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“Re-animating soils: Transforming human–soil affections through science, culture and community”

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FINAL ACCEPTED VERSION PRE-EDITORIAL CHANGES - PLEASE REFER TO FINAL PUBLISHED VERSION AS THERE ARE SIGNIFICANT EDITORIAL CHANGES

Abstract

‘In a sense we are unique moist packages of animated soil’. These are the alluring words of Francis D. Hole, a professor of soil science renowned for encouraging love for the soil and understanding of its vital importance. Affirming humans as being soil entangles them in substantial commonness. This paper explores how altering the imaginaries of soil as inert matter subjected to human use and re-animating the life within it is transforming contemporary human-soil affections by developing a sense of shared aliveness. Presenting research on current practices, material involvements and stories emerging from scientific accounts, community involvements and artistic manifestations, I propose five emerging motifs of renewed imaginaries of soil’s aliveness that feed into each other to affirm intimate entanglements of human-soil matter. I argue that while a vision of anthropocenic soils invokes yet another objectified natural resource brought to exhaustion by a deadly human-centred productionist ethos, as soils are re-animated and enlivened, a sense of human-soil entangled and intimate interdependency is intensified. These new involvements with soil’s aliveness open up a sense of earthy connectedness animates and re-affects material worlds and a sense of more than human community in those involved.

Introduction: when soils become alive

... it is our work with living soil that provides sustainable alternatives to the triple crises of climate, energy, and food... *Without fertile soil, what is life?*
—Vandana Shiva (emphasis added)

The significance of soils for sustaining ‘life’ on earth is pressingly captured in Vandana Shiva’s words (2008). Soils are in danger, but today their aliveness also signifies hope amidst multiple ecological crises. That soils are living worlds and that we should work together *with* this life rather than attempting to harness it has passed from being a message of the alternative margins to become a commonly invoked motif in a broadening movement of soil advocacy attempting to make people care for soils

beyond agricultural or industrial value. A renewed captivation for the life in soils has become a common leitmotif animating imaginaries of soils across the sciences, global institutional initiatives, community groups, policy bodies, creative arts and popular media representations.

This paper introduces involvements with soil life that weave scientific, practitioner and cultural imaginaries of soil aliveness to create affectively charged understandings of human-soil intimate entanglements. The research materials were gathered during ten years of immersion into practices, accounts and material involvements in soil science, communities of soil-centred growers and cultural and artistic soil conceptions. I present what I have perceived as shifts in modes of attention when soils pass from being merely an inert resource – invisible, neglected, uninteresting matter – to be felt as alive, that is: not only revealing a living world within them but even a spirit. I articulate these imaginaries of soil life in science, grower-communities and art, around five affectively charged motifs of intimate entanglement with soil aliveness: biological wonder, interdependent livingness, sensual enlivenments, life as regeneration and animatedness.

This research on human-soil relations opens two new lines of inquiry at the crossing of the social studies of science, the ecological humanities and feminist social theory that shape this paper's contribution. First, I approach radical transformations in human-soil relations as implicated, that is, as re-working productionist cultures *from within* technoscience rather than as outside critical alternatives. Second, I purposely emphasise aspects of scientific practices and narratives that contribute to the formation of new ecological cultures of care for the non-human world. In this sense, my approach to emerging intimate entanglements with soil is not to engage with a critique of the appropriation of the notion of soil as Life by technoscience, but to attempt to participate speculatively in its re-emergence, that is, to be involved in a form of critique that inevitably entangles my stance with the effects of researching worlds I care about.

At a broader level, this paper is also an intervention in debates around changes in more than human relations in an atmosphere of environmental debacle. In ecological cultures permeated by the imaginaries of the Anthropocene it is difficult not see the combined mobilisation of science, technology and economic appropriation of the natural world as a manifestation of human destructiveness, a source of unstoppable ecological deadliness. Contemporary human-soil relations in technoscience are no exception to this doom as we see soils being destroyed at a terrifying rate through industrialised agriculture, or sealed under expanding human infrastructures. On the other hand, as expressed by Shiva's quote, sustainable engagements with soils also signify hope. Soil regeneration invokes salvation – for instance, if we helped nature do its work, if we stopped disturbing soils, or if we could re-engendered them, they could 'save' humanity from unbridled climate change by storing carbon (Ohlson, 2014). Amidst tenacious contestant epic stories of Human-Technoscience vs Self-Healing-Nature, the minor stories presented in this paper, the mixed and infrahistorical ways in which inventive ecological cultures around soil are

being constituted and confronting environmental destruction with care, may seem insignificant. Even more so could seem the unspectacular facets of scientific knowing implicated in the everyday re-constituting of intimate ecological affections. The discouraging questions that human-soil relations are made to bear today remain – how to feed a world populated by more humans without exhausting soils – and allow no innocent perspective – how to confront the commodification of soil life. Yet my hope is that looking at soils from the angle of affections entertained with them, from how soils intimately entangle humans into a new sense of material common aliveness, might nurture the ongoing search for more caring human-soil relations.

1. Teeming with life – biological wonder

A 2013 opinion piece in the NY times, titled, ‘The Hidden World of Soil Under Our Feet’ (Robbins, 2013) has stayed with me even after having encountered multiple examples of similar interventions, all dedicated to improve awareness about the life in soils. The title remains paradigmatic of a leading leitmotif of contemporary soil advocacy: that soils are an unnoticeable world easy to neglect as we walk upon them. A concealed, yet vital, ‘bioinfrastructure’ (Puig de la Bellacasa, 2014), from which most people feel disconnected in spite of our lives being unthinkable without them. What soils are conceived to *be*, visions and concepts of soil, will affect the ways they are cared for (Krzywoszynska, 2016; Puig de la Bellacasa, 2015b). And therefore, across a science-policy-public spectrum, efforts directed at revealing hidden soils, at making them visible, come with a message: knowing soils better could enable better care. This connects with common leitmotif: that even those traditionally closer to the soil – farmers, scientists, growers – have predominantly focused on harnessing soils for production, agricultural yield, rather than as living worlds with an intrinsic value *for themselves* beyond human use.

A second reason why this piece is significant is that while the series of science supported statements on soil biodiversity, it was illustrated by an unusually striking artistic depiction of soil by the British artist Katie Scott.¹ Against a background representing soil’s dark opaqueness Scott depicts a world of carefully portrayed strange colourful living beings, of critters mysterious and alien-like, striking with eeriness. Scott’s depiction of the underworld is attractively vintage for the technologically mediated and recalls Ernst Haeckel’s 19th century exuberant illustrations. Indeed, Scott says to be inspired by old illustrations of science ‘before they actually knew what was going on in the world’². Her drawing of soil’s hidden world reconnects to a historic tradition of scientific semi-fabulated drawings that accentuated enigmatic facets in the natural world as marvellous, emphasising the strangeness of creatures, a sense of mystery, wonder and excitement around the living properties of the dark beneath. A message of aliveness, that nothing down there is dull nor inert.

For science revealing the mysterious alterity of soil is also a practical issue. It is for instance a technical problem driving advances in visualisation methods aimed at non-invasive, non-destructive, 'seeing'– like technologies of X-ray computed tomography that study soil's interactions around plant roots (Mairhofer et al., 2014). Better care and knowledge are entangled here too: perceiving soils in their complexity without disturbing them, unearthing delicate relations without destroying them as when samples are extracted for analysis. Significantly, the 2014 conference of the British Society of Soil Science titled 'Delving in to the dark' was dedicated to 'the continual challenge of working with a complex substance 'in the dark' where we can rarely see how soils are functioning and responding to change but rather have to *try and visualise* what is happening below-ground (emphasis added).³

Today, ecologically minded scientific conceptions of a lively soil see it as the ongoing creation of a multispecies community of biota (Coleman, Crossley, & Hendrix, 2004). At the heart of the NY Times Article was the appeal of this hidden world of swarming creatures. This reflects how soil biodiversity is today a central topic of soil science and policy and the aesthetic appeal of soil life as a way of raising affective awareness. The Global Soil Biodiversity Atlas, published by the EU funded European Soil Data Centre presents striking images of soil's living creatures and tells us: 'Soil is Alive!... Organisms living in the soil are many, amazing, smart, important and unique. Soil biodiversity is full of incredible stories' (Orgiazzi et al., 2016, p. 4). Repeatedly called upon in current popularisations of soil biodiversity for public sensitization are fantastic numerical storyings brought to visibility by modern soil microbiology: that a billion bacteria, thousands of fungi, protozoa and nematodes live in a teaspoon of rich soil, that only 1% soil microorganisms have been identified.

My claim is not that the living soil is a new feature of soil socio-cultural perceptions (Balfour, 1943), but that newly and thoroughly technoscientific imaginaries of soil aliveness are being developed. *Try and visualise* this soil community without the aesthetic knowing of soil microbiology. Imagining nature in technoscientific cultures is permeated by scientific visions (Haraway, 1989). And so those engaged in transforming instrumental feelings about soils are also embedded in technoscientific imaginaries even as we mean to question them. Affective mediations of scientific imaginations are particularly involved in raising awareness of soil aliveness. Soil art that invokes these images as a vehicle of aesthetic presentation of soils is a good example. Captivating creative representations portray the tiniest living soil creatures through scientific microscopic imageries. Soil art is not a new field (Landa & Feller, 2010), soil's colours in particular are a longstanding artistic focus. But this creative relationship with underground soil life exposed at close range is recent, influencing a collective and interdisciplinary re-creation of soil culture⁴, for which scientific imagining is central.

One example is Amanda White and Alana Bartol's beautiful animation movie: *The Soil Is Teeming With Life*, 2015 that puts viewers in the position of observing soil's microscopic life in movement. Beautiful creeping drawings of nematodes, bacteria and arthropods furtively pass through a round bright circular space cut against a black

background, simulating viewing through a microscope's lens. The animated nature of the movie emphasises the swarming feeling of crowds below, the 'teemingness'⁵. Other work highlights the invisible labours of microbial creatures, as do Daro Montag's uncanny Bioglyphs: a series of eco-cosmic prints resulting from soil organisms consuming buried photographic film (Adams & Montag, 2015, 53)⁶. As lively colourful beings at the heart of the hidden darkness become a novel vision of soil they complement, maybe even supplant, previously predominant scientific representations of soil's aesthetic beauty such as soils variant pallets of colours and profiles (the arrestingly diverse colours of soil layers exposed by pedologists). A new vision of soil. Life where once we saw dirt. Life equated to *bios*, biology. Incarnated by teeming creatures. The result is aesthetic biology, deeply affective. This re-emergence of the life of soil as a relevant world, inhabited beyond its status of resource, is the revelation of wonder unseen. Knowledge that touches with a sense of marvel and awe that goes beyond scientific accuracy.

Conversely, artistic reimaginings of soil become a tool for scientists to make the visualisation of microscopic aesthetics appealing (Gilford, Falconer, Wade, & Scott-Brown, 2013). Scientists acknowledging their limitations at instigating protection for soils put hopes in interdisciplinary interventions involving science with these interventions (Feller, Landa, Toland, & Wessolek, 2015). But these cultural engagements with scientifically inspired imaginaries of soils do more than 'communicating' scientific knowledge or enhance its 'public understanding'. They co-create stories. Science participates to an ecological culture around soils, and scientists are also touched, not only by environmental concerns and public pressures, but by a wave of renewed affection for soils that invokes science to support better care. It is possible to say that in these co-constituting moves, *trying to visualise* soil's mysterious darkness becomes both for science and aesthetic engagements akin to *imagine*, to *envision*, to create collective vision. Common to scientific and artistic re-presentations of soil is therefore an engagement of material and speculative meanings that contribute to renew soil imaginaries. And as these aesthetics touch the (im)possibilities of care in human-soil relations, they are inevitably affectively, practically and ethico-politically charged (Puig de la Bellacasa, 2017).

There is hope in a world that offers mystery and wonder beyond absolutist humanness in a historical moment where grand anthropocenic narratives invite 'us' (humans) to find a new sense of wonder at a 'world of *our own* creation' (emphasis added)⁷. Shock and awe at the sublime magnitude of human impact on Earth has a stunning effect. Feminist critics of the notion of the Anthropocene have emphasised how it can reinforce anthropocentrism (Haraway, 2016; Myers, 2017). So maybe an appeal of the mystery of soil's living alterity in this particular moment is that it lures us into a world *not* of our own creation. There is more life underground than above ground. Making visible a wonderful world of nature beyond us, does affirm a teemingness of life beyond deadly humanness. Yet fascination alone easily retains the human/nature dualism that is in need of 'a thorough rethink' (Plumwood, 2009). How can awe at biological life in soils respond to productionist appropriation of soil life?

What is the place of ethico-political involvements in these imaginaries? Can they challenge the subsuming life's creative diversity to the vision of a natural world destroyed by a single species?

2. Teaming with life – interdependent living

Soil as a medium that connects different forms of life that depend on it for everyday subsistence is another motif of their coming alive: soil-life embodies the *down-to-earthness* of daily interdependent interspecies living. This is visible in the many ways in which soil has become an agent of alternative everyday food politics. This move traverses a range of community based growing initiatives – in the Global North as well as in local cultures and agroecology practices in the Global South directed to transforming farming, often also reconnecting to indigenous practices. It is significant here how better knowledge of the soil has become central growing healthy and ethical food. A mix of science-based and practice-based soils-centred farming is promoted in non-commercial grower's communities through soil care training by instructors, advisors from various alternative orientations (permaculture, biodynamics, agroecology etc.). Non-institutional soil expertise is now a typical feature of ventures aiming at changing relations with food production.

In this context, 'From farm to fork' turns into 'from soil to fork'. This earthy food imaginary is well brought home by the picture illustrating a facebook and flyer invitation to a 'Soil Repair' presentation led by Dan Kittredge, of the *Bionutrient Food Association* that promulgates improving connections between soil vitality, crop quality and nutrient levels in food⁸. The image presents a fresh colourful salad served on the scoop of a rusty shovel lying directly on the soil, a jute napkin and old-style cutlery also neatly placed on the brown earth. Eating directly on the soil challenges the idea that soil is dirty, but also grounds in soil the everyday act of eating. Also, this event took place at the *Earthworks Urban Farm* in Detroit, a city where multiple initiatives reclaim urban derelict land as a way to revive communities facing steep decline and neglect. Repair can be an essential aspect of care in situations of neglect (Jackson, 2014). Here the meaning of *soil repair* goes beyond the soil an object of human care. What is repaired as soil is repaired?

During a farm tour for visitors in 2014, a volunteer explained that the soils of Detroit are unsurprisingly extremely polluted and that growers had been collecting soil from Mount Elliot Cemetery across the road⁹. The capacity of soils to sustain life, had been partially protected from the effects of industrial productionism by the boundaries of sacred space¹⁰. A sense of spirituality is inherent to *Earthworks*. It was initiated by the Capuchin monks of the St Bonaventure Monastery, who started growing vegetables to provide for a Soup Kitchen established during the great depression of 1929 and working with the motto 'Feeding bodies, nourishing spirits, strengthening communities'. Today *Earthworks* is a certified organic 2.5-acre urban growing and community education facility that declares in its *Food Justice Manifesto* its aim 'to improve the food security (or, the ability of all community residents to obtain

safe, culturally acceptable, nutritionally adequate diet through a food system that maximizes community self-reliance and social justice) for Detroiters.’

Below the radars of the self-fulfilling prophecy of soil-devouring humans, and ahead of expectations of nature’s self-remedial promise grounding the contemplative wonder of soil life, lies an everydayness by which humans and non-humans are engaged in intensifying intimate entanglements of ecological care. This is indeed care as a material doing of everyday maintenance and repair. Choosing to speak about *Earth Works Farm* from one among so many food growing initiatives that involve ‘soil repair’ is not innocent. *Earthworks* epitomises the link between ecological destruction and social injustice – in Detroit, for the black communities of the inner city – with work that speaks of seeking *eco-social* justice. But it also hints at a notion of interspecies community justice that makes care and repair of earth an essential aspect of care and repair of people. Putting soils central in this kind of community work indicates a more than human ethico-political vision of our entangled interdependency: if soils are alive, humans are in turn more alive.

Stories of everyday care amidst the epic decline and neglect of Earth need to be told. As Nicholas Beuret argues, to move beyond the political and affective impasses of the ‘eco-catastrophic imaginary’ (Beuret, 2015), to respond to catastrophe not as an event in the future – deferring radical work to a devastated aftermath – but as already happening, by confronting a myriad of the ongoing ‘slow violences’ (Nixon, 2011). Looking at ways in which communities confront environmental destruction privileges looking at everyday forms of ‘hope without future’ (Brenishan, forthcoming). A non-epic radicality speaks of livingness as quotidian resurgence from devastation and is rooted in the basics of subsistence, but does not identify with ‘bare’ survival. *Earthworks*, and a range of similar examples of community gardens and farms (Millner, 2017), are about transforming meanings of living well and flourishing with justice, about recreating meanings of abundance accessible to all, about eluding the rarefying networks of scarcity and monoculture production of one size fits all food. Extractivism and productionism are still there, catastrophe all around, but their colonisation of all relations is disrupted by the creativity of cares that give way to working together with soils as a multispecies community.

A particular angle to soil aliveness is embedded in the transmission of soil centred knowledge for care and repair, a theme that traverses contemporary transformations of relations with living soil epitomised in a praxis of ‘teaming with’. This is the motto of two gardeners who wrote a book for growers based on popularising the scientific ‘foodweb’ concept of soil – directly drawn from the work of a scientist activist, Elaine Ingham (Lowenfels & Lewis, 2006). The focus is on ‘collaborating’ with microbes and other soil biota involved in intimate material relations of eating and feeding from each other. Foodweb based soil care emphasizes for instance, giving back to the soils what we take from them – by returning organic waste in the form of composting, recirculating purportedly ‘dead’ materials into lively material processes. The eco-ethical requirement is that humans become soil growers and not only soil consumers (Starhawk, 2004).

Germain Meulemans has shown how soil-making practices across science and community blur the distinction between growing and making, as *pedogenesis* – the scientific concept of soil formation – becomes a more than human endeavour (Meulemans, 2017). We can also say that here productionism is disrupted by a practice of more than human making/creating *together* (Papadopoulos, 2018). This is *eco-social* reproduction. *Eco-poiesis* by a more than human collective maintaining everyday livingness. When humans are involved in the ongoing creation of the soil habitat, not only consuming it or using it, extraction gives way to *re-generation*. It is not only that soils are life we have to take care of, but that we are too. When humans treat soils well, we make (ourselves) justice. Soils are coming alive in these webbed interdependencies, but *humans are enlivened too* by other ecological affections: from soil devourers to soil growers. Ecological agency is decentred agency. These appeals to ‘team with life’ disturb visions of human living as a deadly agent, not through a good ‘Anthropos’, but through its decentring in the multifarious interdependency of more than human community.

These practices restore something beyond the realisation of the life of soil. Philosopher Paul B. Thompson tells us that ‘the modern agronomic view of soil’, allowed the restoring of ‘elements of life’ to a concept of soil which ‘conceived as matter, ... is dead, lifeless’. Yet conceiving soil as living ‘in the form of microorganisms that carry out the life-renewing properties long associated with fertile soils’ didn’t fully restore the spirit of the soil in the act of ‘raising food and eating it as an act of *communion* with some larger whole’ (Thompson, 1995, 18-19). What is at stake here is also a ‘material spirituality’ (Puig de la Bellacasa, 2015a). The ‘larger whole’ is a more than human community of material interdependence not only transcending the ill named ‘materialistic’ reductionism of soils to appropriable resources and conceptualisation of its life to mechanistic processes, but also *specieist* control by a human order. The ‘communion’ – as in the more than human ‘eco-commoning’ practices (Papadopoulos, 2018) that constitute and maintain the commons (Linebaugh, 2008) – is in the everyday, domestic, mundane doings of re-generating shared more than human richness, by transforming each other into each other’s substance.

3. Sensual enlivenment - affectionate encounters

The surge of soil aliveness is not just in the irruption of teeming living beings but in the mundane interdependent teaming of a human-soil community. And this is also involving a sensual enlivenment, the rousing of intimate affectionate entanglements with soils. ‘Our bodies, our soils’, the title artist Claire Pentecost gave to her 2015 exhibition¹¹, expresses well this motif of soil aliveness. Pentecost’s work on soils is in itself an advocacy experiment through transforming our imaginaries of human-soil relations. Here in particular she invited to close reconnecting with soils through samples displayed around the room. Written on a blackboard were a series of invited actions that I cite here: ‘SEE Through the microscope >living beings<’; ‘Put nose into

jar'. People were also invited to bring their own soil samples in a zip lock or a jar. These experiences mingle science-like approaches – looking at soils through a microscope – with a reclaiming of sensual directness – 'Please feel free to lift bell jars and, *breathe* aroma of soils'. A sense of interdependency with soils goes deeper with a feeling of identification to soils – *our soils ourselves* – sought through reclaiming physical intimacy with soils. In Pentecost's 'Our bodies, our soils' we can also read a *clin d'oeil* to the famous book title and motto of the women's health and sexuality movement, *Our Bodies Ourselves*, that reclaimed self-knowledge and self-care against the control of women's bodies by the medical profession. Active engagement versus passive objectedness. Reclaiming soils in this way is claiming back a connection that is not mediated by expertise but by proximity, DIY scientific imaging (soil microscopes for all). Other phrases in the blackboard indicate a knowing practice integrated in a broader relational engagement integrating the mystical – 'Composting is alchemy' – with an eco-politics – 'Soil is local'. Our bodies beyond ourselves, unbounded by human selfness, communing with a larger more than human whole of soil matter.

I have collected multiple accounts of kin events, appealing to sensual affections for soils: creative workshops conceived as artistic/performative/community events that invite people to play, touch and feel soils (Naomi Wright's *Soil Kitchen*¹²); 'soil-tasting' sessions in which participants smelled different local specific soils placed in wine glasses and then tasted food grown in that soil (Laura Parker's *A Taste of Place*¹³). Other forms of imaginative sensorial intimate engagements include: *Dirt Don't Hurt* meditation sessions while sitting on soil filled pillows, or sleeping with a test tube filled with soils from different locations under a pillow and record ensuing dreams (Amanda White and Alana Bartol's interventions as part of their *Deep Earth Treatment Centre* project¹⁴); or embracing a sexual appeal of soils, as in the 'Wedding to the Dirt' *ecosexual* performances that involve marriage rituals as well as rolling naked in the mud (in Elizabeth Stephens & Annie Sprinkle's *SexEcology* work¹⁵). All these interventions would deserve to be approached in their own specificity, but they have in common inciting material intimacies through bodily closeness, and aesthetic and sensual entanglements with soil substance. In kin ways to what Nerea Calvillo & Emma Garnett (this volume) call molecular intimacy, it is through the senses that we are invited to claim commonness and connection to the materiality we share with soil and other forms of elemental matter. There is a feel that we may reduce distance by physically intimating with the soils that we have culturally learned to avoid. Playing with mud. Here, 'aliveness' is a sensuous experience through which we cultivate affections to soil¹⁶.

Interestingly, sensual intimacy with soils is also something of a 'soil pedagogy' in scientific contexts that manifests in how soil scientists speak of their passion for teaching in close contact with soils. 'Nobody should avoid the direct contact with soils' says a soil scientist contributing to an article on 'The joys of teaching soil science' that gathers short interventions by scientists speaking about their teaching practices. He argues that 'the essence of pedology [the study of soils in the natural environment,

focused on physics and geomorphology of soil] is in the study of a profile and a soilscape *in the field*' (in Hartemink & R., 2014 p. 5, my emphasis). 'Students must *see* and *touch* the soil to learn to distinguish texture, structure, color, organic matter, redox morphology, gravel content... etc...' (*ibid*) Another scientist speaks of his 'soil teaching passion' as a 'tactile encounter' insisting that there is no substitute for 'the mentoring and nurturing of observational skills as students actually confront the soil', as 'certain aspects of the natural world can never be grasped from a page or even a photo'. He speaks of the contrast between abstractions, 'concepts' such as 'peds' and 'aggregates' learned in classrooms and how soils 'come to life' as students come to encounter them '*in the wild*' where they reveal their diversity and complexity, their muddled reality beyond reductive taxonomies. As they 'stand in a soil pit', students confront a 'new reality' very different from the 'ground and homogenised samples' carried to the lab. Being together with students '*in the wild*' is experientially rich for the teachers too: 'I like to see their faces when they realize' that something is 'wrong' – with a soil, as a material incongruence that reveals a problem or an inconsistent model. Others in the same paper reaffirm the transmission of what appears to be a common vocational story, that becoming a soil scientist included the joy of 'discovering that the tactile pleasure of 'playing with mud', to assess soil textures and plasticity, was a legitimate scientific activity' (*ibid* p.2). Accounts like these indicate an intimate feeling for the soil, a form of mud love, intrinsic to becoming a soil scientist, and confirm feminist inquiries that refuse restating science as an abstract knowledge enterprise of detached knowing, disconnected from specific encounters of corporeal experiencing (Keller, 1984; Myers, 2015).

The scientists speaking here are pedologists, more focused on the physical features of soil worlds in the environment, and so the aliveness in these soils that 'come to life' in these encounters is not biological nor about interspecies communing (as those studying foodwebs or plant-soil interactions). But the sense of aliveness in these revelation stories, in these sensual and aesthetic encounters, in science as much as in artistic and community projects, has in common a sense of *enlivenment*, of transforming something deemed to be dull into more interesting than it was, something that almost didn't matter to something that we care for as we connect to it. To be enlivened is not just to be alive, enliven signifies life that is lively, uplifted, joyful, cheerful, awake, boosted, more entertaining, a life that raises (our) spirits up. Enlivening encounters with soils encourage better knowledge of living soil and awareness of interdependence, through experiential intimacy and enjoyment. They open the vulnerability of those who mingle with soils not only to think with soils, but to be touched, and maybe even to understand this mingling as an experience of shared material destiny.

4. Regeneration – afterlife as shape-shifting

Shared matter is another motif of soil aliveness in the movement for transformative human-soil relations. Here soil's liveliness has transmorphic power, with its ancestral cultural weight as both site and agent of earth life's incessant cyclic incantation: '...Life

is death is life is death is...’, as Natasha Myers puts it (n.d.). Decay as life has immanent ethical significance (M. Jackson, 2012). This vision of death, in sharp contrast with stories of planetary annihilation, is tied to life in mundane visions of soils as regenerators. A classic meaning of soil that has never left. Soil as the great recycler of matter, the great digester, Mother Earth’s gut, turning remains into food, making rebirthing possible. So, what does it indicate, that in these same times when soils are becoming poorer, sicker and more exhausted, their status as powerful reminders of the possibilities of rebirth? How is this meaning being reclaimed at the heart of cultural spaces seemingly dominated by a misnamed ‘materialist’ modern scientific tradition that had muted it? But had it? (For a critique of other mis-uses of ‘materialism’ see Callen & Lopez, this volume).

Soil remains a place to think with infra-natural spirits, a ‘material spirituality’ of a living death. Logan Bryant in his classic soil elegy, the *Ecstatic Skin of the Earth* says: ‘the soil of graves is the transformer’ (57). His voice intensifies the eco-poietic register as he describes with scientific precision the initiation of the process of degradation of bodies as a lively collaboration between bodies and soils: citing Bacon he tells us that ‘putrefaction is the work of the spirit of bodies’ (54), that the same enzymes that keep our metabolism regulated become ‘self-breaking’ when we die (56) and initiate the re-turning of our matter to dirt. Visual Ecologist Aviva Reed’s *Soil Biome Immersion participatory performance*¹⁷ captures this meaning in work inspired by narratives of scientific ecology that includes sound, visuals and tactile experience. She aims to expose human-soil ‘ecological ontology’ as made of matter that cycles nutrients temporally through the planet, and ‘binds all organisms as ancestral remnants of each other’. This inviting to sympathy in shared more than human matter, *eco-communed* by biogeochemical processes that return compounded matter to elementals, counters the individuation of anthropocenic earth as ‘our own creation’.

A trope of material-spiritual belonging to Earth’s biogeochemical processes is emphasised too by Ana Mendieta’s performative pieces in the *Siluetas Series*, that return bodies to Earth in the shape of female body forms inscribed on wet sands, mud, grass. These performances were captured in images as the silhouettes start diluting, unravelling, burning, or re-becoming life: as in one particular piece where her naked body mimics a dead corpse lying at the bottom of a burial pit (a pre-hispanic tomb) of which flowers are profusely re-growing¹⁸. Ritualised encounters created by the artist’s own body become transient material co-transformations. Mendieta famously spoke of her art as ‘grounded on the belief in one universal energy which runs through everything; from insect to man, from man to spectre, from spectre to plant, from plant to galaxy’ (1988, 70). ‘Same’ matter, shape-shifting through. Rebirth and resurrection through elemental re-circulation.

Again, reading this work as soil art (Adams & Montag, 2015) affirms returning to the soil through death as regeneration. Between annihilated soils – human dominated – and soils as natural renovators – a regenerative nature as promise of salvation – it opens a place for human soil relations that generate aliveness of a more modest kind, even if indeterminate. Humans might be saved, but not resurge without

shape-shifting. Stories that spiritualise the soil as a site of resurgence call to relinquish the identity boundaries of Anthropos into an experience of cosmic intimacy. Here human-soil interdependent aliveness becomes substantial, an ontological owing, but it also connects to everyday material-ethical obligations invoked before: to return (our) matter to the soil, to compost ourselves as a mundane instance of eco-poiesis, of making/creating aliveness. Domestic everyday acts become a cosmic performance.

What better metaphors than composting for stories that transform destruction and fear of decay into a sense of earthy rebirthing? Haraway has named 'children of compost' the communities of healing she imagines at the edge of this present and five hundred years on: settling in devastated landscapes to create 'sympoietic' more than human regenerating relations where metamorphic transformations are an experience of everyday co-shaping between humans and non-humans (Haraway, 2017). In their film *Shape-Shifting* Elke Marhöfer and Mikhail Lylov invite us to dwell in processes by which humans and landscapes change form together. In the accompanying publication, Anna Tsing invokes 'resurgence' to speak of non-human (forest) forces of life growing back beyond annihilation (Tsing in Marhöfer & Lylov, 2016, p. 41). Resurgence: *coming alive again*. Back to *Earthworks* in Detroit resurging is an everyday struggle. Again, these stories of mundane rebirth offer antidotes to the deadly lessening, and somehow abandonment, of human involvement with the more than human worlds to Man the destroyer of worlds. They call for a human who does not only live well, but learns how to die well.

Reinterpretations of aliveness where *life is death is life is death is...*, modestly contribute to these stories, giving a relational key to the aliveness of the more than human-soil community: it is not in 'the' soil. Nor in the humans, nor the plants, nor in the other creatures who live from it. As the anthropologist of human-soil relations Kristina Lyons beautifully puts it, inviting us to think *decomposition as life politics* with the irreducible conception of soils of the Amazonian farmers she works with: 'transformative potentiality is not a human privilege, but rather a relational matter dispersed in the connections and labor among people, as well as other kinds of beings and things' (Lyons, 2016). Thinking with soils, aliveness moves, transitions, circulates, revealing a common entangled fate that blurs human-soil ontological boundaries.

5. Coda: ánimo!

'In a sense we are unique moist packages of animated soil'. These are the alluring words of Francis D. Hole, a professor of soil science, renowned for propagating soil love and promoting understanding of its vital importance for humankind. He was notorious too because of his idiosyncratic soil pedagogy, embodied in sensuous practices of taking students to walk barefoot on soil, or lecturing as he played the violin and inviting to the pleasures of 'soil watching' (Hole, 1988). These words stir a traditional meaning of creation stories: humans coming out of mud, clay, earth matter. Affirming humans as made of soil, makes of humans one kind in a broader material genre. Yet often, in the story, humanity is a uniquely animated kind, chosen by God(s)

to become 'unique' moist packages, quitting the realm of inanimate matter by being infused with 'soul' (*animus: breath, air, spirit*). But if soil is already alive, does 'animated soil' involve a greater type of aliveness that includes all the beings that live/come from it? Are humans then a subtype of animatedness, unique maybe, but just one among a multifarious, immeasurable, assortment of uniquenesses?

We can indeed ask if animatedness is the very definition of aliveness, of livingness (Whatmore, 2013). Animatedness has been debated widely in the last ten years, at the crossings of human geography, anthropology, science and technology studies, religious studies, the environmental humanities, where the notion of a 'new animism' has become a category to explore (Weston, 2017). These discussions are sometimes explicitly connected to traditionally animist cultures in order to 'propose the reanimation of our own so-called 'Western' tradition of thought' (Ingold, 2006, p. 19). While the human-soil reanimations I have approached here are not directly inspired by these debates, I am interested in how these debates on animism open animatedness as a historically, ethically and politically charged notion. A distinction between the animated and the inanimate has served to discriminate the worthy from the unworthy, the proper conscience and sentience from all the rest (Chen, 2012). Stengers also characterised the inheritance of modernity and modern science as putting us on 'the side that characterized 'others' as animists... [As] the ones who have accepted the hard truth that we are alone in a mute, blind, yet knowable world—one that is our task to appropriate' (2012, para 4). While she rejects a 'nostalgic' embracing of animism – as if we could become indigenous 'again' – she invites the inheritors of modernity to open up for new 'assemblages that generate metamorphic transformation in our capacity to affect and be affected—and also to feel, think, and imagine' (ibid, para 60). These are inheritances that current soil re-animations could open up, by embracing the metamorphic transformation of communing with soil. I would like to conclude by pointing at ways by which the motifs of soil aliveness I have approached are not just a re-attribution of anima to matter, but ethico-politically charged responses to destructive eco-social relations.

First, the eco-poietic agencies and affections to soil approached in this paper live at the heart of cultural contexts in which relations with natural resources are predominantly predicated on extractivism, industrialism, and consumerism, in which science *is* technoscience. That is, where knowledge has more value if it can provide the reductions and measurements that facilitate appropriation and management of resources. In these contexts, the notion that entities of the biophysical world might have a spirit, an *anima*, was purportedly eradicated by this socio-cultural and economic complex, helped by modern reductionist scientific rationalism and industrial commodification. And yet, the motifs of soil aliveness presented above disrupt the notion that movements contesting technoscience by seeking alternative eco-centred relations share a thorough defiance of scientific practices – seen as those which have reduced the world to manipulable matter. Coming back to the intentions I stated in the introduction, a form of involved critique, and following a tradition active in feminist science and technology studies that refuses to isolate scientific

knowledge as an alienated and alienating sphere, can help understand how soil advocacy (and other contemporary eco-social movements) can both connect with science as a co-realiser of the natural world in technoscientific cultures, and enact ethico-political involvements that confront the appropriation of soil life.

Second, I'd like to play with a metamorphic re-arousal of the mystery of 'the vital' force. The 'vital force' traditionally referred to that inexplicable principle of animatedness of the living world that modern chemistry is celebrated for having ejected. It did so by finally demonstrating that both biological and psychochemical worlds could be explicated by equal 'mechanical' and 'materialistic' principles (Hunter, 2000). Returning the spirit to the soil brings back the mystery of the vital force as a principle of the more than human soil community, it shows that soil aliveness is not explicable by mechanical principles. I have approached in this paper the ecological scientific envisioning of soil that wouldn't exist without the ongoing creativity of a myriad of creatures, the knowledgeable teaming with living soils to bring resurgence amidst destruction, the sensual nature-cultural enlivenments, and the embracing of shape-shifting shared matter. All these forms of human-soil communing can be read as the mystery of a reconceived more-than-human vital force because they emerge in relational entanglements of which not one element holds 'the key'. The eco-poietic ongoing re-creation of the more than human collective partakes in the mystery of what a community could be capable of, a vital force that is deeply ethico-political (Puig de la Bellacasa, 2015a).

Finally, this begs the question: is this speculative version of the vital force an anthropomorphic projection of human agency? That would be giving the human too much credit. Not only because, as Stengers puts it, the efficacy of metamorphic transformations is 'not ours to claim' or because they remind us 'that we are not alone in the world' (2012, para 60) but also because *who* animates *whom* is an open question in the more than human soil community. Involvements with soil's animatedness open up to a sense of earthy connectedness that not merely animate and re-affect objectified worlds, but complexify a sense of ecological belonging for the humans involved. A material-spiritual transanimation, a *co-ensoulment* (Zitouni, 2012). A thread through this paper has been the anthropocenic background of a dispirited humanity stunned by its own deadliness. In Spanish, my mother language, when someone is not well, feels *they can't go on*, we tell them '*Animo!*' as a word for encouragement, or to cheer them up. Anthropocenic, fatigued and exhausted soils need heartening, but, I would argue, so the humans who strive to care for them. Acknowledging indeed, that this might be a projection of empathy, my stance is that human-soil relations also (re)animate in the sense of *raising spirits up*. From the lure of wonderful soil biological worlds and its teeming wonder, to the embodied hope of eco-poietic everyday soil care and joyful sensual proximities, in the promise of a composted afterlife these stories speak of joy, hope and other possible versions of humanness than the world destroyer.

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¹ <https://www.nytimes.com/2013/05/12/opinion/sunday/the-hidden-world-of-soil-under-our-feet.html>

² Katie Scott, 2015, Crane.tv: <https://vimeo.com/70557477>

³ <http://www.soils.org.uk/event/230>

⁴ See the pioneer project curated by Daro Montag <https://soilculture.wordpress.com>

⁵ <http://alanabartol.com/artwork/3716492-The-Soil-Is-Teeming-With-Life-One-Minute-Edit.html>

⁶ See also Nicole Clouston's "SOIL" epitomised by a 'vast array of microbial life' looking at 'the ways in which we are connected to it'. Using mud and nutrients she let microbial life flourish, creating coloured bands throughout a sculpture: <https://nicoleclouston.com>

⁷ *The Anthropocene Project. A Report,* HKW, 2014, http://hkw.de/en/programm/projekte/2014/anthropozaenprojekt_ein_bericht/anthropozaenprojekt_ein_bericht.php

⁸ <https://www.facebook.com/events/184251545330901> Event co-organised by activists and permaculturists Claire Maitre, Bridget O'Brien and Cliff Scholz

⁹ I thank Dimitris Papadopoulos for bringing to me this Earth Works' story of cemetery soil recovery.

¹⁰ Only partially, as it is known that burial areas can be extremely polluted by chemicals in non-biodegradable caskets, formaldehyde, and other embalming chemicals.

¹¹ <http://www.publicamateur.org/?p=378>

¹² <https://soilculture.wordpress.com/creative-workshops>

¹³ <http://www.lauraparkerstudio.com/tasteofplace/whatisatasting.html> (accessed 09/01/19).

¹⁴ <https://amandawhite.com/DETC>

¹⁵ <http://sexecology.org/wedding-to-the-dirt/>

¹⁶ See Daro Montag's overview of how soil art engages the senses. (Montag, 2017)

¹⁷ <http://www.avivareed.com/soil-biome-immersion/>

¹⁸ <https://mcchicago.org/Collection/Items/1973/Ana-Mendieta-Untitled-From-The-Silueta-Series-1973-77-7>