Beyond Crisis Talk: Making Time for Re-Searching New Narratives of Human Relations With Soil

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Abstract
In this paper, we focus on soil as a "contested terrain" emerging from the interplay of competing socio-political and cultural frames. Starting from the analysis of international reports on soil, we show how the urgency frame acts as a powerful discursive device that progressively reduces the inherent complexity of soil as a socio-ecological system, compressing the temporality of future perspectives and demarcating the inclusion/exclusion of non-human actors in soil communities. In the second part, we draw on examples of practice from our project BRIDGES to highlight possibilities for re-framing research as a "practice of attention" and experimenting with different temporalities and modes of relation with soil. Findings point to the need to address the fundamental questions that such an approach poses for all research communities. Bringing sedimented attitudes, perceptions, and ways approaching research to the surface, our experiences cast light on the importance of methodological choices for thinking differently about soil and about slowing down the narratives of research: not as a tool or resource, but as a shared process of crafting mutual relations amongst all kinds of practitioners, including more than humans.

Keywords
technoscientific narratives; environmental policies; urgency; soil; practices of attention; post-normal science.

1. Introduction

Pivoting on constraining the time available for action, urgency and "crisis" talks have become a key feature of contemporary policy discourses on socio-ecological issues. As critiqued across multiple domains (see for example Roitman 2014), "governing through emergency" tends to reproduce existing forms and relations of power, preserving the neo-liberal social order (Anderson et al. 2020), which, in order to grant its promise of freedom, is intimately relying on the management of danger and disorder (Pellizzoni 2011).

Due to its critical positioning in current environmental debates, the issue of soil is a case in point. Featuring centrally in global discourses on food production, biodiversity loss, land use, but also urban planning and climate regulation, it is by no chance that soil itself both underpins and encompasses all the critical zones identified by Rockström et al. (2009) as the "safe operating space for humanity". Yet, this raised attention sits alongside imaginaries of soil which remain largely connected to the rural past, disassociated from human experiences, sociality and economic practices in the urban present (Meulemans 2020; Granjou and Meulemans 2023). New contributions from soil science itself have put forward the need for a new anthropedology: "a proposed disciplinary development that understands human activities as integral to soil genesis" (Meulemans 2020, 251).

Echoing the dominant rhetoric of human agency in the Anthropocene, global discourses on soil will thus appear to swing between alternative conceptions. On the one hand, the urgency frame – in policy and scientific institutions alike – pushes for solutions in the immediate future. This way of presenting problems dominates funding calls from external organisations (e.g., EU funds, or private investments), a process that, for instance, is also visible in schools and Higher education, via systems and practices emphasising short circuits of input and outputs via measurable outcomes (Hancock et al. 2023).

On the other hand, while discourses of urgency prevail, the literature on soil has also witnessed the progressive emergence of counter-narratives, questioning the timescape imposed by techno-scientific interventions set on maximising fertility and productivity. Such narratives account for the times of soil renewal and are focused on relations with soil based on "care" (Puig de la Bellacasa 2015), including also local and indigenous knowledges, as well as experiential ways of relating and interacting with soils, as found in ethno-pedology and folk taxonomies (Krasilnikov and Tabor 2010; Lyons 2020; Martin et al. 2015).

Thus, to break the cycle of crisis-setting, it is necessary to reconsider the implicit assumptions underlying knowledge production practices vis-à-vis the natural system, with particular attention to the images of science and research that are transmitted and nurtured in current scientific and educational establishments (Burnard et al. 2022). To this regard, we are careful to state that it is not our intention to underestimate the warnings coming from the scientific community; quite the opposite, our analysis intends to identify the urgency frame in discourses about soil, in order to reflect on and articulate the temporalities for a more inclusive, and democratic relation with the soils upon which we intimately depend.

1.1 Focus of This Paper

Addressing the wider international debate on soil as a contemporary socio-ecological issue, this paper brings together contributions from the field of policy analysis with emerging literature in Science & Technology Studies (STS) to illustrate an example of collective praxis, whereby a multidisciplinary community of researchers sought to enter into dialogue with a plurality of ways of knowing, practices and modes of relating with soil. To achieve this aim, we first engage with an analysis of narratives pivoting around the concept of urgency produced by international bodies and communicated through the impactful reports on which public policies are grounded. We highlight the frame and limitations of technoscientific approaches driv-

en by urgency, characteristically informed by a linear trajectory from problem to solution and pragmatic, rationally planned actions, with experts as privileged knowledge-holders, often surrogating the public space for debate and deliberation (Benessia et al. 2012; Tallacchini 2015).

In the second part, we draw upon some of the experiences of BRIDGES (Building Reflexivity and response-ability Involving Different narratives of knowledGE and Science)[1] – a project involving the authors of this paper – to describe and discuss our experience of "slow" science (Stengers 2017) hinged on the practice of transdisciplinary research involving a community of peers, not only humans. BRIDGES engaged a group composed of senior and young researchers, practitioners, artists, students and citizens, in creating extended communities of research with soil, informed by the framework of post-normal science (Funtowicz and Ravetz 1992; 2020) and in accord with a socio-ecological and epistemic justice standpoint (Benessia et al. 2012). Our experience, positioned at the border between research and education, was denoted with an explicit attention to the emergence of tacit narratives shaping our work and our ability – as researchers – to relate with other perspectives and account not only the multiplicity of voices but also the copiousness of both human and non-human temporalities involved in soil care practices. The article will conclude with a discussion on the importance of methodological choices underpinning the creation of soil narratives; and specifically, the possibility of redirecting the narrative of urgency towards new practices of attention, denoted by a slow and continuous conception of time.

2. Background: Framing Human Relations with Soil in the Anthropocene

At a time of unprecedented global environmental change, the scientific community has characteristically endeavoured to "speak truth to power", bringing evidence to bear upon the pervasive disruption of a planet under pressure. Moreover, not only is science tasked to provide evidence informing decisions, but also to spur society into action: calling for innovation and investments to "fix" a world that is presented as increasingly fragile, inhospitable and unstable. Ostensibly framed within a techno-scientific view, nature is presented as "scarce", with resource extraction becoming more expensive and difficult to perform as such resources become less available (Déry 2007); metaphors like "peak oil", "peak nitrate", "peak phosphorus" are used to convey the anxious forewarning of an impending breakdown, by which a resource is heading toward exhaustion without equivalent efforts to renew (Puig de la Bellacasa 2015).

Indeed, we can identify the conceptualisation of the Anthropocene as an over-compassing master narrative of the troubled relationship between humans and environment. Since the concept was first proposed, in the late 90s, natural scientists, mainly in the geo-environmental sciences (Hamilton et al. 2015) have been extensively engaged in debating the thematic core and temporal boundaries of such epoch: when, where and why the radical break with the Holocene took place (Steffen et al. 2015). Randazzo and Richter (2021) have called this perspective "discontinuous-descriptive", underlining the radical discontinuity, interrupting the linear temporality, underlying such debate. Such framing of the Anthropocene, clearly highlighting the unfolding of catastrophic and unprecedented ecological changes (IPCC 2019), is particularly suitable to ground the pressing call to decision-makers for swift actions.

In opposition to this master narrative of the Anthropocene, Randazzo and Richter (2021) advance the so-called "continuous-ontological" approach, aiming at "mapping out ecological relationality and agency in a way that precedes, and will outlive, the current ecological changes that characterise the Anthropocene" (Randazzo and Richter 2021, 297).

Running counter to the "positivistic catastrophism" that fuels the construction of the crisis, the ontological relationality allows for an acknowledgement of the limits of human agency (Chandler 2018; Taussig 2020), and a refusal of the eco-modernist myth of technological mastery of nature (Lynch and Veland 2018), going towards a post-cartesian theorization, in which the networked agencies of both human and non-humans become the object of inquiry (Latour 2018). Hence what is at stake in the Anthropocene is "not the scientific measurement and political management of a set of ecological shifts, but rather a seismic shift in our understanding of being" (Randazzo and Richter 2021, 298).

While originating within a discourse primarily located within the natural sciences, particularly geology – which has recently, incidentally, dismissed the Anthropocene as a formal unit of the geological timescale (Witze 2024) – the narrative potency of this epoch has permeated the social sciences, intersecting with post-structuralist, eco-Marxist, and other debates (Bonneuil 2015). More importantly, it is something that has evolved from a debate about the "most appropriate unit of measurement for the crisis" to a reflection on the multiple relationalities and temporalities that traverse humans and non-humans, including the soil and its inhabitants.

2.1 Narratives and Counter-Narratives of Soil

As Cronon was urging, as early as in 1992, the challenge to scholars is "telling not just stories about nature, but stories about stories about nature", acknowledging that each and every label we give to phenomena or periods of time implies different narratives and prescribe different possible endings (Cronon 1992). Studies on shared imaginaries focussed on metaphors, collective representations, paradigms, frames and narratives show how such shared visions, most often tacitly evoked, contribute – together with power structures, interests and rational choices – to shape future developments: they define the horizon of possible and acceptable actions, impose classifications, legitimise actors, serve to identify relevant issues and, when used in public debate, can affect collective self-understanding and action (Jasanoff and Kim 2015).

"Land imaginaries", in particular, have recently been proposed by Sippel and Visser (2021) as influencing "the notions of what land is, what it can or should do, and how humans can or should interact with it" (Visser 2021, 315); they concern the shared, implicit ideas grounding how soil-related environmental issues are interpreted, the paths towards the desirable futures, the ethical norms underlying actions and the cultural dimensions related to space and place transformations.

While the dialectic interplay of narratives cannot completely account for the emergence of specific socio-environmental issues, their analysis in science-based policy discourses casts light on epistemic practices, how evidence is selected and used and the levels at which conflict is both managed and understood. Thus paying attention to counter-narratives is important to disclose alternative framings and to open up paths hitherto neglected, in terms of both thinking and action. Often counter-narratives have been used to describe and confer systematicity to minority positions, and have been particularly studied, among others, in the field of post-colonial

studies, to show the existence and relevance of non-Western conceptualisations and approaches (Schiebinger 2004). Counter-narratives are also suitable to account for more-than-human processes of world-making, as shown by anthropological (Kirksey and Helmreich 2010), sociological (Murdoch 2001), and geographical works (Whatmore 2006) of the last decades.

In our reflection, we refer to narratives of research as frames which define the focus of attention but also the way in which knowledge is produced and legitimated in academia, as well as their underlying values. This work sets the premise for a rethinking of research practices, recast as a practice of attention, with its inherent features of slow times, relations, reflexivity and care.

3. Part 1: Frames and Narratives Within Policy Reports

As regards big socio-ecological issues, the critical sensitive endeavour of knowledge collection, comparison, systematisation and editing that sits behind both problem-setting and problem-solving is actually realised within a few international bodies. They function as intermediate authoritative entities between the scientific community, tasked to produce sound and objective knowledge, and the governments, which are finally called to take action. A major instrument of communication of such efforts is the periodic publication of reports, condensing data and proposed policies for policy makers and the media. As such, those documents are well positioned to be analysed with the lenses of incorporated narratives and imaginaries, describing the deeply-seated cultural visions of human-environment relationships, as they are shaped within the scientific community and amplified for politics and society.

We focused on the decade 2012-2022, since FAO (Food and Agriculture Organisation of the United Nations) launched the Global Soil Partnership. Recognising soils as a crucial but neglected factor of food production, a number of initiatives and pilot projects were set in motion to raise awareness and support strategic networks, in order to "speak up" for soil and boost action (FAO 2022b).

We started from an initial focus on international bodies holding an explicit institutional mandate to address soil: FAO (Food and Agriculture Organisation) and UNCCD (United Nations Convention to Combat Desertification). These institutions are critical for their role in shaping the debate; their reports are normally commissioned to groups of internationally recognised experts, with the power of yielding influence over the terms of the debate. We then expanded the original set by following internal cross-references, proof of mutual recognition and legitimation as sources of authoritative and trustful knowledge, which allowed us to include IPCC's (Intergovernmental Panel on Climate Change), IPBES' (Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services) and GSP's (Global Soil Partnership) reports, in addition to those produced by joint institutional initiatives. Broadly following the example of Browne et al. (2018), we performed a theory-driven, qualitative, discourse analysis, in two subsequent steps.

First, we explored how the themes of crisis and urgency were semantically and conceptually articulated in the reports, recursively identifying the following discursive lines:

- *Crisis*: all the discourses articulating around the concept of crisis, depicting negative, fearful scenarios;

- *Urgency*: all the discourses containing a push to urgence;
- *Action*: all the discourses proposing actions as responses to problems;
- *Speed*: all the discourses referring to quickness (e.g., need of acceleration, timely action);
- *Pragmatism*: all the discourses referring to a pragmatic mindset in responding (e.g., tangible, viable, proven, evidence-based, etc.).

As part of this initial analysis, we also conducted an exploration of the themes of "uncertainty" and "care", in order to identify discourses pointing to alternative framings of the issues affecting soil and options for humans to intervene.

Secondly, we performed a close-reading of the reports with the heuristical lenses of the different temporalities of the Anthropocene, with a view to identifying actors and solutions which are made visible and possible within the different frames. Since these reports are usually structured with forewords and summary parts targeted to non-scientists, followed by lengthy accounts of technical information, after their extensive readings we carried out a thematic analysis of the parts devoted to summaries and recommendations. This is where conceptual framings are normally found, because these sections are specifically aimed at communicating with societal actors, as well as being the most common source of information relaunched by the media and policy discourses.

3.1 "Moving to a Crisis Footing": Framing the Roadmap to Tackle Soil Degradation

We are aware that each single Institution has both a story and a specific identity, which shaped its approach, vision and proposals; such diversity emerges clearly also from the respective reports. However, here we aim for a synoptic reading of their positions, to highlight some common features of crisis talking at the sensitive interface between research and society (particularly media and politics). Where relevant, we will underline peculiar institutional positions.

An urgency frame generally infuses policy with the necessity for action to address the specific issue of soil degradation:

> In a world of profligate consumerism, global supply chains, and a growing population, land resources – our soil, water, and biodiversity – are rapidly being depleted. As a finite resource and our most valuable natural asset, we can no longer afford to take land for granted. We must move to a crisis footing to address the challenge and make land the focus. (UNCCD 2022)

It is clear in this particular extract the sense of impending danger and calamity which portrays soil as waste-land, unusable and therefore in need to be remedied or salvaged by humans. The "universalist narrative of crisis" (Randazzo and Richter 2021), proper of a discontinuous frame, is also reminiscent of points if discontinuity in the recent past, such as the early Malthusian warnings of a geometric progression in population growth, coupled with the later neo-Malthusian ecological anxieties (Ojeda et al. 2019).

Urgency is then further fuelled by a linear logic demanding human intervention:

> It is no longer enough to prevent further damage to the land; it is necessary to act decisively to reverse and recover what we have lost. (UNCCD 2022)

Time is of the essence but the subjects who should be involved to undertake such changes or even to *contribute* relevant knowledge towards *understanding* the issues at stakes are concealed in the *third-person* written text:

> Time is of the essence. Current trends in natural resource depletion indicate production from rainfed and irrigated agriculture is operating at or over the limit of sustainability. Injecting a sense of urgency into making the necessary transformations in the core of the global food system is essential. (FAO 2022a)

When urgency frames are employed, some recurrent sub-discourses emerge:

- Crisis times require action;
- It is necessary to act quickly;
- It is necessary to act pragmatically;
- Non-action determines a threat, projecting a gloomy future.

These elements can be logically visualised as in Figure 1 below, which depicts an accelerating short circuit: the situation of crisis needs urgent, strong and practical action, or new crises will emerge, threatening our future and bringing us back to the need of acting urgently.

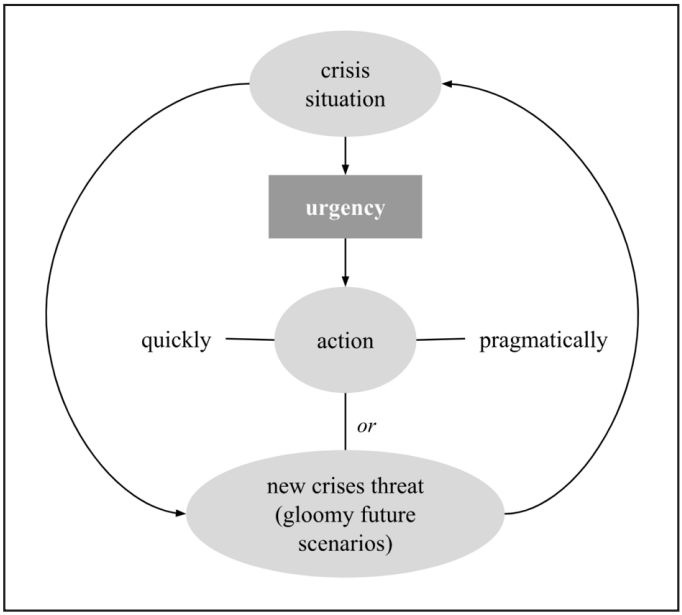

Figure 1.
The thinking pattern underpinning the urgency conceptual frame.

3.2 "A Full Package of Solutions": Crisis Times require Action

All documents share a common, abiding call to action, and the reports themselves conceive of their role as tools to systematise and assess the viable "institutional and technical responses" (FAO 2022a), leading to a "platform for action to avoid and reduce land degradation and promote restoration" (IPBES 2018). Most interestingly, the appeal to action in rhetorical terms works well as the opposite of inaction, appealing to the highest moral ground of acting to rescue and take responsibility for others. Indeed, inaction is specifically addressed as an expensive, destructive option. Alternative pathways involving the necessity to slow down, observe, reflect, relate, share experiences and negotiating values appear in fact only marginally.

It is necessary to act quickly. Inextricable from the emphasis on urgency, the need to act "immediately", "timely", "now" is the invoked time infrastructure. Although longer-term policies and different time scales are also mentioned, the continuous push to urgency suggests a contraction of time over increasingly short time-spans.

It is necessary to act with a pragmatic mindset. Reinforcing the intended call to action, this is presented as an "outcomes-oriented approach" (FAO and GSP 2022), which encourages thinking in terms of effectiveness, tangibility, practicality, and workability of solutions:

> A "full package" of workable solutions is now available to enhance food production and tackle the main threats from land degradation, increasing water scarcity and declining water quality. (FAO 2022a)

Impressing upon the soundness of proposals, extensive reference is made to the evidence-base, informed by data and illustrated by scientific plots. Particularly, IPCC and GSP stressed the value of robust knowledge assessment, performed by "hundreds of experts worldwide" (IPCC 2019), and the importance of quantifiable targets and indicators (FAO and GSP 2022), while FAO gathered experts from several institutions to describe the "state of the art" of research about soil, following the "tremendous growth in the methods available for the study of soil organisms by the scientific community" (FAO, ITPS, GSBI, CBD and EC 2020).

Just like the crisis defines the discontinuous-descriptive frame of the Anthropocene, so do the solutions, aiming to turn problems around and restore an optimal situation. Alongside the extensive use of technical knowledge, the reports also borrow from the culture of financial valuation, using concepts like "ecosystem services" and "natural capital", and a general tone of budgetary balance calculation (e.g., the dialectic degradation/restoration), the underlying logic being that "the worth of goods, things, activities, spaces, and other species can be essentially translated into financial evaluations" (Papadopoulos 2018, 31).

> No country can stand alone – alliances, coalitions, partnerships, collaboration, and cooperation will be essential to build, scale, and deliver the required mix of human, social, and financial capital needed to restore natural capital and transform land use systems. (UNCCD 2022)

As highlighted by Papadopoulos, cultural framings pivoting on valuation also act as "technologies of temporality", since they are sustained by an underlying objective of "appropriating the future" (*ibid.*, 40).

Notably, one of the documents feels compelled to report a critical position towards the prevalent Western concept of "ecosystem services", seen as coming from "instrumental value systems", and describes the effort of reframing it as "nature's contribution to people", to be used especially in reference to "relational value systems" (IPBES 2018).

Non-action determines a threat, projecting a gloomy future. Projected futures are painted with menacing features; even when the rhetorical appeal to urgency is less emphasised, the price of inaction is described as full of "soil threats" (FAO and GSP 2022). We are not discussing here the exercises of scenario-building based on available knowledge normally used by environmental modelists. We are referring to the logical conclusion of the appeal to urgent action: a sanction, in the form of a threat to humans, and their social or economic well-being:

> [...] [T]he human-environment relationship must drastically change to avoid catastrophic tipping points whereby the human power of exploitation is overwhelmed by the power of nature. (UNCCD 2022)

However, imposing an abiding sense of urgency to discourses quickly equates to a device of control, accelerating closure of the debate and narrowing the framing of the problems at stake, expedited by the delivery of effective solutions:

> Establishing the underlying causes of land degradation provides policymakers with the information needed to develop appropriate response options, technologies, policies, financial incentives and behaviour changes. (IPBES 2018)

In the case of complex socio-ecological issues, as is land degradation, problem-framing is particularly sensitive, given their value-based nature, their positioning at the intersections between different disciplinary descriptions, and at the crossroad of social realms. The risk here is that reports act as surrogates of open discussions, subsuming different positions and values, and directly proposing (practical) solutions.

Actors mentioned in the reports have differentiated roles: decision-makers are the first intended recipients of the messages (each document contains a summary for policymakers), alongside "planners and practitioners" (FAO 2022a), although also the whole group of "scientists, laymen and policy makers" (FAO and ITPS 2015) are targeted, and in some cases citizens are involved as "consumers" (FAO and GSP 2022). An implicit hierarchy is established: "governments, scientists, farmers, private sector, and local communities" all have the "shared responsibility" to "support target initiatives", while "youth, indigenous people and local communities" need to be "empowered" (UNCCD 2022); "farmers, pastoralists, foresters and smallholders [...] are nature's stewards and the best agents of change to adopt, adapt and embrace the innovation we need to secure a sustainable future" (FAO 2022a).

Hence, although all documents devote attention to indigenous knowledge and local communities' involvement, stating their right to "be given equal footing alongside modern scientific methods"

(UNCCD 2022), a framework for actual epistemic justice does not follow, and these actors are more often called to action at the end of the policy development line, to comply to pre-established solutions. Crucially, although all societal actors are judged relevant and necessary to address the problems concerning land degradation, the overall perspective of the reports is the technopolitical, Western one. Notably, it is a position that neglects the presence of others, human and non-human actors, resounding with colonial positions against minorities regarded as expendable (Zografos et al. 2020).

Alongside the analysis of urgency-related categories, we performed throughout the reports an exploratory search for alternative visions of human-environment interplay. For example, we tested the use of the concept of "uncertainty", to account for any understanding embracing a non-mastery relation with nature: when it is not denoted in negative terms (e.g., the uncertainty principle as a dangerous brake to the needed acceleration, used to avoid unpopular or costly decisions, as in IPBES 2018), the term is seldom employed. In some cases, FAO reports introduced the concept in the problem diagnosis, possibly opening up towards a post-normal understanding:

> The uncertainty of climate change and the complex feedback loops between climate and land present agriculture with amplified levels of risk that need to be managed. (FAO 2022a)

Interestingly, FAO is also the institutional body which more frequently employs the concept of "care" to denote the interplay with land:

> Taking care of land, water and particularly the long-term health of soils is fundamental to accessing food in an ever-demanding food chain, guaranteeing nature-positive production, advancing equitable livelihoods, and building resilience to shocks and stresses arising from natural disasters and pandemics. (FAO 2022a)

When interpreted as "stewardship", the same conceptual approach is mostly used to describe the interplay with minority groups, like indigenous and young people.

In sum, although reasonably employed by international bodies seeking to draw the attention of the public and policy-makers towards severe environmental situations, the usage of a crisis talk cannot avoid the major flaw of representing a narrative of time contraction over the shortest periods in the future, i.e., while declaring the need for a resolute jump towards the future, it actually forces a stuck on an eternal, uncanny, present (Bryant 2016). Restricting the space and time available for reflexive discussions and evaluation of problems and possible solutions, and favouring the enactment of action-oriented responses, the urgency frame short-cuts the space for action. To produce a paradigm change, critical discussion of the process of production of scientific knowledge, including its actors and values represents the foundation stone, which is exactly what the urgency frame tends to constrain, finally leading to an actual inability to change.

3.3 Short-Cutting Time / Short-Cutting Relationships in the Reduction of Controversial Issues

The analysis of the narratives incorporated within the reports' discourses showed how the political framing of ecological issues is generally confined to what we have termed as the

"urgency frame", expression of the so-called "governance through time" (Pellizzoni 2020) or "chronopolitics" (Kaiser 2015). The urgency frame is pervasive in European policy documents of the first two decades of the Millennium, promoting innovation in terms of economic and techno-scientific progress: it is necessary to act quickly, it is argued, as serious dangers loom over the "European way of life", threatening to destroy it (Giuffredi 2019).

"Governing through emergencies" has been critiqued for its promise of a crisis resolution based upon a sharp distinction between normal and extraordinary times, often happening at the expense of weaker strands of society (because of class, race or gender), whom, on the contrary, are familiar to chronic states of crisis ("slow emergencies") (Anderson et al. 2020).

In the context of environmental governance, a notable mechanism for implementing urgent and time-effective measures is the short-cutting of biological relationships. Whether it is about soil depletion or the need to contain a biological infection that is harmful to humans, the *most effective package of solutions* will focus on restricting the spreading of a disease by isolating the sick from the healthy (i.e., quarantine); or minimise its damage through collective interventions (i.e., prophylactic measures); or even by selecting resistant and tolerant varieties as in the case of plant epidemics in agriculture. In such cases, the reduction of biological complexity of a problem may be accompanied by a reduction in the complexity of knowledge at disposal, not only in terms of "scientific cultures" serving the problem, but also for the possibility of including non-academic actors in the debate over potential solutions.

A noteworthy case revolves around the management of the Xylella crisis in the Italian context (Colella et al. 2019; Milazzo and Colella 2022), which is illustrative of such reductionist practices. Following a wave of olive tree deaths in the province of Lecce (southeast Italy) in 2013, a bacterium identified as *Xylella fastidiosa* triggered an emergency procedure under the then-existing European phytosanitary policies (2000/29/EC). Along with other prophylactic procedures targeting plants' and insects' lives, infected olive trees and those at high risk of infection in the area were removed and destroyed, in order to contain the spread to other healthy plants.

One of the most interesting aspects of the phenomenon was the emergence of local movements which, employing various tactics (street demonstrations, legal actions, formation of autonomous research groups, etc.), openly critiqued the bio-securitarian framework ruling the containment action, but also the science underlying such decisions.

The general thesis upheld by this wave of mobilizations was that the death of the olive trees was not to be attributed solely to the Xylella pathogen, but it was the result of a more protracted crisis rooted in the depleted state of soils. While the scientific and institutional response focussed on the urgent removal of the known pathogen, the civic mobilizations sought to reclaim the possibility of "healing the plant" through experimental practices involving a wider range of expertise as well as other representatives of institutions willing to listen to their proposals. The effect of time compression and the consequent social struggles can be depicted through the visual metaphor of the hourglass (see Figure 2). As urgency-infused discourses reduced the breadth of the debate by focussing on symptoms or apparent causes, the complexity of the issue reappears elsewhere, for example in the calls for protection of soils, or as collateral effects re-occurring after the action.

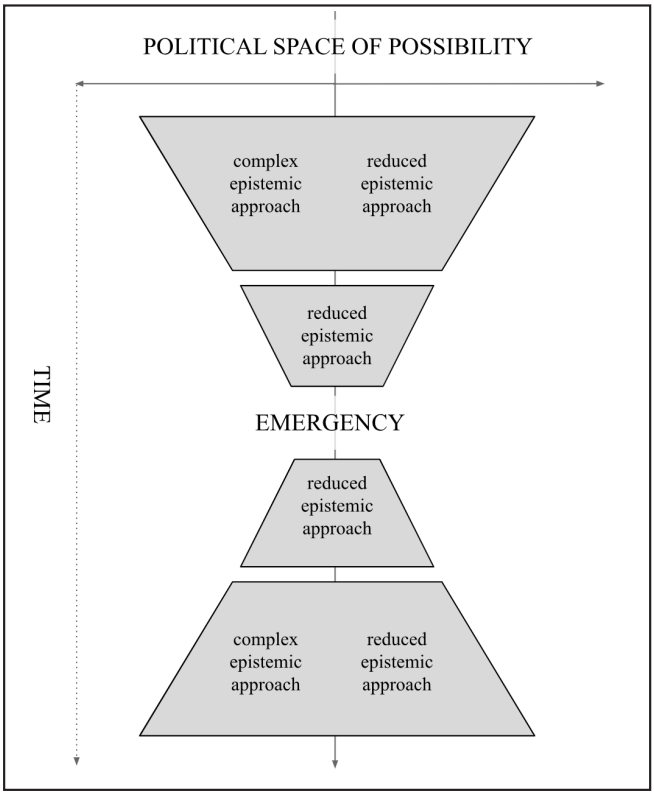

Figure 2.
A schematic depiction of the "hourglass" structure of time induced by emergency: urgency infused in discourses pushes to reduce the available epistemic options, excluding the more complex hypotheses, only to reinclude the complexity of the issue after the action. The reduction of hypotheses causes a shrinking of the political space available to a narrow set of knowledge producers, reducing the social robustness of the political choice. The image is adapted from (Colella et al. 2019).

4. Part 2: Evolving Understandings of Soil

Hegemonic understandings of soil, and of its relations with humans, are challenged by the emergence of alternative visions within and outside the Academic community, rooted on a rethinking of the nature-culture dialectic. Starting from the second half of the 1990s, newer takes on materialism and matter stood in opposition to humanist (and dualist) traditions predicated on a separation of mind and body, humans and non-humans (Coole and Frost 2010).

In this context, soil becomes a space to experiment with new reflective research practices that are open to public involvement and a "technoscience from below" (Krzywoszynska et

al. 2018; Meulemans 2020), encompassing experiences of transdisciplinary research across the sciences, humanities and the arts (Meulemans et al. 2017). Doing research about soil will thus bring into focus some new questions both for policy-making and for science, asking "whose science", "whose logic" and what kind of research processes can be deployed to understand the problematic and fundamentally dialectical relationship between human communities and soil.

4.1 BRIDGES: Experimenting in the Minor Key

Encompassing research and education, the BRIDGES project was designed with a focused attention to the narratives shaping research and the researchers' ability to relate with other perspectives and the more than human soil. In line with the ideas of post-normal science (Funtowicz and Ravetz 1992; 2020), in which the quality of a research process is grounded into a multiplicity of perspectives and visions framing a problem, the project promoted the creation of a community of research involving a multiplicity of legitimate actors – humans and more-than-humans – in researching with soil.

Such approaches, based on exchange of practices and involving different forms of knowledge and disciplinary perspectives, are visibly minoritarian, and are particularly disavowed by the ties and requests of traditional Academic Institutions. Hegemonic narratives of scientific research rooted in the mastery of disciplinary expertise are introduced from the very early stages of education, and consolidated further into one's research career; hence the task of setting out alternative ways of doing research requires a critical and reflexive stance that must be explicitly introduced and nurtured within the research community. The underlying questions of the project were: how to develop an ecological approach to our research practices transcending disciplinary views and common attitudes to nature? How do we enact attentive and inclusive practices? Which epistemic posture, dispositions and languages lead to re-framing soil and research narratives?

The process was articulated around a series of transdisciplinary workshops involving young and senior researchers, and a research-artistic residence in the rural environment of Pianpicollo Selvatico[2], in the high hills of Piedmont in Italy[3].

We began this process by working directly on ourselves as a group of senior researchers, who would later in the project guide the young researchers and local citizens. Amongst us were: 1 science educator, 3 science communicators, 1 sociologist, 2 visual artists, 1 philosopher of science/photographer, and 3 natural scientists with cross-disciplinary expertise in botany, geology and agricultural sciences. We note here that the mix of discipline within our group was not dictated by the ambition of piecing together expertise to solve a set problem as set out by International funding agencies promoting multi and interdisciplinary networks to address the global challenges. On the contrary, we sought to create a space for critical reflection and dialogue amongst ourselves and with the soil in order to surface and to explore the values and tacit narratives that we hold, transcending the particular interests of our disciplines (Khoo et al. 2019). Throughout the process we took reflective notes of our discussions and audio and video recorded our conversations. Two of us (Giuffredi and Colucci-Gray) were also acting in the double capacity of participants and participant observers in charge of taking notes and offering those as stimuli for shared reflection over the course of the project following the practice of participatory action research in community and educational settings (Chevalier and Buckles 2013).

4.2 Working Across Frames of Experience

Our experience set out to examine the dynamics of such a collective experiment of working with the soil in its multi-dimensional and multi-levelled complexity. Important in this regard are the insights of Gregory Bateson (2000) who referred to the "pathologies of epistemology" that inhibit the unconscious, perceptive and fundamentally sensorial processes in order to recover the "experience of knowing what one feels" and "feeling what one knows", as very particular ways of knowing that are rooted in one's body. One such experience was led in our project by two artists – Andrea Caretto and Raffaella Spagna – who involved us in the performative act of "digging" the soil.

Digging is one of the most immediate and perhaps most fundamental of human activities. We dig to find water, minerals, food and we dig in order to plant seeds and work the soil. But following Bryant (2007), digging seen from an arts and humanities perspective is perhaps one of the closest metaphors we associate with doing research.

The challenge and the opportunity were to experience the research process as situated in lived and embodied situations, with every single object and every single change experienced in the course of the relation with soil *mattered*. This approach took charge of recent critiques of attentiveness (see Krzywoszynska 2019), cautioning against the more simply construed idea of care-giving encoded in protocols and best practices etc., moving instead with Stengers' (2006) call for slowing the time of research and making place for «hesitating». In this sense, research as attentive practice would not simply "seek out" but tend forward towards those interrelations and interdependencies that may not be immediately visible. As Haraway (2008) also described it, soil as the ground for research acts as a spatio-temporal "place" of "power, knowledge and technique, [and] moral questions" (*ibid.*, 205). From the diverse ethnographic records collected (interviews transcriptions, group discussions recordings, fieldnotes), the experience of "slow", reflexive science led to critically re-examining some taken-for-granted features of research, and opened the space for addressing them. We can organise and briefly describe such reflections in parallel with our analysis of the features of the urgency frame, as follows.

Urgency frame	**Slow science experience**
Crisis time require action	The fatigue and the opportunity of inaction
It is necessary to act quickly	Unaccustomed to slowness
It is necessary to act with a pragmatic mindset	The need for relentless reflection
Non-action projects a gloomy future	Response-ability over our common futures

Table 1.
A synthetic view of the features of the urgency frame, as identified and analysed in the devoted section, and some categories of reflection stimulated in the participants to the BRIDGES project by the experimentation of alternative vision and practices of research.

- ***The Fatigue and the Opportunities of Inaction***. The BRIDGES digging experience was framed within an indefinite time of observation. The mandate was to close the observation only when all of us agreed to have had the time to observe and note down *everything*. This requirement was felt particularly challenging by some of us: some reported feelings of boredom and fatigue of staying within *an indefinite present time*. Conversely, space was opened to note and record feelings and affective dispositions that are commonly neglected in our working lives (especially when compiling research accounts), such as sensorial experiences (hot/cold, smells and perfumes, hunger/thirst) and the opportunity to notice the presence (or the absence, in some contexts) of animal and plant creatures, insects, worms, maggots, different types of grasses, trees and their roots, along with careful and meticulous noting down of the material properties of the soil (dusty/dry/hard/soft/moist). A certain difficulty was also reported regarding the lack of a proper language to name the objects of observations; alternative ways to describe the observations were then proposed, including sketching the objects and testing the features of soil by preparing colours for painting.
- ***Unaccustomed to Slowness***. The experience of digging was performed over the course of all 4 days and it was only at the end of the period spent together that we realised the importance of having been away from our everyday commitments and in a context that invited a curious openness (Haraway 2016). This aspect became particularly apparent when the same experience, constrained in time and space, was proposed in an urban setting (a public park in Milan). Some participants reported a negative opinion on the experience, perceived as being not so meaningful and uncomfortable: the urban context appeared to reduce the space for openness to encounters, in many ways different from the experiences reported by those of us who had been in the rural context of Pianpicollo. Dishabituation to slowness also emerged when dealing with the life of researchers, packed with deadlines, anticipation of outputs and impacts, and in general based on "human" times, removed from the times of relations and the times belonging properly to non-humans. This was a problem which affected planning in the project as researching with soil also demanded taking account of its rhythms, the seasonality of plant and animal life as well as the unpredictability of the weather and how this was to be reconciled with the timelines of human working lives. Resonating with the observations of Meulemans (2019), our experiences spoke to us about the importance of recognising the modalities and the specific context in which we come to know soil.
- ***The Need for Relentless Reflection***. Over the course of the project, it became apparent that the journey towards a new way of doing and being in research necessitates times and spaces for reflection, that are not simply individual but shared within a community. This led to modifications in our communication infrastructure to accommodate discussion on emerging issues: in-presence meetings under the guidance of more expert colleagues as well as online research conversations amongst us, shared documents for writing down ideas and the creation of a photographic repository as a memory of our journeys, a way of remembering the community and bringing it together, each time offering a new perspective. Later in the project, when we worked with the group of young researchers, it was notable the need at every meeting to re-discuss the grounds of

their research work: for example, when dealing with the idea of developing participatory indicators of soil fertility, the debate centred on the meaningfulness of such an instrument, for what purpose and for whom; a critical stance towards the overwhelming measuring attitude of the natural sciences emerged regularly as a point of discussion. Many young researchers reported that creating the space for discussion of pre-existing structures and assumptions was one of the most revitalising features of the project.

- ***Response-Ability Over our Common Futures***. As the project is currently ongoing, the next steps in this inquiry will revolve around addressing the fundamental questions and dilemmas that such an approach poses for all research communities wishing to account for the needs of soil communities. Bringing sedimented attitudes, perceptions, ways and modes of approaching research to the surface, and recasting cognition as part of a set of artistic-relational practices, was the first methodological choice we made to physically bring soil to our own attention; focus and reflect on the role of intermediaries in this contact-zone, those being our values, prejudices but also our pre-existing knowledge and the tools chosen (or not chosen) for our inquiry. In this sense we began to think differently both about soil and about research: not as a tool or resource, but as a set of mutual relations amongst crafting practitioners of human-nature relationships.

5. Conclusions: Re-framing Narratives of Research as "Practices of Attention"

Rhetoric based on urgency is widely diffused across Western countries' science policy discourses. Soil in this case is not only the ground upon which we walk, but it is also the terrain of the debate; it is perhaps more appropriately understood with capital "S" as suggested by Ulmer (2017), to mean a state of being which can be framed differently according to alternative master narratives; one such narrative foregrounds results and outcomes over subjects and relations; while the other, which we pointed to as a narrative of attention, is the one which highlights processes of mutual interdependencies and co-evolution, and can be referred to as the narrative of Slow (Stengers 2017).

Guiding our experiments was the idea of moving in the opposite direction of the narrative of urgency, widening the range of perspectives and points of view and thus slowing down rational action, by making visible and possible dimensions of our existence which are normally negated, silenced or left unconscious. As Coole and Frost (2010, 5) observe, ontology facilitates the study of the "existence[s] that shape our everyday relationships to ourselves, to others, and to the world". In this regard, Slow Ontology is not simply about expanding time to the point of grinding to a halt, or even justifying the lack of action, but it offered us a lens through which to re-examine methodological practices, and our experiences in BRIDGES showed some opportunities but also difficulties. While framing a relationship with Soil within a Slow ontology has the potential to multiply and expand the possibilities and dimensions for knowing, this approach challenges the current system of competitive funding, demanding researchers to work in a hurry as they chase the next paper or the next contract. Time constraints are always problematic for projects but even more so in a project like BRIDGES, which has the ambition

to develop relationships and community, make tacit narratives emerge and promote a transformative process. Further research is thus required to understand the extent to which master narratives can be reformulated in everyday research practices within and beyond academia.

From this perspective, we can at least start exploring what might be alternative rhythms of inquiry running alongside the industrial beat of economic production. In the Slow framing, we can ask different questions of our own research communities: how diverse are the relationships that are being forged and with whom? What values underpin our practices, aspirations and perspectives? And how far and for how long are we letting the other enter our perception, and be prepared to listen? Such questions revolve around methodological choices that are dialogical and sensorial; they do not operate via logical-analytical thinking but they seek patterns, connections, and story-telling, calling for a more-than-human, entangled approach to research with and through the multiple epochs of Soil.

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Notes

[1] See: https://www.progetto-bridges.it.

[2] See: http://www.pianpicollo.org/.

[3] Not covered in this paper's account of the BRIDGES project was the final experiment – inspired by Citizen science – involving a number of citizen networks engaged in different forms of soil care activism in the urban area of Milan (Criscuolo et al. 2024). Inspired by the European Responsible Research and Innovation (RRI) Approach (L'Astorina and Di Fiore 2017), the citizen science experiment headed towards a responsive and iterative process aimed at discussing and collectively co-producing "soil fertility indicators", based not only on techno-scientific but also social, political, and esthetical categories.

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