Chapter 2

Checking in with Deep Time: Intragenerational Care in Registers of Feminist Posthumanities. The Case of Gärstadsverken

Christina Fredengren & Cecilia Åsberg

The generations of men run on in the tide of Time / But leave their destin'd lineaments permanent for ever and ever. (Blake, Milton, f. 20, 11. 24-25)

Although I have for some time accepted the force of Fredric Jameson's dictum that "we cannot, not periodize," until very recently it would not have occurred to me that postcolonial study, critical theory, or the humanities disciplines in general needed to periodize in relation not only to capital but to carbon, not only in modernities and post-modernities but in parts-per-million, not only in dates but in degrees Celsius. (Baucom 2014: 125)

Introduction

In the face of planetary environmental degradation, most agree that societal transformation is necessary. Yet it seems that it is easier today to imagine the end of the world, and even the end of capitalism (see Jameson 2003), than it is to imagine the end of the universal human that would enforce such magnificent societal transformations. Gendered, racialized, fully cognizant and safely zipped up in a skin of his (sic) own, this impossibly unchanging human figuration looms large over debates on the futures of climate change, environmental degradation and heritage alike. He stands there seemingly untouched by the world as it changes

material-temporal transformations, without contingency or bodily subjection to the synergistic dynamics of evolution, mass species extinction, or toxic legacies. Starting from the assumption that such human exceptionalism is disingenuous to the work needed to meet the major challenges of today (Haraway 2008 Braidotti 2013; Colebrook, this volume), we suggest instead to front a (posthuman) analytics of more-than-human relationality and sociability in regard to the co-becoming of bodies and places over time. Such analytics are familiar to many scholars in the environmental humanities (Bastian 2012; Bastian and van Dooren 2017; Åsberg 2018; Fredengren 2018a & b) and to feminist theorists of technoscience, the posthuman and postnatural conditions of the Anthropocene. While differing in emphasis and terminology, we subsume such diverse work under the heading of feminist posthumanities. We opt for this open-ended and inclusive term as we see it as a way of enlivening the human of the humanities (and critical heritage studies) with a mix of relational, technological, nonhuman, and more-than-human conditions of co-existence.

Starting from the assumptions of feminist perspectives from such forms of re-invented humanities, this chapter approaches the major research question of *how better to re-tie the material and immaterial knots between past, present and future generations*. This is a research question guiding us in our project on deep-time interventions and intragenerational care that we explore here through the multi-temporal site of the Gärstad waste-to-energy plant. This plant resides just outside the town of Linköping in the region of south-east Sweden, a site we ourselves often pass by on our way home or to the university. The over-arching intent of our research is to contribute to the sociocultural and material transformations needed for us all to become more gracious ancestors for multispecies generations to come. More specifically to this chapter, we hope to explore the affordances of such feminist posthumanities analytics and show why such posthuman/postnatural concepts work as thinking technologies to augment research within critical heritage studies. This research field stands out for its critical contributions to a politics of representation in heritage work, but it also carries an inherent anthropocentrism built around questions of the attribution of heritage values by present humans to be passed onto future humans. There is a need for heritage

studies to move beyond this to acknowledge and deal with the variety of inherited material workings that are passed on to human *and* more-than-human generations. In pondering the age-old humanities question of what it means to live in the end of times, with our contemporary new ways of knowing change, we contend that new temporal notions, considerate of the multispecies futures we may never know the shape of, are needed to reformat our histories for more diverse futures.

Towards Intragenerational Justice and Care

Intragenerational justice and care are terms that emerge from our post-disciplinary commitments to feminist environmental humanities, and to natural as well as cultural heritage. Here, the related concept of intergenerational justice is commonly defined as how equity is transacted between non-contemporaries and captures temporal commitments in policy texts and law (see Brown-Weiss 1992; Rawls 1977). Hence, this is an ~~institutionalisation~~ of how to formally handle and structure various territorializations of the future. However, we emphasize the Karen Baradian 'intra-' (Barad 2010) as a way of evoking co-constitutive togetherness and conviviality over time. We deploy the notion of intragenerational justice and care for a more-than-human ethics of coming together as companions for merriment, awe and inheritances across generations, where these generations are entangled with each other in intricate and situated ways. Intragenerational care is something that the more moderate concept of sustainability, used in relation to sustainable development in various ways since the Brundtland Report for the World Commission on Environment and Development in 1987, has difficulties contending with in detail. Famously, this report defines 'sustainable development' as development that meets the needs of the present without compromising the ability of future generations to meet their own needs. Hence sustainability in this version is performing an analytic separation of the two, in efforts that could be perceived as a move towards deterritorializing the future. However, in the Anthropocene there are not that many places that anthropogenic action has not yet territorialized, and such untainted futures might be hard to come by. Furthermore, as many environmental scholars have pointed out, the very modern idea of sustainable

development also reverberates with capitalist assumptions of economic growth without consideration for planetary boundaries, and continues in the tradition of treating the nonhuman world as a resource and not a receiver of inheritances and care across generations. We believe sustainability and heritage concerns have a lot to gain from a more-than-human and *postnatural take* on the links between generations.

To take an obvious example of how in/equities may travel between generations and impact futures to come, and that ought to be a matter for deep-time heritage politics, is how we store nuclear waste from our present energy-intensive heydays, or how to handle climate change and environmental degradation itself or how we engage in the handling of garbage (see Fredengren 2015, 2018a). Such legacies will have physical repercussions for hundreds of generations of humans and nonhumans to come. The pharmaceutical drugs we ingest, the make-up we wear, the sofas we sit on or the refrigerators that hold the food we eat: every day we interact with untested chemical cocktails and different compounds that will be part of the genetic and transcorporeal heritage of futures to come (Alaimo 2010; *Åsberg* et al. 2011; Cielemecka and Åsberg 2019). Changes enacted today have repercussions for the generations that will live and die with them, and are set in motion as inheritances that entangle across generations.

Another example of multigenerational heritages set in action today: the recent jumps and advances in synthetic biology enabled two human baby girls to be born in 2018 without receptors for HIV by way of recent CRISPR technologies. Various critics, such as environmentalist Bill McKibben, and Gene Corea, Vandana Shiva, Rayna Rapp, as well as many other feminist scholars of new reproductive technologies and seed modification in the 1980s and 1990s, have long argued that genetic engineering infringes on informed consent and constitutes an unwarranted imposition of the past on the future. The gene-editing CRISPR techniques, the epitome of the Frankenstein technologies they warned about, have today already been tried on many nonhuman organisms in laboratories worldwide. These and other more mundane but equally transformative genetic modifications are commonplace in laboratories and agricultural practices today, where a wide range of species have been modified for human medical or domestic purposes. It might only be

a matter of time before the science-fiction imaginaries of rogue mutations, militarized viral zoonosis or designer babies emerge as CRISPR ecologies of the Anthropocene. Considering the advanced and far-gone reproductive interventions in live-stock breeding, wildlife conservation and long available, even naturalized, reproductive modifications amongst people, perhaps we need to consider ourselves as already living among/with/as hybrid ecologies. Sudden mass mutations in the evolutionary past have after all been drivers of change throughout the planet's history, and nothing points to advanced contemporary science standing outside such previous planetary *modus operandi* even if human scientists are only unintentionally assisting. Yet, all this is of course just speculation in the public face of vigilant science communities and laboratory safety precautions. It stands to reason, however, that transformations of today have enviro-corporeal effects, some unforeseen. They linger, like plastics.

The new immortals, as Michelle Bastian and Thom van Dooren (2017) call the plastics and synthetic materials that already litter landfills, shore lands, cities, ocean streams and seafloors, are also ubiquitous to our own bodies, part of food-chains and other permeable environs. Waste and waste management are therefore crucial societal pivots of contemporary engineering and social planning, as are toxicities inherent in conservation work and cultural heritage. However, these domains of inheritance (genetics, pollution, waste, art and heritage conservation) are seldom connected, mirroring the division of labor between nature (for science) and culture (for humanities). Obviously entangled, waste cultures connect humanistic norms with ecological responses to toxicity, the provinces of the humanities with those of the sciences, and need to be dynamically approached as such. Translations between waste and heritage, toxic embodiment and impure legacy are certainly an urgent sustainability-in-the-Anthropocene concern that we approach as nature-cultural heritage phenomena, and that also extend way beyond any research domains or human control. To tentatively approach these human and more-than-human matters, we ask in our project how intra-generational communities become forged and undone in the toxicities and energy flows at Gärstadverken, a waste-to-energy plant, across the transits of deep time.

Intragenerational Care as Heuristic Prism of Analysis

To do more-than-human humanities, we rely in particular on a notion of *intragenerational care* amalgamated from the *anything but* postbiological, postcritical or postfeminist registers of humanities. In fact, we build our understanding of intragenerational care with a synthesis of bio-curious and corporeal feminist philosophy, STS and critical cultural research. Intragenerational care is thus a term that has emerged from our postdisciplinary commitments to feminist environmental posthumanities. We define it as a respectful consideration of always already existing ties between noncontemporaries. Or rather, between co-contemporaries of *a shared time* as the material ties are what exist across shared pasts, presents and futures.

With this analytical device, we emphasize the 'intra-' of intragenerational ethics as a way of evoking the co-constitutive togetherness, 'ongoingness', and conviviality across time and place for which there is always accountability. This is much in the vein of Karen Barad's bringing together of ontology and hauntology (Barad 2010). Inspired by Maria Puig de la Bellacasa's (2017) take on feminist care ethics, it is a more-than-human *considerational ethics* of coming together of companions for merriment, loss, awe and heritages *across generations*. Donna Haraway's multispecies approach to evolutionary conviviality and 'response-ability' in *When Species Meet*, with its emphasis on common grounds, has been trailblazing for us as well (Haraway 2008). In our research project on environmental waste, conservation and heritage issues in present-day Swedish green policy practices and national heritage imaginary, we start from such emerging multispecies and intragenerational approaches to conviviality *and comorbidity* over the long arch of deep time. This offers us a way of moving beyond thinking about gender, race, sexuality, dis/ability and feminist analytics in narrow terms of identity politics, and in terms of who gets represented or not in expressions of heritage. Instead, we explore forces of formation and ask who and what within these formative forces get to live, thrive, suffer or die. *Cui bono?* It moves us analytically and critically in terms of open encounters, response-abilities and reciprocal responses for the deep-time event. We also try to cultivate such sensibilities in the encounter between heritage research and environmental humanities within the heuristic frameworks of conceptual innovation we call feminist posthumanities.

An Anthropocene Challenge to the Humanities: How Feminist Posthumanities Give Shape to our Analysis

Contemporary philosophers, many outside the discipline of philosophy itself, have taken on the challenge of thinking dangerously and letting themselves be taken hostage by contemporary 'hypercomplexities' such as climate change or mass species extinction. As Peter Sloterdijk and Hans-Jürgen Heinrichs (2011) suggest in the introduction to *Neither Sun nor Death*, such thinkers opt boldly to forsake the present humanist and nationalist world for a wider horizon *at once ecological and global*.

Even though humans certainly impacted their environments prior to this post-Holocene era, the notion of the 'Anthropocene' indicates such a 'hypercomplexity', at once ecological and global, that by now has captured the imagination of many contemporary humanities and social science scholars. Famously, the Anthropocene has been suggested by natural scientists as that epoch we now live in that is defined by human disturbances of ecosystems and climates. As the 'anthropos' of the Anthropocene, humans have, in a sense, become a 'force of nature', signaling that nature in its classical sense is over (Chakrabarty 2009). This also has some serious philosophical consequences for research in the humanities and social sciences. Consequently, we cannot separate humanity from nature: the environment is in us, and we humans are fully in the environment (Åsberg 2018). Thus, there is a call for an ecological or environmental (post-)humanities that refuses the divide between nature and culture in analytical and disciplinary terms (see also Harrison 2015, Fredengren 2015). However, the study of anthropogenic impact in a range of emerging ecologies is still of utmost concern.

In academic cultures, these shifts in our understanding have meant that humanities research, which previously tended to prioritize culture over nature, minds over bodies, and words over things, is shifting rapidly. As 'nature' becomes cultured, the humanities – and contemporary culture at large have become increasingly 'natured' (Alaimo 2010). Here we might consider the ubiquitous climate awareness and influence of public recycling imperatives or the effects of common popular science reporting on our social imaginaries. Such examples point to the values of reinvented forms of humanities research. As Deborah Bird Rose et al. (2012) have argued, environmental humanities redeploy humanities

modes of inquiry such as 'meaning, value, responsibility and purpose' to real-world environmental problem-solving. The environmental humanities in their plurality of longstanding traditions and new transformations (Neimanis, Åsberg and Hedrén 2015; Oppermann and Iovino 2016; Emmett and Nye 2017) are already well poised to take up the challenges of the Anthropocene. Today, new generations of ecofeminist scholars, speculative scientists and practice-oriented philosophers would like to push the humanities' critiques further. These theory-practitioners, like ourselves, claim that the humanities have become all too 'human', and reclaim the notion of 'posthumanities' (Halberstam and Livingston 1995; Wolfe 2003; Åsberg 2009, 2013) for a novel set of postdisciplinary approaches based on taking the ongoing entanglements of nature and culture very seriously.

Grounded in both science-infused archaeology and contemporary eco-gender studies of the bio-curious kind, our research here situates itself within these contexts in general (environmental humanities and feminist posthumanities) and within the 'posthuman turn' to ethics, and the notion of intragenerational care, in particular. The 'posthuman humanities' or, more often, the 'posthumanities', has created a paradigm shift (Åsberg and Braidotti 2018) in humanities scholarship by focusing on embodied subjectivities *after* the singular idea of 'Man' and subsequent debates on who gets to count as human, as the 'anthropos' of the Anthropocene (Latour 2004; Haraway 2008; Grusin 2017). Instead, posthumanities imagine humans as co-constituted within multispecies relations, thereby decentring humanity from the humanities and making room for human *and more-than-human* ethics. In doing so, it stands on the shoulders of longstanding anti-humanist or anti-anthropocentric claims within continental philosophy, as well as postdisciplinary commitments to historical and emerging medicine, technology and natural science (Haraway 2008; Franklin et al. 2000; Bryld and Lykke 2000). Taking science, biology and the corporeal seriously is what defines such bio-curious feminist scholarship (Åsberg and Birke 2010; Radomska 2016), indicating its multivalent inheritance as neither postfeminist, postcritical nor postbiological. Rather, it is kin to the science fiction and cyborg approaches of Donna Haraway, and the affirmative ethics of embodied subjectivity of Rosi Braidotti (1993, 2006).

Besides rethinking human subjectivity and ethics, the posthumanities rely also upon another concept with a queer feminist legacy, namely the 'postnatural' (Åsberg 2018). The Anthropocene forces us to recognize the queer (non-normative) situation we find ourselves in and make us question (in a gesture borrowed from queer theory) taken-for-granted assumptions about life as we thought it was (Radomska 2016). For feminist posthumanities, this boils down to the idea that nature was never natural to start with, and that any kind of purism amongst our analytical categories (be it gender or nature) would not serve analysis well. Because the categories of 'nature' or the 'natural' have been used with detrimental effects upon real bodies and ecologies, even 'naturalizing' discrimination and power asymmetries, diverse scholars interested in *just sustainability for the many* have long problematized these categories altogether. Haraway's early work on the technoembodied figure of the cyborg springs to mind as a starting point for such postnatural conceptions. In this vein, many feminist, queer and decolonial scholars assume that 'natural' is a largely ideological space (Butler 1993; Wynter 2003). Nonetheless they see the world as material and real, and subjectivity as corporeal (Braidotti 1993; Haraway 1991), matter as agential and formative, even ethical (Barad 2010; Alaimo 2010), demanding an analytics of material-semiotics for its ongoing materializations forged by forces, flows and abilities of attachment and affirmation (Haraway 1997; Braidotti 1994; Åsberg, Thiele and van der Tuin 2015; Alaimo 2016). In relation to critical heritage studies, such an approach offers ways of thinking about heritage in terms other than those of a narrowly defined representationalism and identity politics. Heritage can through these advances be ~~analysed~~ as material discursive phenomena composed by a variety of material/immaterial agencies, processes and apparatuses (Fredengren 2015). This avenue enables a meeting between heritage studies, new materialism and feminist posthumanism, allowing for critical heritage to continue as critical and engage with a materializing world beyond the human. Furthermore, it also allows for experimental and affirmative work that views heritagization alongside other worlding practices. As Fredengren (2012) notes, whilst biases and injustices based on identity in heritage selection need to be recognized and critiqued, they do not necessarily need to be perpetuated. In addition, such injustices need to meet up with

the bias of human supremacism in times of great injustice to vast ecologies of nonhumans. Such deterritorialization (and reterritorialization) of categories such as gender, race and class, and of queries in terms of what human gets represented or not in humanistic expressions of heritage, move us instead, critically, creatively and tentatively, in the multispecies directions of posthuman and postnatural ethics.

Identity categories, like for instance those of sex or species, are thus not to be taken as either natural or mere social constructions of human ideation. As material-semiotic phenomena they are actively made, maintained and politically charged to serve some interests more than others. In the planetary age of the Anthropocene, human activities clearly link to mass species extinction rates and environmental destruction. This makes dominant human thinking and acting regimens a lot more radically open and suitable for feminist, decolonial or Deleuzian re-inventions in terms of, for instance, 'becoming imperceptible'. Moreover, it makes inquiries into our relationships with the nonhuman animal (also as it relates to those humans deemed less-than-human or even inhuman) seem increasingly necessary.

With intragenerational care as our multispecies prism, we ask what relationships of mutual dependence sustain ecological survival on this planet, and on this specific multi-temporal site (Gärstadsverken) in particular? How can we enable specific relations of care, or a sense of communality, between species that from an evolutionary point of view must be regarded as co-constitutive? Haraway uses the term 'companion species' to describe such mutual dependencies, highlighting the extent to which our human ongoingness is embedded in symbiotic relationship with bacteria and other microbes, with trees, plants and other nonhuman animals. In the vein of outlier biologists such as Lynn Margulis, Carl Sagan and perhaps Haraway, developmental biologist Scott F Gilbert (2017) deconstructs individualist notions of embodiment. He does this in terms of symbiosis, symbionts and holobiont evolution providing postdisciplinary Anthropocene scholars with arguments for avoiding 'human exceptionalism' (Haraway 2008).

Indicative of how feminist posthumanities draw on both arts and sciences, the proto-science of evolutionary development along with a

well-established feminist care ethic (Tronto 1993), enables us to explore the affordances of a multispecies care ethic, or at least more-than-human ethics, for deep-time futures. Care, in the words of feminist ethicist Joan Tronto (1993: 103), defines "a species activity that includes everything that we do to maintain, continue and repair our 'world' so that we can live in it as well as possible". A more-than-human approach to intragenerational care, as we will explore it, thus finds footing in both critical and biological literature. For us this means asking questions about what heritages are needed to be able to repair the world for future multispecies uses.

How relations come to matter is a core political concern for feminist theory today. It is also the pivot of evolutionary development theories of relationality. The starting point for both sets of theories is that no organism lives out its life in isolation or lives only to fulfil its own needs during its lifetime. Biologically speaking, symbiont relations play out, for instance, as *mutualism* (mutually beneficial), as *commensalism* (beneficial to one, negligent effect to the other), as *parasitism* (to the detriment of one), as *competition* (detrimental to both), as *mimicry* (masquerading as the other to mutual benefit or as exploitation of the other), as *amensualism* (asymmetric inhibition or annihilation of one whereas the other stays unaffected), and as *co-evolution* (mutually dependent evolution as in the case of infectious disease, ecological communities at large, and famously, flowering plants and associated pollinators). While competition has been given priority in the more commonplace ideas of evolutionary biology, it is by no means the only way, or even the most successful mode, of multispecies relationality. A sophisticated extension of such evolutionary biopower relationship theory is found in Haraway's multispecies approach to conviviality, 'companion species', and the ethics of 'response-ability' (Haraway 2003, 2008). Put to use in the feminist environmental humanities (or, more aptly, posthumanities) registers of Stacey Alaimo (2016: 175) and others, this leads us to maintain a vigilance in relation to environmentalism and sustainability efforts too, as we, working from within such efforts, need also to ask 'What is it that sustainability seeks to sustain'? A similar question needs to be asked in these cases when heritage is used for sustainable development and care between generations, as the concept is far from innocent. For example, are care for future generations only about commensalism (if such relations are at all still possible

in the present environmental predicament?). Again, we cannot care for relations with future humans alone, but need to be concerned about all the ranges from mutualisms, to parasitism etc across generations. There is *no purity of categories* to be had in the Anthropocene, and we cannot afford it anyway. A caring notion of sustainability over intragenerational time would need to combine environmental quality with human equality (social justice), extending care without knowing whom the environed subjects of the future would be. This is how feminist posthumanities works to deterritorialize taken-for-granted notions without losing its critical edge. The deep time concept in our more-than-human heritage research provides us with another such notion that wreaks havoc on human-centred conceptions of time and history.

Deep-time ~~H~~aunting the Anthropocene

The concept of 'deep time' is rooted in European, early modern challenges to biblical narratives wherein the planet was seen as created in 4004 BC for humans to rule. Scottish sea-cliff strata revealed to early geologist James Hutton that the ~~earth~~ had to be much, much older, and that humans, in turn, had only been around for a relatively short period (McPhee 1981: 20). Later, and now quite famously for this audience of readers, Chakrabarty (2009: 213-20) argued that in order to better understand the contemporary world with its climate and environmental problems, there was a great need to question the barriers between histories of geological deep time, natural history and that of the human. This has major implications for how history can be studied/comprehended, and how to engage with inheritances of all types and kinds. Such a union of natural and human history also has the eerie capacity to make us query what a world without humanity might look like. For example, Jussi Parikka (2016: 201) points out how the current situation engages timescales orchestrated by a range of more-than-human others and there is a need to act in response to these others. Here, archaeology, as an early form of posthumanities, *avant la lettre*, taking on board human and nonhuman temporalities, provides useful reference points for heritage studies. Such more-than-human heritage accounts would of course contribute to wider debates within the environmental humanities in terms

of memory and time, but also with regards 'archaeological' deep-time materialization processes. The research of Lucas (2015), that archaeology troubles the temporalities of the contemporary, is of particular interest so as to avoid the pitfalls of *presentism*, making everything about the now, which is rampant in Anthropocene discourse. In the age of the 'great acceleration' (Steffen et al. 2015), it is important to slow thinking down so we can acknowledge properly a much denser, layered sense of all the ~~materialising~~ multi-temporalities at play in particular locations.

As succinctly framed by Bird Rose (2013: 1), "Time and agency are troubled, relationality is troubled, situatedness is troubled. We are tangled up in trouble". Moreover, the term *chrono-normativity* comes into play here, as it has been used by queer theorist Elizabeth Freeman to describe "the interlocking temporal schemes necessary for genealogies of descent and for the mundane workings of domestic life" or "the use of time to organize individual human bodies toward maximum productivity" (2010: 3) through calendars and schedules. This notion, however, can favourably be adapted for a critique of the temporalities of modernity, namely, clock time, factory time and time-management that so many modern institutions rely upon. As Michelle Bastian (2012) distinctly articulates, such calendars and clocks also structure power relations, where your time-slot directs my life-choreography, and where the temporalities of a range of different, yet relational, nonhuman others are simply ignored. Bastian asks, are there ways in which time and calendars could be designed otherwise, for us to rebuild more sustainable relations amongst human and nonhuman chronologies?

This stands out as an apt question for heritage research with an outlook to the future, where time may not primarily be a noun, but a verb: *how could material processes, times and temporalities and relations be knotted together and made elsewise and in less damaging ways?* How can our temporal appreciation and language be improved and stretched to better encompass deep-time realities of the past and the future? Would it benefit us today, in daily life, to have our deep-time interventions marked out for us, and recognized as such, through exhibitions, apps or ceremonies? Against this background of how we could be 'checking in with deep time' it seems important to focus on how, in place-specific detail, temporal relations could and need to be designed differently, given the challenges we

face in terms of social justice, climate and environmental change. Deep-time concerns *haunt* the Anthropocene, and so do a range of slowly moving and shifting ~~materialisation~~ processes.

In the onto-ethical takes of her agential realism (and posthumanist performativity), Barad (2010: 266) addresses in concise philosophical terms how ongoing processes of materialization are already inherently enmeshed with ethical issues. Past violence shapes futures. To elaborate on this, Barad makes interesting use of Derrida's (1994) concept of hauntology to address relations between past-present-futures (see also Fredengren 2013: 63–64, 2016). As Elaine Gan, Anna Tsing, Heather Swanson and Nils Bubant (2017) describe it in the vernacular of feminist environmental humanities, ecologies are made and unmade by traces of more-than-human past ways of life, still charged in the present. Extinction leaves traces in the landscape. Similar to the political philosophy of death developed by Rosi Braidotti (2006), 'refusing to forget the past' – a plant's co-evolutionary relationship to now extinct pollinators or large mammal herbivores that had previously carried their seeds to new places, for instance – can fruitfully be described as ghosting those now hampered plants (Gan et al. 2017). Gan et al. make a powerful argument for such an ecological *hauntology of the Anthropocene* in which the 'great acceleration' of species extinction rates makes "Every landscape haunted by past ways of life" (2017: G2). In their Anthropocene anthropology *modus operandi*, "Big stories take their form from seemingly minor contingencies, asymmetrical encounters, and moments of indeterminacy" (Gan et al. 2017: G5). Amongst assemblages of ghosts and wounded landscapes we might detect liveability again.

Environmental change affects differently situated ecological subjects to varying degrees. For example, flooding or toxic mudslides from ~~busted~~ dams affect people and animals living near the lake shore or along the river more than people or animals higher up on dry land. Derrida (1994) argued that Marx's theories continue to haunt society in a ghost-like way. Whether his political objectives were realized or not, Marx's critique instilled in society an awareness of social injustice and a responsibility to create just outcomes, in future worlds. Despite failing to be fully embraced in the capitalist world, this critique is hard to undo, leading

to continuous questioning of the present, which needs to be dealt with in part through historical analysis. This 'hauntology', as Derrida (1994) defined it, works by looking back through the past as a ghost-like apparition, whilst remaining connected to hopes about the future (Barad 2010: 266). However, such re-thinking and re-composition of history cannot be completely novel, nor can it completely erase events or cover up injustices in the past. 'History' like spectres of what we used to regard as nature, will continue to disturb us through its present-absence. In short, the Anthropocene is "haunted" by its exclusions (Barad 2010: 253; Gan et al. 2017). As argued in Fredengren (2015 and 2016: 14) heritages can be explored as onto-ethic-epistemological phenomena, in all their excesses, which in turn may imply a disruption of the unilinear past-present-future arrangements. Here, the lavish workings of material and immaterial pasts can instead be traced as enchanting or haunting – presently at work forming unexpected and queerly formed materializing alliances, not always within human capture or control, but certainly with the capacity to disturb and diffract temporal workings and alliances of different kinds.

Offering more politicized accounts than approaches that leave it to a celebration of the object/thing *per se* or that work for the maintenance of nature-cultures, as this idea dies down in the Anthropocene discourses, we turn instead to the situated analytics and postdisciplinary practices emerging out of environmental humanities and feminist posthumanities. To explain, it is not enough to point to flat ontologies or instances of nature-culture entanglements, and it is not enough to parade science reports on the deteriorating state of nature. Instead, the Anthropocene calls on us to find ways of, in the words of Cate Sandilands, "seeing beauty in the wounds of the world and taking responsibility to care for the world as it is" (Mortimer Sandilands 2005: 24). In this chapter, we join company with such environmental scholars who try to formulate a more sustainable and equitable ethics of human diversity and multispecies co-existence in dire times.

In this chapter and our continued research we tentatively discuss the politicization of the long term within the natural/cultural heritage sectors and the layers of vernacular temporalities that meet and transform on a particular site of present contestation, namely a high-tech garbage

disposal site that is situated on an Iron Age archaeological sanctuary in the city of Linköping, Sweden. At this site high tech energy economies meet up with ancient heritage environments, resulting in a significant deep-time metabolization process taking place in this very location, where some material features have been removed and other added to facilitate a large modern waste treatment plant that churn over and transform a range of different left-overs from geographically extensive locations.

Curating Energy Over Time at Gärstadsverken: Organic Temporalities

One could look at the waste-to-energy plant as a fine example of futuristic architecture for the Anthropocene imaginary (cf. Turpin 2013). Towering over the East Sweden flatlands right beside the European Highway 4, the Gärstad plant is a steel and glass composition consisting of a district heating plant and a newer building next to it, an incineration plant designed by Winell&Jern Architects in 2016. The openness of the newer, taller building contrasts with the other lower and more closed-off buildings and the surrounding small, fenced-off, sewerage pools, which are teeming with bird life. Perhaps the city of Linköping's most visible building, the high-profile location presented the architects with significant demands in terms of architectural design. Exposition is key to the building's pedagogical aesthetics. The architects describe how they built the framework largely out of glass in order to expose the primary processes of the furnace and the gas purification plant, partly as part of the architectural expression, and partly as a pedagogical element. Tekniska Verken, the municipal company running this waste-to-energy and district heating plant, have indeed a strong pedagogical mission. All the schoolchildren in the town get to visit the sewer and waste operations and learn about the plant processes, and at least monthly the households of Linköping take part in 'green' or 'climate smart' programs, depositing household waste in regular plastic bags and organic waste in specially designed green bags. The pedagogical mission of exposing the 'green' process of waste incineration is thus strongly connected to both public discourse and the architectural expression of the building itself. In visual rhetoric, advertisements, billboards around town, websites and

pamphlets, the citizens of Linköping are called upon as part of a climate and energy-efficient community and Gärstadverken is presented as the green temple, accessible (made for us all) and at the same time inaccessible in terms of the technological sublime.

All household waste collected in Linköping (together with waste from another 20 municipalities, and from other countries) is transported to the Gärstad waste-to-energy plant where the garbage is incinerated, and the district's heating and electricity are produced. In Sweden, more than 99% of all household waste is recycled through material recycling, incineration/energy recovery or biological treatment, and less than 1% goes into landfills.[1] The waste-to-energy plant consists of several facilities that are themselves fuelled mainly by the burning of garbage, a technique patented and proudly branded 'climate smart' due to its energy efficiency compared to adding garbage to landfills. With an enormous capacity to

Figure 2.1 — The Gärstad plant at night. (Photograph by Cecilia Åsberg).

burn 88 tons of garbage per hour, the three older-type furnaces in combination with the new ones in the glass house (highly visible from the motorways intersecting at the location outside Linköping) generate as much electricity as 293 GWh/year. In 2006 the Gärstad plant was modernized with two newer furnaces, in a project entitled *Future Gärstad*. Now we live with it, and the extensive CO_2 emissions of waste incineration, for centuries to come.

The Gärstad plant now supplies practically the whole town of Linköping (160,000 inhabitants) with its energy, central heating and electricity. Tekniska Verken in Linköping AB, the company running Gärstadverket, is also owned by the Linköping municipality and employs around 500 people, making it one of the largest employers in the region. This large-scale energy business provides, besides energy, services and service operations for electricity, lighting, water, district heating, district cooling, waste management, broadband, biogas and efficient energy solutions. Not to mention more CO_2 per megawatt of energy than burning coal, at least in the short run.[2] In fact, the CO_2 emissions that are produced from the waste itself over the long period of natural decomposition are in the waste-to-energy incineration process speeded-up, condensed into the present and not spread out over a long duration.

As such Gärstadsverket could be said to represent the built heritage of the Anthropocene epoch, but also its folding of time. In a classical heritage sense, this plant stories the green arts of engineering and the burning of garbage from all over Europe. As an imploded node of material-semiotics with future repercussions, it condenses the infrastructures and politics of heating and purifying the town of Linköping, to include extensive European trade-links and interconnectivities across national boundaries. As such, the plant stands as an important industrial heritage. While this may be a classical way of arguing for making heritage, it would fail to pay attention to the various other, unwanted effects of the site. It would be as if the Anthropocene was something still ahead of us and not something processing us now. There is a certain sense of modern denial involved. And in addition, such accounts of the plant as heritage would fail to consider it as *an artificial time folding agent*, postnaturally taking on the brunt of CO_2 emissions from waste now instead of later in futures to come.

In reports from the Swedish Environmental Protection Agency (*Naturvårdsverket*), waste-to-energy incineration of plastics are troubled by uneven combustion and subsequent emissions of dioxins and furans as cancerous agents present in the remaining ashes and are spread via air. Waste disposal sites and treatment facilities, like the plant at Gärstad, provide water ponds and waste areas that provide important sanctuary, resting and feeding sites for migrating and resident birds, such as jackdaws, ravens and gulls. Bird species have been known to recover from PCP and DDT pollution after such substances affected the eggshells. However, the precise levels of sustained dioxins and furans emissions from waste incineration, accumulating over a long time period into the environment and into environed bodies, are presently unknown. And it is not an issue for birds alone, as effects of dioxins and furans are detrimental to all vertebrate organisms. As it appears when searching for literature on the topic, it remains quite unknown how such recent increase in emissions from burning waste affect the gatherings of birds, and the teeming bird life in the pond waters of Gärstadsverken. The town of Linköping has hosted large flocks of jackdaws and other birds of the crow species, and during the daytime Gärstadverken is their main habitat. Amongst the airborn ashes from waste incineration not caught in the filters, and amongst the waste deposits, many scavenger birds such as gulls and ravens have made Gärstad their main site of attraction. What postnatural heritage of persistant organic pollutants for multispecies generations to come are accumulating in these avian bodies? Such bodily accumulations are indexing time in the Anthropocene, layering bio-temporalities for future generations.

It would be highly cynical to discuss the Gärstad plant and its haunted past-present as merely conglomerates of nature and culture, and simply celebrate its underpinning of nondualistic theories or flat ontologies. After all, some pasts clearly matter more than others, and some futures will materialize more than others in the deep sense of posthuman politics. We would suggest a revisioning of the plant through the environmental posthumanities heuristics we have delineated above. This cannot fail to take into account the multivalent intragenerational comparison and choice between, on the one hand, dispersal of large amounts of *slow* CO_2 emissions from 'naturally' decaying waste, and, on the other, gifting the

near-present with massive and rapid emissions immediately. The uneven folding of toxic bio-accumulation and CO_2-time at Gärstadsverken begs consideration beyond conventional heritage discussions.

Sweden likes to regard itself as a forerunner in terms of green waste management. The Gärstad plant also functions in more self-satisfied heritage narratives about national green pride, as Swedish recycling policy has been described in international media as so revolutionary that the country has run out of rubbish. Gärstadsverket has been discussed in the *New York Times* as part of a Swedish success story – being one of 34 plants in the country where garbage is turned into energy. In governmental discourse and media, the engineering of Swedish waste-to-energy politics is articulated as no less than 'the Swedish Recycling Revolution'.[3] However, other voices have also been raised; according to Larsink's waste hierarchy (Figure 2.2), energy recovery is the second least wanted option, with only disposals in landfills being worse. Burning waste is, after all, hardly the same as recycling it. The incineration of garbage, although its dioxin-rich fumes are filtered, contributes to environmental pollution and has adverse climate effects. Hence, Owen Gaffney at Stockholm Resilience Centre describes it as a short-term solution and environmental watchdog organizations, such as the Environmental Integrity Project, even see incineration/waste-to-energy options as green-washing (Yee 2018). Other critics have taken this stance, pointing out that while

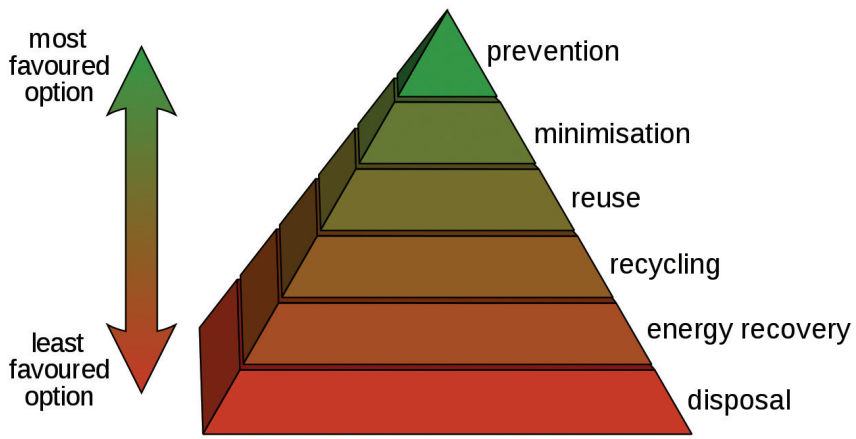

Figure 2.2 — Larsink's waste hierarchy. (Drawn by Drstuey at the English language Wikipedia, CC BY-SA 3.0).

import-incineration practices *pass as recycling* (bringing down the costs and fines for landfill), it is not recycling, thereby creating a false sense of 'garbage Nirvana' (Hogg 2016). To use the same vocabulary, perhaps this insistence on incineration instead creates negative karma for generations to come. This is also because the waste-to-energy plants of today are so efficient, they have created *a commercial demand for waste*, its main fuel source. Such market demands for more waste to burn hardly creates an incentive for either waste prevention or actual, practical recycling of refuse materials. The Swedish Environmental Protection Agency (*Naturvårdsverket*) therefore proposes a higher levy on waste collection.

On the other hand, landfills – also an integral part of the waste plant at Gärstad – could, as suggested by some more visionary researchers, be turned into veritable treasure troves. Tanha and Zarate (2012) at Linköping University have calculated that there might be some 100,000 tons of aluminium, but also significant amounts of expensive minerals such as copper and zinc, to be retrieved from the depot at Gärstad. To the extent that these landfills have the potential to become future garbage mining sites, they also evoke the latent societal and corporeal toxicities of other forms of mining politics. Attending to the deep infrastructures of valuable metals sitting on site awaiting extraction, other Linköping researchers have pointed to the dangers involved in digging into decades of toxic landfill materials. The jury is out, when it comes to this waste-to-energy plant and to what hypercomplex heritages it may be a part of, with its impact on climates, environments and temporalities. Clearly, the congregated levels of toxicity associated with the untested practice of landfill extractions in Sweden begs the question, when we turn matter into refuse and throw it out of sight, what are we trying to forget? Picking at the surface of deep landfills that we might come to see as barely covered human-induced earth wounds, alive with a toxic agency of their own, we ask what different, more safe, possibilities could there be for recuperation, inhabitation and healing at the Anthropocene site of the Gärstad plant?

Multi-temporal Clock Sites

As discussed in Michelle Bastian's (2012) essays, time and agency are deeply interconnected, not only in linear narratives of cause and effect,

but also when figuring out action capacities and relationalities in the Anthropocene. If heritages are understood as mere social constructions in the present, they become void of time, they become timeless, and hence without any agency or material effects. As evidenced in the previous sections, Gärstad stands out to us as anything but void of temporality and nonhuman agency. It is teeming with interlinked and embedded human and nonhuman activities and with multiple temporalities, unfolding as the story develops. One can argue with Bergson (1907: 14) that "The present contains nothing more than the past, and what is found in the effect was already in the cause"; however, this would, in our posthuman take on time, be a present that reaches across the entire arch of deep time, including deep futures. Of concern for us is how a particular place, the site of Gärstad, re-territorializes and acts-out past/present/futures in situated ways. Gärstad clearly holds many temporalities in place. Essentially, we care about how places and practices with varying temporal rhythms and durability interfere with intragenerational matters in sometimes unexpected, and not always linear ways.

Following Bastian's reasoning, we ask in particular how this site is telling time. We consider the way human and more-than-human forces and flows of the Gärstad plant are dragging multispecies beings into future existence, or not. Organisms-in-place become multi-temporal clock sites by way of embodiment. They become indicative of past intercessions as woven together with present interventions, for futures to come.

In the periodic sense of temporality, time comes with an order, a past precedes its present and its future. This can be measured, clocked and performed culturally as aesthetic or artificial devices for understanding the passing of time. In evolutionary terms of multispecies liveability, time accounts for degrees of adaptation and extinction in organisms. Large herbivores, like aurox and tarpan, now extinct, would have been the major environmental engineers of the post-ice age site we now call Gärstad, influencing its vegetation and the composition of woodland species. In an anachronic sense, some herbs (like sorrel) that they munched are still prepared as food (herb soups) by contemporary people while other herbs have lost their most advantageous means of dissemination due to the extinction of these large, grazing animals. Large herbivores, now long vanished, still haunt the present and the possibilities for the spread

of plant life on site. Using terms from film studies, the herb sorrel for instance can be said to mediate time, providing us with a 'flashback' (analepsis) of past pastures around Gärstad, and so on (Table 1). Taking into consideration such temporal categorizations and temporal relations possible at the site of Gärstadverken, what time would Gärstadverken tell?

Economical or social time/Time as noun	*Ecologizing time/time as verb*
Time as history/Periodizing time	**History working beyond 'the ~~historians~~ code'**
Past/contemporary/future: Extinction/adaption: Modern/Altermodern: Obsolescence/Innovation: Anticipation/Unexpected	Processes and relations weaving through past/futures – densing up the contemporary – and possibly bursting this time fold
Time as calculation/Measuring time	**Intra-historical workings**
Clock/Lived: Synchronic/Anachronic: Human/Planetary: Serial/Simultaneous: Emergency/Everyday	The holobiontical labouring of organisms, the kiss of death to certain life-forms by toxicities, environmental damage and climate change
Time as culture/mediating time	**Supra-historical workings**
Aesthetic/Prosthetic: Analepsis/Prolepsis	The dynamics and cascading effects of CO_2 emissions, isostatic movements, long-term storage of heavy metals

Table 1: Table of humanistic times (after Burges and Elias 2016), adapted by Lucas (2015), Bastian (2012) and Barad (2010) and further inspired by Baucom (2014), Gilbert (2017) and transformed.

As we will continue to explore in the research project, this landscape is interwoven with materially entangled temporalities, perhaps where we might explore something like ecological or even ecologizing time, where it is made through a variety of ~~materialising~~ relationalities, braided together in situated ways. Suffice to say, the high modern wonder of engineering of the Gärstad plant is in fact also located on an archaeological site. Bit by bit, by careful excavation, the archaeological layers have recently had to make way for the expansion of this waste-to-energy plant. A variety of material and temporal processes can still be mapped in the area of Gärstad. Geological, hydrological and archaeological temporal changes perform transformations that are still taking place in the landscape. The land is still slowly recovering from the last ice age, but it is not clear if and for how long the land rise will counter-act increasing water-levels from sea-level rise. Topographically transformed by modern exploitation, the small remaining archaeological area is located on two elevations that lie between Lake Roxen and, to the west, River Mörtlösa (now

straightened out, managed and partly laid in culverts). The shorelines in the nearby geography have retracted since prehistory – for instance as a result of ongoing isostatic movement, where land is still recovering from having been under pressure. The small river supplies its own hydrological temporalities, running in a more seasonal register, with overflows in spring after ice-melts, and perhaps droughts in the summer. This seasonal change is adapted and tamed, handled by the culverting. However, with climate change, such volatility also means increasing prospects of future flooding and human emergencies to come, from swamping to deluging and other water related events.

There are remains of Neolithic activities in the area – hut sites and some of the pottery from recent ~~excavation~~ are discerned as being from this period. In fact, the general area of Gärstad is internationally known as one of the major rock art sites in the region of East Sweden (Östergötland). Here the Neolithic layers meet up with pre-Roman Iron Age and ~~medieval~~ strata. It has been argued that this was a sacred place, an attraction for people on foot, where both the act of carving the stone and the flow of bronzes from Europe were handled by an elite (Tilley 2008 and cited literature therein).

More precisely, there is rock art (both figurative and non-figurative) in the fields between Linköping, Lake Roxen and just north of Gärstad Mansion (a geographical area). A sun horse and a ship carving, together

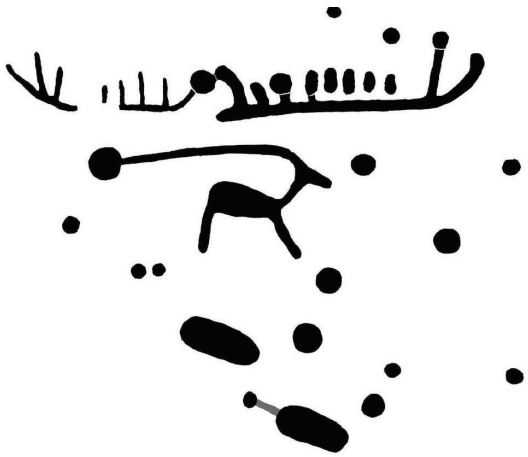

Figure 2.3 — The sun horse and ship in Gärstad. (After Wikell et al. 2011).

with several cup marks, have been found here (see Figure 2.3). These were times when the sun was understood to be carried over the skies by a horse (Wikell et al. 2011), hence this panel captures the temporalities of day and night. However, the rock art that originated in the Bronze Age also had relevance for futures to come, as argued by Nilsson (2017), as the past was of importance also in the past. Traces of previous rituals including fire sites haunt the location to this day. There is even archaeological evidence for small bonfires from later times, i.e. the Iron Age, telling stories of the interplay of fires and folks. It is likely that these fire sites were connected to cattle herding, as it appears that the sites of rock art, at the time, were resting places for people and animals as they moved across the flat landscape, leaving imperceptible marks (Nilsson 2017: 82–87).

Broadly speaking, the archaeologies of the place run on a variety of temporal registers. Not only does the figure of the sun horse relate to and describe the temporalities of the day according to what may be a Scandinavian Bronze Age cosmology; the rock art and the associated sites materially remind us of alternative ways of forging human-animal relations. Furthermore, the rock art captures the intragenerational, seasonal and daily rhythms of this landscape. This place mixes up the temporalities of synchrony/anachrony, as it has been available and in use during subsequent periods of time, therefore marking out places of return. The rock art also points towards human-animal relations and marks resting and meeting places, along with possible ways to move around in the landscape under other climate regimes than the present.

Looming over this area is the wilder, more extreme, both wetter and dryer Anthropocene climes. This general area of Östergötland was intensively settled during the Bronze Age as people took advantage of the more stable Holocene landscape. Here, material archives of sediments from wetlands and lakes as well as archaeological waste deposits tell stories of land change. During the Middle Bronze Age, the broad covering oak forests (favoured by now extinct large herbivores), with vegetation and undergrowth, ~~was~~ cleared to make room for human settlements and fields. Botanies of more light-loving species, such as salix, rowan and hazel, took their place. Various types of plant such as dandelions, yarrow, coltsfoot and nettles that thrive in the company of humans and animals came into being (see Carlsson 2014 and cited literature therein). The landscape has

never fully recovered from these clearings. Such widespread deforestation is still regarded as an archaeologically registered deep-time intervention that affected many futures to come. Materializing at this stage were the more familiar, open and flat farming landscapes of today.

Gärstad is also a place that harbours temporalities of life and death of other cultural kinds. The plant is located near one of the larger excavated burial grounds from the pre-Roman Iron Age in Sweden, with over 500 graves. This too has been removed to make room for the expanding waste plant (Helander 2017: 11–12).

These material and temporal layerings of the site tie together the knots of past and present generations but had to be undone for the power plant to expand. New temporal layers, in completely different registers, have been formed as the burial ground (Figure 2.4) was removed to make way for the large footprint of the waste-plant buildings, where artefacts, burnt skeletons and soil samples have left some of their relations behind

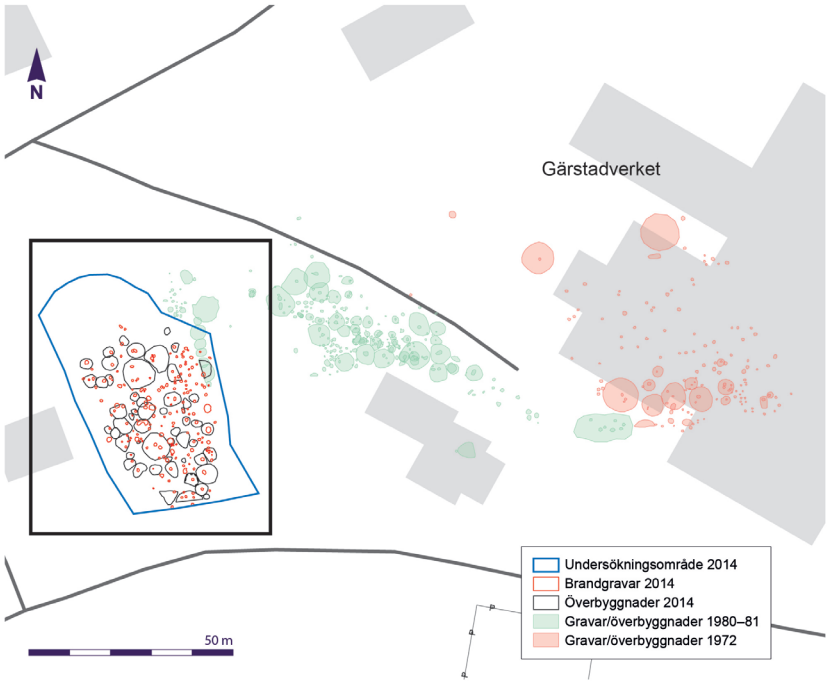

Figure 2.4 — The location of the burial ground in relation to Gärstadverket. (Reproduced from Helander 2017: Figure 3; courtesy of Arkeologerna, National History Museums).

in this place and made their way into and continue their relational working in other contexts. Hence, they are carrying with them some relations, losing others, but are also capable of forming a part of new ones within museum ecologies. In the Iron Age, the bodies of the dead were burned, with clothes and personal items, and when the funeral pyres died out the bones were gathered and placed in the ground with some of the attire. At the plant, clothes and organic materials are burned at a much higher rate today, where consumption/waste ~~materialise~~ at an accelerating speed. The Iron Age funerary rite included meals with the dead, with food placed in the grave (Helander 2017). Today, small green plastic bags containing leftover food get dumped, fermented and eventually ~~burnt~~ just behind this location. The earliest Iron Age is often seen as a period when humans had a comparably light footprint on the ~~earth.~~ It was to some degree a period characterized by today's fashionable *de-materialization movement*, with less prestige-consumption than the Bronze Age. Yet, it was still a period that brought substantial human-induced landscape change, with more organized field systems and farming. In later days it was a *tingsplats*, a site of deliberations and ruling, a place where people met to discuss and pass judgment on current affairs (Helander 2017). As a heritage site, it works both in, through and towards the Anthropocene, as a location where intragenerational justices and judgment are played out today too.

As captured in research (Fredengren 2016 and cited works therein), archaeological remains occasionally appear unexpectedly and disturb modern chains of events, contributing to clashes and disjunctures in time. Encounters with materials from deeper temporal strata can give rise to what is understood as *enchantment effects*. Bennett (2010) has argued that such effects are important when people step up from environmental ethical thinking to real and substantial environmental action. Here, however, the archaeological finds from the excavations interfered with the development of the plant from the 1980s and onwards as it expanded.

Presently, the buildings and asphalted surrounds have their own ~~life-cycle~~ and temporality of use. It is often held that buildings have ~~life-cycles~~ of about 100 years, and there is no indication that the large glass and iron structures of the plant would be much different.

Figure 2.5 — Archaeological remains, still protruding in the field, with the plant in the background. (Reproduced from Helander 2017: Figure 4; courtesy of Arkeologerna, National History Museums).

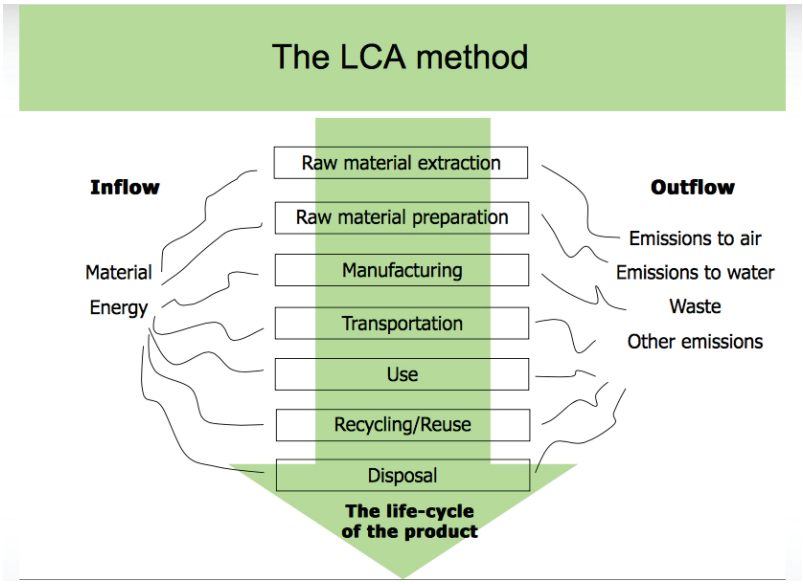

Figure 2.6 — ~~Life cycle~~ assessment method. (Drawn by Linda Tufvesson, SLU (Swedish University of Agricultural Science)).

Life-cycle assessment is a method that tracks the resource use and environmental impact during an item's life, from raw material extraction, through manufacturing, transportation and use (cf. Finnveden et al. 2009). Besides being applied to the garbage plant itself, it can also be used to formulate the garbage content. Garbage can be seen to have reached the end of its life-cycle. But there is more to it, this garbage also gets a second life through the process of recycling, or, as in the case of the Gärstad plant, through the waste-to-energy process. It passes into the metabolism of the town, in the form of energy for heating, with the possibilities for future garbage-dump mining. While the model favourably points to all the necessary energies and flows that go into the making of a product, the question is whether the model really knits together a cycle for *all* the garbage here? As most of the waste is incinerated, and not really recycled, and takes on the precious form of energy it seems to join in the more volatile register of the *new immortals*, i.e. less degradable forms of polymers and plastics that defy decay and interfere with future lives in unexpected ways (cf. Bastian and van Dooren 2017). Waste products actually recycled, such as batteries or part of refrigerators, stay in circulation albeit in various forms. But the waste that flows into the massive incineration process takes on other life forms as toxicities in bodies and CO_2 emissions to air, water and land.

While garbage disposal certainly was a part of human and animal activities in the past as well, both the intensity and volume differ substantially. The present-day waste accumulation and incineration at the waste plant of Gärsta is part of a much larger world system. It plays into transformations on the planetary level with insidious and irregular impacts on climate. These large-scale transformations cascade with extended time lags between causes and observable effects, toxification processes and the invisibility and extent of air pollution. The circulation of toxins to the planet's polar areas, vast dispersal of pollution and other large-scale matters of environmental degradation are scientifically measurable, and part of what some researchers refer to as 'the great acceleration' (Steffen et al. 2015). Compared to the Iron Age, this site has transformed into a massive gathering site for waste from all over the world, following the great acceleration of global consumption. This is the insignia of the Anthropocene where the human impact on planetary ecosystems and geology has

increased significantly. The waste plant of Gärstad brings into sharp contrast the intensity and speed induced by the super-efficient incineration process and its circulation of ~~both~~ energy, emissions~~,~~ and waste matters. The waste-to-energy plant is part of a transnational network of consumption and waste production, and serves at the furthest end of the ~~life-cycle~~ of the product. Waste finds its way to this site from all over the world, as commodity and fuel goods, central to a whole new waste economy. The plant is supported by garbage from the whole of Sweden, but also from Britain and the ~~continent.~~ It thereby creates spatio-temporal relations between consumption in different countries and depositions in others. It makes us, on the one hand, part of the same Eurocentric garbage community, but on the other, it also keeps us in chains of temporal and material dependencies. The furnace needs waste to support us with energy and heating. As high-energy consumers we depend on these networks. However, these waste networks and consumer desires cannot be sustained over the long term. The activities at Gärstad, through the burning of garbage and emissions into the atmosphere, cause serious *deep-time interventions.* They feed into climate change and set up a relation to future multispecies generations. In the vernacular of Bastian, they shape the action capacities of deep-time futures, unsustainably.

What ~~T~~imes ~~D~~oes Gärstad ~~T~~ell?

At face value Gärstad appeared very provincial to us. But in more ways than we imagined at the start of this research, it connects us with the world and with the global infrastructures of waste, energy and power. This occurs not only through the creation of elusive sets of new immortals, but also by enticing us into a perceived re-cycling nirvana where, ~~in Marx's phrase,~~ all that is solid melts into polluted air. With scholars like Stacey Alaimo (2012), we stand concerned with what type of sustainability really gets sustained through the hyper consumption enabled by such garbage disposal places. What type of wounds and deep-time interventions, not only at Gärstad, but also around the world, do the underlying desires and consumptions perpetuate? This site not only remembers and tells the time of the sun horses, cattle and their herdspeople, the dead herbivores or the loss of trees, but also makes kin with the gaps and

wounds in other landscapes following mining, oil fields, plastic production, chemical cocktails and treasure trove consumption. Hence, tuning in with Gärstad as a time-giver opens up the observation of a range of othered relationalities connected with the ~~materialising~~ practices of international consumption and garbage economies. Parts of the world connect, congeal and transform by incineration at Gärstad, as do a multitude of planetary temporalities.

Our brief survey and analysis of this situated place has started to outline some of the linked times and places that still have a traceable endurance in the landscape. On the one hand, this material could be placed into ordinary linearized time-slots, such as the Holocene, which contains the Neolithic, Bronze Age, Iron Age, Medieval and Modern period. Voices have been raised to also periodize the Anthropocene and make it into a series of consecutive phases, such as early Anthropocene, the first acceleration, the great acceleration (post-1950) and then into the more futuristic good or bad Anthropocene depending on what human actions are taken (Kunnas 2017). One could continue this series with a *baroque Anthropocene* of heavy impact, a *rococo Anthropocene* of asymmetries and emotions – for fun and as an ironic and playful pedagogic contribution. However, the material processes knotted together in this location would have been an interlacing of a variety of sources and forces, where a myriad of materialization processes are in action, that would make such periodization unbound, as they stitch through time in, for us, rather uncanny ways. Here, these protruded time layers make the place around the waste plant of Gärstad a haunted site of Anthropocene refusals, and denials, that time as a noun would hide.

The multi-temporal site of Gärstad has interfered with the present generations, with traces of deaths, depositions from several archaeological periods and comorbidities to come. The archaeological excavations have temporarily hindered the expansion of the garbage site, from time to time, and perhaps have spooked the development (albeit in a rather modest way, with low-key ghosts). Hence, this first mapping exercise suggests that Gärstad is a materializing political ecology of a variety of temporalities coinciding in this place, and a multiplicity of places haunting us in time, a place with futures both territorialized and deterritorialized. We live in haunted landscapes (Gan et al. 2017), where such pressing

temporalities can be captured as Derridean hauntologies (Fredengren 2015, 2016). Here we are bothered, and spooked, by both pasts and futures to come, injustices already made, that are stitched into the fabric of the world.

As Bastian (2012) argues, various phenomena 'tell the time' in particular ways, and some of them, those that are connected with pressing environmental challenges, need to be better coordinated with our actions. Such a re-alignment also concerns who we need to care for more in times of environmental upheaval and climatic deep-time changes. When such temporal analysis is applied to Gärstad, it could highlight that we are already in intra-action with a number of past-present-future generations and trajectories. While the standard sustainability endeavour to have a commensurable relationship to future generations i.e. where practices of today have negligent effects on future generations are admirable, the co-constitution over time takes other turns. We are in the process of both becoming-with and becoming undone by our involvements with future generations, in for example parasitic, co-evolutionary, amensualistic or mutually beneficial ways. Bird Rose (2013: 7) alerts us to the fact that "our past is now racing towards us from the future". A variety of deep-time interventions, woven into the fabric of the past with distinct future trajectories, would, if we contemplated them in full, overwhelm us with shadows. Not only past generations, but also present and future ones, are coinciding at the waste plant of Gärstad. This site is telling the time of those intragenerations, reaping what was once sown here, but the processes are far from linear. And this has a bearing on intra-generational ethics and practices.

Ways of Living and Dying Well Together

> *If our species does not survive the ecological crisis, it will probably be due to our failure to imagine and work out new ways to live with the earth, to rework ourselves and our high energy, high consumption, and hyper-instrumental societies adaptively… We will go onwards in a different mode of humanity, or not at all (Plumwood 2007: 1).*

With Gärstad as our starting point for checking in with deep time, we aimed for encounters with all sorts of heritages – past, present, future – to

probe into what responsibilities 'inheritance' and becoming decent ancestors for future generations place upon us.

In considering this waste plant as Anthropocene heritage, we knew a feminist ethics of intragenerational coexistence would need to take an experimental path. Grosz (2005: 14) would refer to it as an untimely ethics, as it orients itself to the needs of the present and the immediate future, but also accommodates for nicks in time. Haraway (2016: 130) enrols Arendt and Woolf, to cultivate *response-ability* and remind us of "the high stakes of training the mind and imagination to go visiting, to venture off the beaten path to meet unexpected, non-natal kin, and to strike up conversation, to pose and respond to interesting questions, to propose together something unanticipated, to take up unasked-for obligations of having met. So far, we have with this brief set of encounters visited cattle and herders, moved through the land and rested by bonfires next to the rock art at night. We have seen the loss of tree-canopies and herbs, times and places of possibly just and unjust rulings. But we also, possibly, met non-natal generations to come in challenged futures, suffering the bad karma inherited from a variety of consumer/garbage networked relations and materialities. What we are beginning to discuss here is what types of virtualities open up in close encounters with Gärstad, its past, present, future inhabitants and its ongoing energy processes, stretching from before and after. Imagination and sympathy are key to this endeavour. In this, perhaps we find the hope of retying the knots between species and generations over time, in less harmful ways. Yet again, in the words of Donna Haraway: "Outcomes are not guaranteed. There is no teleological warrant here, no assured happy or unhappy ending, sociologically, ecologically, or scientifically. There is only the chance of getting on together with some grace" (Haraway 2008, 15).

Becoming Better Ancestors: Re-visiting Intragenerational Ethics

As explored above, several nonhuman generations (waste burnt into CO_2, jackdaws with survival skills, sun horses next to grazing cattle) already co-habit this landscape of Gärstad, and they also leak into other places and other bio-temporal knottings. By these action capacities, we consider them more than spatially and temporally contained inter-generations, but

rather intra-generations. As living things are facilitated by queer temporalities and heritages, where one generation is already related both to past, present and condition future lives, they (we) are as such co-constituted. Here, the question of how to live and die together comes to the fore, as well as how future generations can develop more-than-human kin and affinity. Against this background, the traditional take on intergenerational ethics and law (cf. Brown-Weiss 1992) experiences problems in capturing the queer links between past/present/future generations, primarily because of their focus on bounded human individuals. Entanglements of self and other, cultures within worldly nature, and pasts, presents and futures, have emerged. Barad's work inspires our intragenerational take on multispecies ethics. The entanglements of Barad's 'phenomena' – or '*agencements*' or assemblages according to Deleuze – do not come from an interconnectedness of separate entities but are instead "specific material relations of the ongoing differentiation of the world" (Barad 2010: 265). And these entanglements, these onto-epistemological processes of "becoming with" (Haraway 2008: 15) are, we argue, in relation to intragenerationality constantly being both territorialized and deterritorialized. These entanglements are also relations of obligations: they come with a more-than-human ethics. For that reason, both past and future generations are already here to haunt us, and as we have done here, can always be summoned from the shadows.

De la Bellacasa (2017: 4–5), following Tronto (1993: 105–8), teases out the various dimensions of care, and the tensions that there may be in-between those dimensions. Working in a similar vein for *intragenerational* care may mean tracking what affects and affections are linked to engagements over deeper periods of time. In this chapter we have touched upon these sensibilities when they perform as hauntings, or an eerie feeling that they (whoever they are) are here with us. However, there is also the revelation of joy and pleasure in convivial interlinkages over time. We have discovered various types of labour/work/material processes as makers of time and temporalities. They range from local, regional and international disposal and recycling practices to the possibilities of preservation for the multigenerational environments of the Gärstad waste plant. In the super-accelerated waste-to-energy cycle, the grand-scale unwinding of consumption might be out of reach for most people, even if they dutifully

sort their garbage in the most appropriate way. The issues at stake are too large for individual interventions. However, working with the waste plant at Gärstad in this way invites contemplation on how to heed the pressing materializing temporalities of this site-in-relation to figure out *how better to re-tie the material and immaterial knots between past, present and future generations*. It opens up a space for mourning, regrouping and alter-worlding, for training us in an ethics of becoming better multi-species ancestors. It might also demand of us that we design more clearly when we make deep-time interventions, and to ask what such actions impress onto future generations. We believe it invites a more careful re-stitching of ourselves into futures, a way for heritage to get in touch over time, sustainably.

Notes

1. An official Swedish government website claimed that 99 per cent of Sweden's waste is 'recycled': https://sweden.se/nature/the-swedish-recycling-revolution/. This claim was picked up in *Global Citizen* https://www.globalcitizen.org/en/content/sweden-garbage-waste-recycling-energy/ and debated, as incineration is not recycling, at Tree Hugger: https://www.treehugger.com/energy-policy/no-sweden-does-not-recycle-99-percent-its-waste.html. After the writing of this chapter, in March 2019 the page was updated, and the claim to recycling moderated.
2. A 2013 European Environmental Agency report, 'Municipal Waste Management in Sweden', claims that incinerating garbage releases 2,988 pounds of CO_2 per megawatt hour of electricity produced. This compares unfavourably with coal (2,249 pounds/megawatt hour) and natural gas (1,135 pounds/megawatt hour). However, most of the stuff burned in waste-to-energy processes (such as paper, food, wood and other stuff created from biomass) would have released the CO_2 embedded in it over time, as 'part of the Earth's natural carbon cycle'. If adjusted for the slow temporality of the natural carbon cycle, here speeded up by way of incineration, the calculations for CO_2 emissions are on a par with those of energy derived from natural gas, but without the advantage of getting rid of waste in the process.
3. The Swedish Recycling Revolution: https://sweden.se/nature/the-swedish-recycling-revolution/#start ~~(accessed February 2019)~~

References

Alaimo, S. 2010. *Bodily Natures: Science, Environment, and the Material Self.* Bloomington: Indiana University Press.

Alaimo, S. 2012. Sustainable This, Sustainable That: New Materialisms, Posthumanism, and Unknown Futures. *PMLA* 127(3): 558–64.

Alaimo, S. 2016. *Exposed: Environmental Politics and Pleasures in Posthuman Times.* Minneapolis: University of Minnesota Press.

Åsberg, C. 2009. Den posthumanistiska utmaningen. *Tidskrift för genusvetenskap* 2009(2–3): 64–68.

Åsberg, C. 2013. The Timely Ethics of Posthumanist Gender Studies. *Feministische studien* 1: 7–12.

Åsberg, C. 2018. Feminist Posthumanities in the Anthropocene: Forays into the Postnatural. *Journal of Posthuman Studies* 1(2): 185–204.

Åsberg, C. and L. Birke. 2010. Biology is a feminist issue. *European Journal of Women's Studies* 17(4): 413–423.

Åsberg, C., R. Koobak, and E. Johnson. 2011. Beyond the Humanist Imagination. *NORA – Nordic Journal of Feminist and Gender Research* 19: 218–30.

Åsberg, C., K. Thiele, and I. Van der Tuin. 2015. Speculative before the turn: Reintroducing feminist materialist performativity. *Cultural Studies Review* 21(2): 145.

Åsberg, C. and R. Braidotti. 2018. Feminist Posthumanities. An Introduction. *A Feminist Companion to the Posthumanities,* 1–22. Doordrecht: Springer.

Barad, K. 2010. Quantum Entanglements and Hauntological Relations of Inheritance: Dis/continuities, Space Time Enfoldings, and Justice-to-Come. *Derrida Today* 3(2): 240–68.

Bastian, M. 2012. Fatally Confused: Telling the Time in the Midst of Ecological Crises. *Environmental Philosophy* 9(1): 23–48.

Bastian, M., and T. van Dooren. 2017. Editorial Preface: The New Immortals: Immortality and Infinitude in the Anthropocene. *Journal of Environmental Philosophy* 14(1): 1–9.

Baucom, I. 2014. History 4: Postcolonial Method and Anthropocene Time. *Cambridge Journal of Postcolonial Literary Inquiry* 1(1): 123–42.

Bennett, J. 2010. *Vibrant Matter: A Political Ecology of Things*. Durham, NC: Duke University Press.

Bergson, H. 2007 (1907). *Creative Evolution*. London: Palgrave Macmillian UK.

Bird Rose, D. 2013. Anthropocene Noir. *Proceedings of the People and the Planet 2013 Conference: Transforming the Future*. Melbourne: RMIT University.

Bird Rose, D., ~~van Dooren, T., Chrulew, M., Cooke, S., Kearnes, M. och Gorman, E. 2012.~~ Thinking through the Environment, Unsettling the Humanities. *Environmental Humanities* 1: 1–5.

Blake, W. 1908. *The Poetical Works of William Blake*, ed. John Sampson. London: Oxford University Press, ~~1908~~.

Braidotti, R. 1993. Embodiment, Sexual Difference, and the Nomadic Subject. *Hypatia: A Journal of Feminist Philosophy* 8(1): 1–13.

Braidotti, R. 1994. *Nomadic subjects: Embodiment and Sexual Difference in Contemporary Feminist Theory.* New York: Columbia University Press.

Braidotti, R. 2006. *Transpositions: On Nomadic Ethics*. Cambridge: Polity Press.

Braidotti, R. 2013. *The Posthuman.* Cambridge: Polity Press.

Brown-Weiss, E. 1992. In Fairness to Future Generations and Sustainable Development. *American University International Law Review* 8(1): 19–26.

Bryld, M. and N. Lykke. 2000. *Cosmodolphins: Feminist Cultural Studies of Technology, Animals and the Sacred*. London and New York: Zed Books.

Burges, J.~~,~~ and A. J. Elias. 2016. *Time: A Vocabulary of the Present*. New York: New York University Press.

Butler, J. 1993. *Bodies that Matter: On the Discursive Limits of "Sex".* New York: Routledge.

Carlsson, T. 2014. En bronsåldersgård i Sjötorp, Ekängen. Östergötland, Linköpings kommun, Rystad socken, Ekängen, inom Sjötorp 1:1, RAÄ 327. Särskild arkeologisk undersökning. Linköping: Riksantikvarieämbetet, Arkeologiska uppdragsverksamheten, UV Öst,. Linköping.

Chakrabarty, D. 2009. The Climate of History: Four Theses. *Critical Inquiry* 35(2): 197–222.

Cielemęcka, O. and C. Åsberg. 2019: Introduction: Toxic Embodiment and Feminist Environmental Humanities. *Environmental Humanities* 11(1): 101–107.

De la Bellacasa, M. P. 2017. *Matters of Care: Speculative Ethics in More Than Human Worlds*. Minneapolis: University of Minnesota Press.

Derrida, J. 1994. *Spectres of Marx: The State of Debt, the Work of Mourning and the New International.* New York: Routledge.

Emmett, R. S.~~,~~ and D. E. Nye. 2017. *The Environmental Humanities: A Critical Introduction*. Cambridge, MA and London: The MIT Press.

Finnveden, G., M.Z. Hauschild, T. Ekvall, J. Guine, R. Heijungs, S. Hellweg, A. Koehler, D. Pennington and S. Suh. 2009. Recent developments within Life Cycle Analysis. *Journal of Environmental Management* 91: 1–21.

Franklin, S., C. Lury, and J. Stacy. 2000. *Global Nature, Global Culture*. London: Sage.

Fredengren, C. 2012. Kulturarvets värde för en hållbar samhällsutveckling. In *I valet och kvalet. Värdering och urval av kulturarv*, edited by C. Fredengren, O. W. Jensen, and Å. Wall, 189–223. Stockholm: Riksantikvarieämbetet.

Fredengren, C. 2013. Posthumanism, the Transcorporeal and Biomolecular Archaeology. *Current Swedish Archaeology* 21: 53–71.

Fredengren, C. 2015. Nature: Cultures: Heritage, Sustainability and Feminist Posthumanism. *Current Swedish Archaeology* 23: 109–130.

Fredengren, C. 2016. Unexpected Encounters with Deep Time: Bog Bodies, Crannogs and 'Otherworldly' Sites. The Materializing Powers of Disjunctures in Time. *World Archaeology* 8(4): 482–99.

Fredengren, C. 2018a. Re-wilding the Environmental Humanities. A Deep Time comment. *Current Swedish Archaeology* 26: 50–60.

Fredengren, C. 2018b. Archaeological Posthumanities: Feminist Re-invention of Humanities, Science and Material Pasts. In *Reinventing the Humanities*, edited by R. Braidotti and C. Åsberg, 129–40. New York: Springer.

Freeman, E. 2010. *Time Binds: Queer Temporalities, Queer Histories*. London: Duke University Press.

Gan, E., A. Tsing, H. Swanson, and N. Bubandt. 2017. Introduction: Haunted Landscapes of the Anthropocene. In *Arts of Living on a Damaged Planet*, edited by A. Tsing, H. Swanson, E. Gan, and N. Bubandt, G1–G14. Minneapolis: University of Minnesota Press.

Gilbert, S. F. 2017. Holobiont by birth. Multilineage individuals as the Concretion of Cooperative Processes. In *Arts of Living on a Damaged Planet*, edited by A. Tsing, H. Swanson, E. Gan, and N. Bubandt, M73–M89. Minneapolis: University of Minnesota Press.

Grosz, E. 2005. *Time Travels: Feminism, Nature, Power.* Durham, NC: Duke University Press.

Grusin, R. (ed). 2017. *Anthropocene Feminism.* Minnesota: University of Minnesota Press.

Halberstam, J. M. and I. Livingston (eds). 1995. *Posthuman Bodies*. Bloomington: Indiana University Press.

Haraway, D. 1991. *Simians, Cyborgs, and Women.* London: Routledge.

Haraway, D. 2003. The *Companion Species Manifesto: Dogs, People and Significant Otherness*. Chicago: Prickly Paradigm Press.

Haraway, D. 2008. *When Species Meet*. Minneapolis: University of Minnesota Press.

Haraway, D. 2016. *Staying with the Trouble: Making Kin in the Chthulucene*. London: Duke University Press.

Harrison, R. 2015. Beyond 'Natural' and 'Cultural' Heritage: Towards an Ontological Politics of Heritage in the Age of Anthropocene. *Heritage and Society* 8(1): 24–42.

Helander, A. 2017. *Gravfältet vid Gärstad*. Rapport 2017: 15. Arkeologisk Undersökning. Stockholm: Statens.

Hogg, D. 2016. The dark truth behind Sweden's 'revolutionary' recycling schemes. *The Independent Newspaper,* Tuesday 13 December 2016. https://www.independent.co.uk/voices/sweden-recycling-rates-revolutionary-dark-truth-behind-uk-wales-incineration-a7471861.html.

Jameson, F. 2003. Future City. *New Left Review* 21: 65–79.

Kunnas, J. 2017. Storytelling: From the Early Anthropocene to the Good or the Bad Anthropocene. *The Anthropocene Review* 4(2): 136–150.

Latour, B. 2004. Why Critique has run out of steam? From matters of fact to matters of concern. *Critical Inquiry* 30(2): 225–48.

Lucas, G. 2015. Archaeology and Contemporaneity. *Archaeological Dialogues* 22(1): 1–15.

McPhee, J. 1981. *Basin and Range*. New York: Farrar, Straus & Giroux.

Mortimer Sandilands, C. 2005. Unnatural passions? Notes toward a queer ecology. *Invisible Culture: An electronic Journal for Visual Cultures.* http://ivc.lib.rochester.edu/unnatural-passions-notes-toward-a-queer-ecology/

Neimanis, A., C. Åsberg, and J. Hedrén. 2015. Four Problems, Four Directions for Environmental Humanities: Toward Critical Posthumanities for the Anthropocene. *Ethics and the Environment* 20(1): 67–97.

Nilsson, P. 2017. *Brukade bilder. Södra Skandinaviens hällristningar ur ett historiebruksperspektiv*. Stockholm: Stockholms Universitet.

Opperman, S. and S. Irvino 2016. Introduction: The Environmental Humanities and the Challenges of the Anthropocene. In *Environmental Humanities: Voices from the Anthropocene,* S. Opperman and S. Irviono (eds), 1–21. London: Rowman & Littlefield International.

Parikka, J. 2016. Deep Times of Planetary Trouble. *Cultural Politics* 12(3): 279–292.

Plumwood, V. 2007. A review of Deborah Bird Rose's 'Reports from a Wild Country: Ethics for Decolonisation'. *Australian Humanities Review* 42: 1–4.

Radomska, M. 2016. *Uncontainable Life. A Biophilosophy of Bioart.* Linköping Studies in Arts and Sciences, No 666. Linköping: Linköping University.

Rawls, J. 1971. *A Theory of Justice.* Cambridge, MA: Harvard University Press.

Sloterdijk, P. & Heinrich, H-J. 2011. *Neither Sun nor Death.* Los Angeles: MIT Press.

Steffen, W., W. Broadgate, L. Deutsch, O. Gaffney, and C. Ludwig. 2015. The Trajectory of the Anthropocene: The Great Acceleration. *The Anthropocene Review* 2(1): 81–98.

Tanha, A. and D. Zarate 2012. *Landfill Mining: Prospecting metal in Gärstad Landfill.* Examensarbete Linköpings Universitet.

Tilley, C. 2008. *Body and image. Explorations in landscape phenomenology.* Walnut Creek: Left Coast Press.

Tronto, J. 1993. *Moral Boundaries: A Political Argument for an Ethics of Care*. New York: Routledge.

Turpin. E. (ed). 2013. *Architecture in the Anthropocene: Encounters Among Design, Deep Time, Science and Philosophy*. Michigan: Open Humanities Press.

Wikell, R., S.-G. Broström, and K. Ihrestam. 2011. Ostkustens första solhäst (The First Sun Horse on Sweden's East Coast). *Fornvännen* 106: 179–88.

Wolfe, C. 2003. *Animal Rites: American Culture, the Discourse of Species, and Posthumanist Theory*. Chicago, IL: University of Chicago Press.

Wynter, S. 2003. Unsettling the Coloniality of Being/Power/Truth/Freedom: Towards the Human, After Man, Its Overrepresentation – An Argument. *CR: The New Centennial Review* 3(3): 257–337.

Yee, A. 2018. In Sweden, Trash Heats Homes, Powers Buses and Fuels Taxi Fleets. *New York Times* 21 September 2018. https://www.nytimes.com/2018/09/21/climate/sweden-garbage-used-for-fuel.html