdrop (binding or unbinding) across contemporary experiences.

There have always been ways of imagining the end of times. It is a transcultural distribution of ideas about a common death for all humanity, seeking to compensate for the inability to join the beginning and the end of existence into a coherent narrative shaped by the desires and fears of a human group.

On this, Frank Kermode argues that the structure of apocalyptic fictions seeks a representation "wholly concordant, with an end in harmony with the middle, and the middle with both beginning and end" [3]. A unifying narrative [24] of discourses that humanizes the unrepresentable nature of the end of history and the universe—that void of meaning upon which experience rests—through imaginaries that give intelligible form to the End. From there arises the tendency to mediate the absoluteness of catastrophe through apocalyptic images, endowing with human meaning that which would otherwise remain ungraspable. It is, ultimately, a narrative articulated around consensuses. Now, while the socialization of these narratives may result in sensibilities and practical manifestations of large-scale collective panic (something that has already occurred in various contexts and places), it could also function as one of the few remaining symbolic nuclei capable of generating some form of affective and cognitive consensus around human agency on the planet.

In a present so saturated with catastrophes, the development of narratives about the "end" takes on greater importance and becomes a site of impact upon sensibility. In times when the geophysical and biochemical processes of the environment have ceased to be a stable background and become active agents of uncertainty, stories—that is, the symbolic forms through which we organize experience—emerge as a fundamental mode of connection. Indeed, in the face of the vastness of climate and technological transformations, it is not always data that enables understanding, but narratives: sensitive structures that render thinkable, inhabitable, and intelligible that which affects us. To narrate, in this context, is not a supplementary activity to knowledge, but a pathway to its ontological grounding. Telling stories is a way of being in the world. Thus, the ability to create and share narratives becomes crucial for constructing collective meaning and for channeling the emotional shock generated by disaster into a powerful force for social transformation. In this way, the shared experience of emotional overwhelm in the face of a common existential threat, rather than being merely paralyzing, holds the potential to become a unifying and mobilizing force.

4. When Disaster Summons Wonder as Collective Potential

Nature ceases to be a passive backdrop and reveals itself as an active and powerful force, often indifferent to human intentions. This revelation has the potential to produce a powerful aesthetic emotion: the sublime, understood in its reflective configuration; and, in its pre-critical and pre-individual phase, wonder as an initial affective disposition. The world is, above all, an inexhaustible source of wonder. Living beings are absolutely dependent on ecosystems, and life forms persist in an existence that is both overflowing and often fragile—vulnerable to a multiplicity of material and existential factors that we never fully comprehend. A vast universe makes us feel physically small and defenseless, and our bodily integrity seems to hang by a thread before colossal forces. This visceral awareness of our fragility—that something could annihilate us in an instant—is what gives such experiences their quality of horror, of the sublime and/or of wonder. In the current context, this is no longer merely an aesthetic idea but becomes a daily experience for many communities.

In a media landscape saturated with images of catastrophe, fear emerges as the dominant affect, displacing other forms of relationship with nature. Various studies, such as those by the American Psychological Association, already report the rise of phenomena such as eco-anxiety, defined as a "chronic fear of environmental doom triggered by observing the impact of climate change on the Earth" [4].

This concept is being studied within existential and psychodynamic psychology, among other social sciences [5], along with related concepts such as solastalgia, a "grief caused by recalling the past and confronting the loss of landscapes and natural assets as a consequence of environmental degradation" [6].

These emotional impacts contribute to a perception in which the environment is no longer experienced as a living space, but as a threat or imminent ruin.

In the face of vast geological and climatic transformations, human responses may vary greatly—from passive contemplation and evasion to various attempts at mitigation and conflicting interests. However, the generalized feeling of facing something immense and uncertain often persists. Ecological collapse can thus be read as a crisis of individuation—a crisis in which instituted modes of existence are destabilized, but also as an opportunity to imagine new forms of ecological subjectivation. In this context, phenomena such as eco-anxiety or solastalgia should not be reduced to merely pathological symptoms, but recognized as limit-affects that, in their disruptive intensity, may also open a threshold of sensitivity toward the living, enabling an affective reappropriation of the world.

Burke's concept of wonder, as "that state of the soul in which all its motions are suspended with some degree of horror" [7], is directly relevant here. Fear, as the author admits, "is, in every case, more or less, the ruling principle of the sublime" [7]. The mix of fear and awe both attracts and repels us: we are fascinated by the grandeur of nature, yet also terrified by its destructive power. And perhaps it is precisely in the shared recognition of our exposure to disaster that a space of enunciation can emerge, from which to articulate agreements and cultural practices aimed at repairing the bond with a displaced and decentered human becoming on the planet. The shock provoked by disaster, far from being merely paralyzing, can—if adequately channeled—become a driver of social transformation in the face of the urgent need to create or adapt spaces to protect life.

In this context, scientific-aesthetic practices gain central relevance—a series of scientific exercises (focused on communication and cultural mediation) that already exist in the world, whether within institutional frameworks or beyond them, in local and/or grassroots initiatives that generate participatory, territorially situated, and affectively binding processes. These practices facilitate a symbolic and material reappropriation of the natural environment by communities that maintain a connection with specific ecological systems or dynamics. This shift demands the creation of relational methodologies and devices that operate between scientific knowledge and lived experience—capable of translating technical abstraction into meaningful forms of collective understanding and appropriation. Thus, the very shock triggered by disaster can, if channeled, be transformed into a driver of change, as a territorially situated practice. Ultimately, in the face of the colossal scale of geological and biochemical transformations, the reconstruction of the human bond with the Earth cannot rely solely on instrumental rationality: it also

requires practices that activate sensitivity, imagination, and a sense of shared belonging. For the sensation of abyss and finitude can open the door to a new awareness of our interdependence with the environment.

5. The Urgency of a Scientific-Ecological Praxis Reactivating the magical unity between knowing, doing, and being

The climate crisis is not only a physical or ecological phenomenon: it is also an epistemic disruption that destabilizes instituted modes of knowledge production. It confronts us with a limit of understanding—a threshold where modern categories become insufficient. This situation questions not only what we know, but how we know it and from where we feel it. In this context, this chapter proposes to understand the crisis as an opportunity for transduction: a process in which scientific knowledge can be reorganized through a sensitive, ethical, and situated openness.

Today, science—and its transmission—can no longer be conceived as a neutral body of truths to be deposited in the consciousness of subjects devoid of history, body, or territory. In fact, in the face of the vastness of climatic and technological transformations, it is not always data that enables understanding, but narratives: sensitive structures that make what affects us thinkable, livable, and communicable. To narrate, in this context, is not a supplementary activity to knowledge, but a path toward its ontological grounding. Telling stories is a way of being in the world. In this scenario, it becomes imperative to envision the development of scientific-aesthetic practices that acknowledge the historicity, materiality, and affectivity of knowledge, producing modes of relation with the world that do not reduce knowledge to a tool of control, but cultivate a situated relationship with the ecological and symbolic fabric of reality. In this sense, science is not merely an accumulation of truths—it is also a way of inhabiting, of world-making. Simondon maintained that individuation cannot be reduced to a process internal to the subject, but is realized through a becoming-with others, with technical objects, and with material environments. From this perspective, narratives operate as transductive devices that condense memories, affects, tensions, and desires into transmissible forms that do not close off meaning, but open it to shared worlds. In his psychosocial studies on human individuation through technicity, Simondon does not merely question the cultural function of the technical, but proposes an ontological reconceptualization of human becoming as a relational, open, and co-constitutive process. This is fundamental for this study, as it allows us to think about the relationship between science, ethics, and sensitivity from a relational ontology—one that recognizes individuation processes not as isolated events, but as constant becomings in interaction with the environment.

From this perspective, scientific knowledge must assume its eco-aesthetic dimension: it is not about representing nature as an object, but entering into resonance with its forms, cycles, and forces. This shift involves recovering what Simondon calls magical unity: an original moment in which the technical, the sensitive, and the ethical were not separated but integrated within the same vital gesture. For Simondon, both technicity and religiosity emerge from a disjunction [2] in relation to this original active center—"the original sensorimotor appropriation mode of homo sapiens" [8] in connection with its environment. Myths of creation, ancestral rituals, and indigenous cosmologies share a core intuition: the world is alive, and human beings participate in that life in communion with all realms of the living (and the existing). What prevailed was a mode of "being-in-the-world," in which all living beings formed a continuum [2], a web

of relationships animated by shared meanings. Mountains could be grandmothers, rivers had spirits, animals were brothers or gods.

In Simondon's own words, this mode of integration of the human into the world is defined as the "primitive union, anterior to all splitting, of subjectivity and objectivity" [2], and as such, it presents itself as a matrix from which to think about more integrated modes of relation. A powerful framework to imagine scientific-aesthetic practices that do not separate knowledge from affect, or technique from care.
Such "magical" perception did not imply ignorance of material causality, but rather an expansion of causality: the entire cosmos was seen as a web of sensible causes and effects, charged with purpose and agency. Thus, this magical state would represent a form of equilibrium prior to the split that established distance between the human and the universe—a split that would later manifest, on one side, as material form, in technical thought that unfolds into scientific theory and is realized as science; and on the other, as cosmological background, in religion, which becomes theoretical dogma and finds its application in ethics—separating the immanent and transcendent domains of human individuation in the world. Now, Simondon's thesis is that it is possible—and perhaps necessary—to aspire to reintegrate those two separated halves. For a true convergence between science and ethics (that is, between theoretical-practical knowledge of the world and the value-based orientation of our actions) would produce "a second analogue of magical unity, beyond aesthetic thought, which is its first analogue—an incomplete one, for it leaves in place the disjunction between technics and religion" [2].

This return to magical unity does not imply nostalgia for the archaic, but rather a reconfiguration of the contemporary conditions of knowledge production. Transduction appears here as a key operation: it is not a matter of applying knowledge to an external object, but of reorganizing thought through a co-transformative process with its environment. Thus, imagining a science with magical sensitivity is also an affirmation that the sustainability of ecosystems depends on how we cultivate relationships, and how we ethically, openly, and pluralistically share the conditions that allow us to feel the world once again. In this context, wonder appears as a privileged methodological affect. Far from being a decorative emotion, wonder functions as an epistemic opening: a state of suspension that interrupts habitual perceptions and enables the emergence of new relationships between subjects and the world. This primordial affect, which precedes conceptualization, reorganizes attention and attunes bodies to an intensified form of learning—where knowledge is not transmitted but co-created through relational experience.

Eco-anxiety, understood not only as psychic distress but as a symptom of ontological dissociation, can also be read as a sign of a need for reenchantment—an anguish before the loss of shared references around the meaning of life in common, which can lead to an intensification of questions about dwelling. In this frame, scientific knowledge cannot respond only with more data: it must generate symbolic spaces where this discomfort can find collective forms of elaboration and agency.

It is important to clarify that this idea does not propose an uncritical return to traditional magical thinking, but rather its analogy at a higher level of reflexivity. Simondon himself points out that art or aesthetic sensitivity alone, while they may offer glimpses of lost unity, will not revert the structural separation between facts and values, between knowing and signifying. Only a true synthesis between all scientific practices and an ethical sense could reestablish a functional unity akin to the original one. In that spirit,

the proposal for a scientific praxis with magical sensitivity is radical: it entails ethically resemanticizing every technical intervention we perform in the world. This second analogue, if fully achieved, would replace both magic and aesthetics, restoring at a new level the lost unity. However, Simondon also expresses a note of skepticism: such convergence may only be an ideal, for nothing guarantees that the gap between theory and practice (between knowing and doing, between scientific understanding and ethical action) can ever be entirely overcome.

6. Research Method Thinking Situated Knowledge through Transindividuation

This chapter does not stem from an isolated theoretical exercise, but from a question sustained over time, motivated by an initial concern: could it be that climate change, more than an environmental phenomenon, also represents an epistemological turning point with transformative potential for consciousness?

It was in 2022 that this question began to take clearer shape while studying critical theories such as Morton's, whose notion of Hyperobjects [1] not only challenges the postmodern diagnosis of the "death of grand narratives," but also suggests that the experience of climate crisis—due to its temporal, material, and affective scale—constitutes a new type of transindividual reality [2].

From this perspective, what collapses is not only an ecosystem, but also a structure of meaning, a way of inhabiting and thinking the world. In the face of the void of common references, a new density of the present emerges, where science, ethics, and sensitivity can no longer be articulated in a dissociated manner, but as part of a single ontological question. From this, it became possible to deepen the notion of "science with magical sensitivity" as an attempt to reintegrate technics with the symbolic and affective background of the living. This initially abstract hypothesis aimed to imagine a scientific praxis not severed from the world, but ethically oriented and situated: a science capable of reactivating the magical unity that once linked the human being with the forces of the environment. Something that would allow for a renewed sense of belonging to the world, mobilizing the existential background shared in the climate crisis.

This framework acquires methodological strength in addressing scientific-educational practices not as mere channels for transmitting codified knowledge, but as structures of transindividuation in which subjects are configured through their relational inscription within a technical, symbolic, and ecological network in the world. Where, as Simondon proposes, subjects are not constituted as isolated entities, but in relation to a shared preindividual dimension: a field of potentialities not yet actualized, which links the individual to what they are not yet, but which constitutes them.

This is a call to think of all the "vibrant matter" [9] of the universe, in its capacity to affect and be affected, as a constitutive part of all subjectivity. This relational turn becomes urgent in the context of the climate crisis. In this framework, subjectivity is shaped not in isolation, but in co-constitution with others—both human and non-human—and with the technical and natural environment we inhabit and transform.

In an initial phase of this work, the hypothesis was explored by analyzing international climate change policies, aiming to identify whether the articulation between technical knowledge and ethical orientation could give rise to a situated scientific-magical praxis. However, over time, the author's direct experience in cultural mediation practices revealed that this sensitivity to storytelling through wonder is not merely a philosophical hypothesis but a practice already underway. In both informal and institutional settings, it

has been personally verified how certain scientific and aesthetic devices are capable of reconfiguring the link between knowledge, body, and territory.

A pedagogy of wonder does not aim merely to transmit content, but to produce conditions of possibility for a meaningful encounter with the world. Scientific-aesthetic devices, in that sense, are not neutral tools: they are material and symbolic assemblages that mediate our relationship with the world in all its complexity, and can be designed to reactivate that magical unity between knowing, doing, and being.

From this perspective, scientific mediation cannot be conceived as an auxiliary task, but as a political and aesthetic practice in which the very possibility of constructing a more compelling and transcendent science is at stake—one capable of articulating with territorial knowledges. A science that is not only critical, but also sensitive and connective, in which knowledge is not imposed: it is embodied, dramatized, and situated.

7. Findings Magical Transduction in the Adriana Hoffmann Forest

Within the framework of a situated scientific-ecological praxis, this chapter proposes a reading of wonder not as a spontaneous emotion, but as an affect that—through specific methodologies—enables the connection between human sensitivity and the vital processes of the natural environment. It operates as a vector for a relationship with the real, where knowledge becomes embodied and the territory becomes an interlocutor. From this perspective, the experiences developed in the Adriana Hoffmann Forest at the Museo Interactivo Mirador constitute a concrete example of how space can become a pedagogical agent. Far from being a passive infrastructure, the forest emerges as an active structure, with various essential actors in an ecosystem that enable mediation: a sensitive ecology where the technical, the symbolic, and the living are assembled into a pedagogy of transduction.

The practices carried out there—community gardens, botanical recognition workshops, encounters focused on local flora and fungi—were not conceived as mere tools for content delivery. Rather, they shaped a situated form of knowledge production, in which scientific knowledge was affectively and symbolically reconfigured through direct experience, collective dialogue, and material interaction with the environment. Wonder, understood here as a preindividual disposition, enables the emergence of transversal links among subjects, techniques, and landscapes. By activating forms of attention and resonance with the non-human, it opens a space of magical transduction: an instance in which knowledge is not merely represented, but transformed. Following Simondon, we might say that this is a passage between ontological states, where the technical does not interrupt the relation with the world, but mediates it in a new form [2]—where learning becomes a way of perceiving, being, and caring.

The co-creation of the forest in 2022 also responded to a need for symbolic repair with the surrounding neighborhood. If the installation of the MIM in the early 2000s was experienced by some neighbors as a form of cultural expropriation—a museum “for others”—then the forest sought greater territorial connection to heal that distance from the neighborhood. Thus, the techno-ecological space was built through ecological reforestation practices and participatory devices for civic co-creation. The process involved collective planting of native species using the Miyawaki ecological restoration method, the co-design and activation of community gardens, and collaboration with local carpenters to build infrastructure. These gestures—manual, symbolic, relational—not only resignify the space, but enable

transindividuation processes: dynamics in which subjectivity is not understood as an autonomous entity, but as a co-implication between bodies, knowledges, and territories. They reinsert manual labor, agricultural memory, and popular technical knowledge as legitimate forms of knowledge production and territorial appropriation.

The forest, as a technical-ecological artifact, becomes a medium of subjectivation where learning occurs in co-presence with the world. In this way, space ceases to be a neutral support. It becomes an ontological agent that teaches not through representation, but through affect. The forest, as a co-created space, is not a passive stage but a pedagogical agent for scientific praxis: it carries memories, activates knowledges, and produces subjectivation processes that restore the bond with the territory. A co-implication between subjects, knowledges, and territories, in which learning becomes a situated experience. This notion implies that space is not a neutral backdrop, but an active structure of mediation—an ontological agent that participates in the configuration of knowledge.

In these experiences, space does not teach through what it represents, but through what it affects, through the various actors that compose it: the shadow, the wind, birdsong, or the smell of damp earth become epistemic materials. Knowledge becomes a sensitive event, where learning does not occur in the distance of a classroom, but in co-presence with the world. The methodology derived from this perspective requires that each experience not be thought of as a module, but as an ecosystemic situation. What materials are being activated? What bodies are participating? What territorial memories are being summoned? What form of attention is being requested?

These questions guide a practice in which knowledge is configured as a situated relation between organism, presence, environment, and technique.

8. Ecopedagogies of Wonder A Situated Analysis of Mediation Practices

The project **“**Esto no es una visita guiada**”** [10] was developed by the mediation team at the Museo Interactivo Mirador, of which the author of this paper was a member during 2024. This work was conceived and carried out in the months following the inauguration of the Adriana Hoffmann Forest—a new space envisioned as an ecological milestone within the museum—which was addressed by the education department through a series of workshops aimed at responding to contemporary sustainability challenges. The project exemplifies a methodology in which flora, soil, seeds, and vegetal life cycles are treated as active interlocutors in the educational process. Within this framework, wonder serves as the methodological foundation, activated by triggering stimuli that deliberately interrupt habitual perceptions and open participants to an experience of mystery.

The analysis will focus on a set of scientific mediation practices in which wonder operates on four interconnected levels: the triggering (the initial stimulus), the sensitive (perceptual and affective openness), the techno-aesthetic (the assemblage of devices), and the narrative (the process of constructing shared meaning). This reveals that the central wonder of this ecopedagogy is not a passive emotional response, but an actively designed and cultivated one—through sensitive apparatuses and workshops described here as transductive methodologies. In this context, devices such as the **“**Florascopio**”** [10]

demonstrate a deliberate design in creating participatory scientific experiences, crafted so that nature ceases to be a passive backdrop and becomes an active interlocutor in educational processes.

This methodology promotes a pedagogy that does not separate knowledge from feeling, nor learning from being-in-the-world. It seeks to mobilize wonder as a threshold to deeper participation—a form of knowing that is also a form of presence. In this way, scientific mediation can become a practice in which new ways of inhabiting a shared world are rehearsed, where artifacts, magnifiers, visors, solar stations, camera obscuras, and planting modules are not oriented toward representing the world, but rather toward provoking its emergence in a new form. They open the field for a narrative experience in expansion, unfolding through relationships, questions, and collective actions. A fossil found among the leaves, the subtle sound of a mushroom breaking, the play of light that reveals the silhouette of a leaf on photosensitive paper—these are all elements that function as interruptors of the ordinary, displacing participants toward an experience of active openness to the unknown. It is an invitation to relate to the environment through wonder—not as a passive response, but as a primary binding affect.

8.1. Pedagogical Experiences with Non-Human Life Ecological Walks

Experience	Wonder Device	Connection with the Environment	Methodology for Generating Wonder
Aventura Botánica: Guided walks with general and school audiences	Guided exploration + botanical magnifier	Urban flora as interlocutor; situated perception and interspecies ethics	Activated through guided narratives and optical devices that intensify the sensitive perception of plants
Ruta Verde: Guided walks with general and school audiences	Guided exploration + Florascopio	Urban flora as interlocutor; situated perception and interspecies ethics	Activated through participatory dynamics and didactic devices that create a meaningful meeting space with non-human life

The methodological pathway of the workshops linked to the vegetal and fungal world—those that comprise the "ecological route" [10] in the project—constitutes a scientific-aesthetic praxis where wonder, in the midst of the forest, emerges as a primordial affect. This is guided by devices that articulate sensitivity, botanical knowledge, and a pedagogy of attention, activating forms of careful observation and affective connection with vegetal life forms.

The **"**Florascopio**"** in **"**Ruta Verde**"** [10] proposes a perceptual shift: to return plants their power of presence. They are no longer studied as objects, but approached through a sensitive relationship enabled by a device that allows for observation of the morphological diversity of leaves, and for meaning-making through the content printed on their surfaces. The viewer transforms what is visible into a kind of portable micromuseum, used during walks that combine magnifiers, agricultural techniques, and the real-time conservation of a forest, along with all its agencies.

The trigger manifests through the alteration of perceptual scale: seeing a leaf, moss, or a plant vein through the viewer magnifies not only the visible, but also the body's disposition toward the world. The ground becomes a map, details become signs. Wonder emerges as a productive disturbance through the appearance of the minimal as something vast. A first threshold opens the way to the sensitive.

By carefully observing a decaying leaf or a flower still closed, an affective relationship with the vegetal is activated, interrupting the functionalist logic. The body becomes receptive, breathing synchronizes with observation, and the gaze—rather than decoding—accompanies. Flora ceases to be urban decoration and appears as an interlocutor: a life form that coexists, resists, and blooms in the creases of the city. In this way, an ethical gaze is activated: how do we co-inhabit with these other forms of existence?

In this act of attentive contemplation lies the embodiment of a possibility for interspecies ethics. Wonder here does not arise from absolute novelty, but from the sudden alteration of the familiar. In this gesture, the sensitive is activated: the device produces a contemplative scene that suspends habitual perception. Sunlight is manipulated, channeled through magnifiers and directed illumination, to reveal the texture, thickness, and micro-relief of the vegetal. For this, the techno-aesthetic includes not only the magnifiers or the Florascopio, but also the notebooks accompanying the exploration, the questioning methodology, and even small botanical collages.
Together, they configure a space of situated observation, where knowledge is inscribed both in the image and in the participant's drawing. This disposition does not represent the world, but brings it forth in a new way. Thus, transduction in this case is the process through which vegetal matter transforms perception, and perception transforms the way of knowing.
Finally, the workshop concludes with a collective appreciation session, where participants are invited to share what they observed and to name it freely. The conversation does not aim to classify, but to multiply meanings. Invented names emerge, poetic associations, family memories, gestures of recognition. Scientific knowledge coexists with imagination, producing a shared field where the objective and the sensitive do not oppose, but interweave.

8.2. Pedagogical Experiences with Non-Human Life Workshops on the Initiation of Plant Germination

Experience	Wonder Device	Connection with the Environment	Methodology for Generating Wonder
Siembra tu semilla: Workshop focused on early childhood	Soil, seeds, moisture; material and sensory conditions of germination	Gestures of care and continuity; symbolic relationship with life cycles	Activated through the symbolic and sensory manipulation of the seed as a promise of future and collective regeneration

In **"**Siembra tu Semilla**"** [10], wonder does not emerge from the spectacle of technology, but from the symbolic condensation of a minimal action: holding a seed in the palm of one's hand. The trigger in this case is the encounter with a latent form of life. What is activated is not surprise at the unexpected, but the depth of a gesture that contains within it a vital potential usually overlooked in daily life. The seed appears

as the minute that anticipates the immense, as a promise that exceeds its own materiality. It is not only a botanical object, but a symbolic vector: it inscribes a future time, a gesture of care, an affirmation of continuity amidst collapse.

This experience immediately summons the sensitive. The workshop invites participants to write a "question for the world" or a wish related to the care of the environment, which are then placed alongside the seed in a biodegradable container [10]. A co-implication is thus established between body, word, and living matter. Wonder becomes an oriented affect: not a fleeting emotion, but a relational disposition.

The techno-aesthetic device consists of a planting module integrating soil, native seeds, biodegradable materials, and a poetic design of the workspace. The seed and its biodegradable container are proposed as both material and symbolic mediators. Thus, the device not only introduces principles of plant biology, but also proposes a situated action: planting involves an act of care that links the participant with the future. Wonder is thus activated in response to the vital potential of the seed—its latent possibility of becoming a plant.

This moment is carefully guided through a sensitive use of language, where each participant writes a "question for the world" or a wish related to environmental care. These written phrases are placed with the seed, creating a bridge between the biological and the emotional dimensions. Finally, the narrative level expands over time: the seed is not left behind in the workshop. Each participant takes home their container with the seed and their written question, to care for it and witness its germination. In this case, learning does not conclude, but unfolds into everyday life. Scientific mediation thus becomes a slow pedagogy, where knowledge is interwoven with waiting, attention, and care.

8. Pedagogical Experiences with Non-Human Life Fungal Observation Sessions

Experience	Wonder Device	Connection with the environment	Methodology for Generating Wonder
Estaciones Fúngicas: Periodic sessions conducted with the general public	Magnifying glasses, viewers, microscopes, scientific illustrations, and mycelium models	Fungal networks as vital agents; interspecific cohabitation and invisible interdependence	Activated by magnified images and sensitive representations of the mycelium that reveal its structure, proposing an ethic of coexistence with the non-human

The magnifiers at **"**Estación Fungi**"** [10] turn the mycelium into narrative—not to reduce it conceptually, but to expand it perceptually: it is about learning to see again, with different eyes, with different bodies.

The triggering moment emerges when observing magnified images of the mycelium—whether through microscopy, illustration, or three-dimensional modeling—that reveal its filamentous structure. What remains invisible beneath the soil becomes a figure; what seemed formless manifests as a network. This wonder is not merely contemplative but cognitive-affective: it proposes a pedagogy of interspecificity, suggesting that fungi not only "do things" but can be considered agents with whom we share a common ecology.

There is not a single image of the fungus, but a constellation of representations designed to provoke multiple encounters. The techno-aesthetic dimension is expressed in magnifiers, viewers, animations, scientific illustrations, and natural materials that form a scenic device. The mycelium is not explained, but hinted at, expanded, activated. The mushroom is observed not just for its shape or color, but for what it suggests: an organization of the world that does not rely on hierarchies, but on connections. Here, sensitivity is not limited to emotion; it becomes an epistemological attitude. As Bennet (13) would say, it is about perceiving the "vibrant matter" that traverses the human and the non-human in radical coexistence. Finally, the narrative level of these encounters invites collective reflection on what it means to live alongside these organisms. The questions emerge forcefully: What ethics arise from inhabiting a world sustained by invisible connections? What does it mean to know that we breathe thanks to a network of decomposition and symbiosis? The answers are not formulated abstractly, but through gestures, words, drawings, acts of recognition. At that moment, the workshop ceases to be a lesson and becomes a scene of subjectivation.

8.3. Pedagogical Experiences with Non-Human Life Papermaking and the Ecological Bond with Language

Experience	Wonder Device	Connection with the Environment	Methodology for Generating Wonder
Brotar la palabra: Workshop with general audiences	Recycled papermaking + symbolic writing + collective planting	Relationship between language, organic matter, and collective desire; ecological gesture of care and regeneration	Activated by the sensory creation of biodegradable paper and the performative planting of a word-desire

"Brotar la palabra" [10] is an experience that activates the bond between language, organic matter, and collective desire. Unlike a merely contemplative or symbolic activity, this workshop involves a full process of creation: from the artisanal making of recycled paper to the writing and planting of a word chosen by each participant, which is then buried along with a seed. In this way, a methodological chain is built where the technical, the sensory, and the affective intertwine in a pedagogical gesture of transindividuation.

At the triggering level, wonder arises in the unexpected moment when participants actively take part in creating the medium. Used paper, plant fibers, petals, and seeds are recovered to form a cellulose pulp that becomes unique, biodegradable sheets. This becomes a tactile experience where waste is transformed into living matter, and the technical gesture of making paper is re-signified as an act of care and ecological reappropriation. This first moment already introduces a pedagogy of the sensitive: the wet touch of the pulp, the smell of the plant fiber, the rough texture of the freshly formed paper. Each body enters a state of intensive attention to the materials, opening up to a situated aesthetic experience.

At the techno-aesthetic level, the experience is traversed by a narrative design that intertwines action, contemplation, and desire. After the paper dries, each participant receives a sheet to write a word they wish to "plant in the world." These words are not spoken aloud: they are buried—together with a real seed. The performative act of writing and planting does not produce a message, but a world-making act. In its narrative dimension, the workshop becomes a scene of collective sowing, where language ceases to be a medium of representation and becomes a way of inhabiting the future. By planting the written word together with a seed in a biodegradable container, a choreography of care is enacted—one that unites the symbolic with the vegetal. Each future sprout will carry an inscribed desire. Each germination, an activation of the bond between word and life.

8.5. Pedagogical Experiences with Non-Human Life Play and conflict as activators of ethical thinking

Experience	Wonder Device	Connection with the Environment	Methodology for Generating Wonder
Justicia en Juego: Workshop with participants aged 8 and older	Presentation of real environmental cases as controversy	Embodiment of roles that rehearse environmental justice scenarios	Dramatized debate and revelation of real verdicts

In **"**Justicia en Juego**"** [10], wonder and connection with the environment are not activated through direct interaction with biotic elements, but rather through an ethical tension. The triggering moment emerges with the presentation of a series of real environmental cases—forest fires, toxic gas pollution, river diversions, biodiversity loss—introduced through provocative questions that activate the participants' moral judgment. This initial stimulus not only challenges them cognitively, but also creates a perceptual urgency in the face of ecological harm, producing a disruption that calls for involvement.
From the outset, the experience does not seek to deliver a closed content, but to embody it through a role-playing game that simulates an environmental trial. The workshop's techno-aesthetic device includes character cards, background files, territorial maps, and symbolic objects. Each participant assumes a role—defense attorney, environmental prosecutor, judge, community representative—and receives partial information, requiring interaction as a means of constructing knowledge. This setup turns the workshop into an argumentative scenography, where knowledge is produced through friction and judicial embodiment, not exposition. The design does not aim to represent a situation, but to unleash it.

The sensitive level appears in the creation of a horizontal deliberative space, where children, youth, and adults share intuitions, emotions, and strategies. Traditional hierarchies of knowledge are destabilized, giving rise to a transgenerational community constituted through play. In this shared space, emotion is not treated as an obstacle but as an epistemological vector. Indignation, doubt, and empathy become affects that nourish reflection and enable a collective reappropriation of the notion of environmental justice.
The narrative level unfolds in two stages. First, the simulated trial takes place: each team argues, presents evidence, and builds narratives in defense or accusation. However, at the end, it is revealed that the cases were not fictional. The actual verdicts issued by the courts are presented, often dissonant with the

conclusions reached by the participants. This revelation provokes an ethical wonder: a kind of disorientation not tied to aesthetic surprise, but to the mismatch between a shared moral expectation and the institutional reality.

This kind of wonder produces a cognitive and affective rift in which the familiar—injustice against nature—becomes more visible, more urgent, more intolerable. Within that rift, an intensified attention is activated, where ethical thinking becomes perceptive and situated. The game thus becomes a civic theatre, a sensitive rehearsal of a justice yet to come. The challenge of the workshop lies in generating a perceptual and narrative imbalance capable of moving participants through thought. It is not about teaching environmental law, but about inhabiting conflict as a form of knowledge in a civic context. Ultimately, Justice at Stake emerges as a scientific-aesthetic mediation that allows for rehearsing new forms of consensus in defense of the commons—through a device in which ethics becomes embodied and judgment becomes a shared affective territory.

9. Methodological Synthesis of Experiences

The following table summarizes the experiences analyzed, highlighting how each one integrates wonder as a methodological affect and its link to the environment through specific devices. This synthesis makes it possible to observe the practical application of the principles proposed for a scientific-ecological mediation.

Experience	Triggering of Wonder	Connection with the Sensitive	Techno-Aesthetic Devices	Narrative
Aventura Botánica/ Ruta Verde	Activation of wonder through devices that intensify perception and collective attention (magnifiers, viewers), transforming the minimal into an object of analysis and generating cognitive disruption.	Affective connection with urban flora, redefining it not as a static element but as a dynamic interlocutor within the urban space.	Florascopio, magnifiers, and exploration notebooks as material and symbolic assemblages for situated observation, revealing vegetation as an active presence in the environment.	The experience is structured as a narrated walk. The mediation devices enable the translation of scientific language into the sensitive and symbolic register of each group.
Siembra tu semilla:	Activation of wonder through the confrontation with the latent potency of life in a seed, acting as a symbolic vector of future regeneration and affirmation of continuity amidst collapse.	Intimate relationship between body, intention (desire), and life projection. The formulation of a "question for the world," placed	Sowing module with biodegradable components and native seeds, designed as a poetic and scientific artifact. Functions as a material/symbolic	Each participant writes a word or wish to plant alongside their seed. That word, buried in a biodegradable container, transforms the action into an unfolding

		with the seed, establishes a co-implication oriented toward commitment to the environment.	mediator for a situated and ethical act of care.	narrative. Language is no longer spoken—it is cultivated.
Estaciones Fúngicas	Activation of wonder through magnified observation of mycelium (via microscopy, illustration, 3D modeling), revealing its filamentous structure.	Perception is reoriented toward the imperceptible, generating renewed attention to the invisible structures that sustain ecosystems. This installs an interdependent sensitivity to fungal networks.	Magnifiers, viewers, microscopes, scientific illustrations, and mycelium models. The mycelium is not explained but hinted at and activated.	Promotion of a collective reflection on coexistence with these organisms. The emerging questions about the ethics of invisible bonds transform the workshop into a scene of collective subjectivation.
Brotar la palabra:	Activation of wonder through active participation in the creation of paper from organic waste (used papers, plant fibers, petals, seeds).	This process transforms the perception of waste into living matter, and the technical gesture of making paper is re-signified as an act of care and ecological reappropriation, activating a haptic connection with matter.	Handmade paper, planting, and performativity. The creation of paper and the planting of a word-wish alongside a seed constitute a "world act," mediating between language, life, and regeneration.	The workshop becomes a scene of collective sowing where language, through the act of writing and planting, inhabits the future. Subjectivities intertwine in a narrative of regeneration and symbolic-material co-implication.
Justicia en juego	Activation of wonder through the presentation of real environmental cases (forest fires, pollution, river diversions, biodiversity loss) with provocative questions that activate the moral judgment of participants.	Horizontal space for deliberation that destabilizes hierarchies and fosters intergenerational dialogue. Emotions (indignation, empathy) become epistemological vectors that nourish reflection and the reappropriation of	The game is structured with cards, files, maps, and symbolic objects, designed to activate conflict, argumentation, and civic imagination. The device is an argumentative scenography intended to unleash the situation, not just represent it.	The simulated trial culminates in the revelation of real cases, generating "ethical wonder" and a "cognitive/affective rift" that exposes the dissonance between morality and institutional reality. This intensifies attention and mobilizes ethical

		environmental justice.		thought toward a justice to come.

The journey through **"**Esto no es una visita guiada**"** [10] workshops has allowed us to map a set of experiences in which scientific knowledge is not conceived as content to be transmitted, but as a sensitive form of engaging with the world. Throughout the scenes described, we have explored a pedagogy of wonder in which each methodological level—triggering, sensitive, techno-aesthetic, and narrative—contributes to a nonlinear, affective, and situated learning experience. These levels are not steps toward a higher truth, but modulations of a single transductive practice: producing reality through relations.

Each workshop activates a particular form of transindividuation, understood as a process by which the subject is constituted in relation to other subjects, technologies, affects, and territories. The tools used—magnifiers, viewers, pinhole cameras, recorders, cards, recycled paper, green screens—do not function as simple intermediaries between knowledge and the public, but as affective technologies that reconfigure the relationship between body, world, and knowledge. In this framework, wonder should be understood as a preindividual condition (Simondon), one that precedes and enables the emergence of a shared subjectivity. There is no "I" that becomes amazed; wonder is what constitutes the "I" as part of a shared event. From this perspective, scientific mediation does not aim to communicate finished truths, but to enable conditions in which knowledge becomes a lived, situated, and transformative experience. Scientific praxis, thus understood, can once again be inscribed within an ethics of care and respect for life.

This is not merely about designing attractive workshops or generating memorable experiences, but about reconfiguring the very idea of scientific education: one that recognizes territories as agents of knowledge, listens to the rhythms of living beings, and fosters narratives ethically implicated in the ecological crises we face. In this sense, the methodological praxis developed here does not aim for replicable results or quantifiable evaluations, but for enabling modes of being in the world. The co-implication between technique, aesthetics, and territory is not a decorative addition—it is the very structure of these practices. Aesthetics is not limited to the visual; it acts as an ontological dimension of knowledge, where learning is possible because something affects us, moves us, and transforms us. Technique is not neutral; it is placed in service of a sensitive reappropriation of the world. And territory is not a passive backdrop, but a pedagogical agent that restores depth to educational agency.

Conclusion

Revisiting these experiences today, in light of Simondon's thought and his conceptual framework on transindividuation, allows us to propose a radical hypothesis: this science imbued with magical sensitivity

is not a utopia to come, but a discreet, persistent event—already present in certain scientific-ecological practices where the technical, symbolic, and ecological weave constitutes the experience within its territory. This research is an invitation to become aware of that place.

From this theoretical transposition, we can propose a critical methodology for scientific mediation, articulated in four guiding principles:

1. Ontogenetic: Mediation is a process of individuation. It does not transmit finalized knowledge; it co-creates a way of being in the world. The experience is always unfinished, situated, and transformative.
2. Transductive: Knowledge is not communicated linearly; it is generated at the intersection of subjects, objects, materials, environments, and affects. The science mediator does not transmit content but creates conditions for resonance [2].
3. Territorially Situated: Cultural mediation cannot abstract itself from place. The environment—physical, symbolic, and emotional—is a pedagogical agent. Mediation resonates when it engages with the memories, tensions, and potentials of each territory.
4. Ethico-Affective: Every practice of knowledge produces a way of inhabiting. Teaching science is not neutral: it enables possible worlds, builds sensitivity and responsibility in a present shaped by catastrophe [11].

From this perspective, scientific mediation is not about transferring data, but about activating processes of connection. In this gesture, wonder becomes key—not as a fleeting emotion, but as a preindividual affect that disrupts established forms of perception and opens a threshold where knowledge can be lived as a collective, situated, and ethically implicated experience.

In a scenario marked by climate catastrophe, knowledge understood in this way does not seek redemption, but it can help us recompose meanings of continuity and collective agency. Wonder, as a preindividual affect, can become a threshold from which to interrupt the automatisms of collapse and experiment with other forms of cohabitation. Instead of sealing the future under the logic of disaster, these practices foster an ecological, affective, and situated imagination, from which the future once again becomes an open and shared question.

Wonder, then, not only inaugurates knowledge: it territorializes it and renders it sensitive (Burke, 1998; Morton, 2018). Where knowledge emerges as encounter, a politics of care may also emerge. And this is what these practices suggest: that scientific mediation can function as a cultural participation platform in the face of climate change—a way of generating affective and narrative consensus around geological, environmental, and technical transformations that challenge us collectively.

This participation becomes more powerful when carried out in territories where scientific research, technical development, and affected communities coexist. When the environment ceases to be a backdrop and becomes an agent—when knowledge arises from connection rather than imposition—a practice of transindividuation is activated. That is, a form of individuation that does not close off the subject but opens it to the common: to the symbolic, ecological, and technical forces that traverse and constitute it [12]. This

is a fundamental axis of analysis for understanding the psychosocial impact of the climate crisis, but one that can be extended to the study of other technical-symbolic systems.

Thus, it becomes urgent to expand the sense of the scientific-magical beyond museum or school devices and protected natural areas. This methodology can (and already does) unfold in places not usually recognized as educational: forgotten ravines, urban hillsides, threatened wetlands, industrial ruins, or polluted zones.

What matters is not the place itself, but the way in which knowledges, technologies, memories, and forms of life become interwoven there.

Today, multiple experiences across South America reveal this clearly. In southern Chile, Indigenous communities care for the Monkül Wetland (Araucanía, Chile) by combining biodiversity studies, sustainability practices, and local traditions [13]. In Caracas, the collective EnlaceArq organizes walks along the polluted Guaire River to re-signify the urban landscape through public pedagogy, where maps, stories, and games open the possibility of rebuilding ties with water and ecological memory [14]. Likewise, in projects such as HAWAPI, artists and residents gather in vulnerable areas of Peru and Colombia—such as retreating glaciers or mining zones—to imagine, fabulate, and rewrite the relationship with the environment through sensitive and performative practices, where artists and neighbors reflect collectively on the transformation of their territory [15].

These practices configure modes of mediation in which the technical and the natural are co-implicated. In these places, technology ceases to be a neutral means [12] and becomes affective and territorialized; aesthetics is no longer decorative, but emerges as a form of situated attention; and scientific knowledge becomes a practice of relation and cohabitation—a way of relating [11]. Far from being exceptions, these experiences outline a possible ecology of knowledge, where the magical is not the opposite of science but its sensitive reverse: its capacity to make worlds.

At the end of this journey, what remains is not a lesson learned, but a possibility ignited. To re-enchant matter is not merely a poetic task, but a fundamental ethical commitment to the world's presence. It constitutes an inescapable political urgency—one that permeates and confronts the various devices that, in contemporary life, manage and regulate both subjective sensitivity and the materialities of the environment.

Science thus understood—technopoetic, transductive, and situated—does not aim for immediate solutions to the climate crisis but for more human and ecological ways of inhabiting it. Its power does not lie in the promise of salvation, but in its ability to generate collective processes of re-signifying the world. In this sense, transduction is not just an internal transformation, but a social articulation in which the technical, the sensitive, and the territorial mutually reconfigure one another.

Thus, the future does not appear sealed by collapse but as a contested field, where new forms of connection, political imagination, and action are at stake.

Authors' Biography

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