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Reconceptualizing the ‘Anthropos’ in the Anthropocene: Integrating the social sciences and humanities in global environmental change research

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ABSTRACT

There is growing recognition that humans are faced with a critical and narrowing window of opportunity to halt or reverse some of the key indicators involved in the environmental crisis. Given human activities' scale and impact, as well as the overly narrow perspectives of environmental research's dominant natural sciences, a major effort is necessary to place the perspectives and insights of the humanities' and social sciences' perspectives and insights at the forefront. Such effort will require developing integrated approaches, projects, and institutions that truly do so. This article's goal is to help mobilize the social sciences and the humanities on the topic of sustainability transitions, but also call for a meaningful research agenda to acknowledge the profound implications of the advent of the Anthropocene epoch. We formulate the need for an innovative research agenda based on a careful consideration of the changing human condition as linked to global environmental change. The humanities and social sciences will need to change and adapt to this pressing, historic task.

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Currently, there is a general understanding that humans are faced with a critical and narrowing window of opportunity – if we do not act very soon, it will be too late to halt or reverse some of the key indicators involved in the environmental

crisis. Not only is there this growing recognition, but there are also increasing demands for the rethinking and reshuffling of disciplines, in order to craft an academe suitable for the gigantic task ahead. In his book *A World of Becoming*,

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William E. Connolly (2011: p. 150) outlines some of the challenges involved:

It is pertinent to see that in a world of becoming this or that force-field can go through a long period of relative equilibrium, or even gradual progression as defined by standards extrapolated from that equilibrium. Much of social thought and political theory takes such periods as the base from which to define time and progress themselves, making the practitioners all the more disorientated when a surprising turn occurs, that is, when a period of intense disequilibrium issues in a new plateau that scrambles the old sense of progress and regress in this or that way. . . . It is now time to modify old extrapolations of possibility and desirability (2011: 150).

This timely call is the culmination of a gradual, growing awareness of the extent to which human beings have been altering the global environment. One milestone was George P. Marsh's *Man and Nature; or, Physical Geography as Modified by Human Action*; 'The earth', Marsh wrote 'is fast becoming an unfit home for its noblest inhabitant. . .' (1864: p. 44). The idea that the 'noblest inhabitant' (presumably Marsh was referring to humanity, with or without irony) might need to refashion its unfit home came still later. In 1948, Osborn Jr. suggested: 'It is man's earth now. One wonders what obligations may accompany this infinite possession' (1948: p. 66).

When the general awareness of our ecological predicament started to emerge in the early twentieth century, the human sciences contributed significantly. However, in line with modernist theories about technology and progress, the post-war framing of the environment fatefully reduced it to an object of natural science. It is becoming increasingly clear that this framing is itself part of the environmental problem. We argue that, because what currently counts as 'environmental' is also social (or, in some accounts, 'biosocial' or 'natural-cultural') (see Ingold and Palsson, 2013), humanity's knowledge enterprise needs to return its attention to social theory and the humanities.

The International Council of Science-led 'Earth System Science for Global Sustainability' visioning process (ICSU, 2010), with the involvement of the International Social Science Council (ISSC) and the 'Belmont Challenge' (Belmont, 2012), emphasized the important contributions required from the social sciences and humanities. This article discusses the human and societal challenges posed by global environmental change, emphasizing the humanities and social sciences' potential contributions and the need for those scholarly communities to step up to the challenges involved, given that the context within which we are currently embedded is increasingly and globally the result of human activities. The humanities and social sciences will need to change, adapting to this pressing, historic task.

Our goal is to reframe current understandings of the environment in a way that acknowledges the global system's emergent character and the profound implications of human activities. This will help mobilize social sciences and the humanities to contribute their knowledge for achieving sustainability transitions. Furthermore, we formulate a meaningful research agenda based on a careful consideration

of the changing human condition that is linked to global environmental change. We suggest that the new era, characterized by measurable global human impact – the so-called Anthropocene – does not just imply conflation of the natural and the social, but also a 'radical' change in perspective and action in terms of human awareness of and responsibility for a vulnerable earth – a 'new human condition,' to paraphrase Arendt (1958). The need for humanities and social sciences research communities to mobilize their efforts and articulate a specific priority research agenda for this field of research is emphasized. We will identify five specific challenges in this respect.

We thus encourage social scientists and humanities researchers to become further involved in one of the most challenging issues for humans, individually and collectively, in our present time. This call for involvement is both a 'call to arms' to the mainstream social sciences and humanities and a call for intensive cooperation with natural scientists in this endeavor, starting with a joint framing of the key research questions. A series of recent works in social sciences and humanities (e.g. Hackmann and St. Clair, 2012) have usefully identified many of the global environmental issues to which these fields can meaningfully contribute, given the current state of affairs in these fields, the tool kits and visions that might be drawn upon, highlighting at the same time potential avenues for reorganizing academic communities, funding, and institutions. The larger conceptual task remains to reframe *Anthropos* for the modern context. This will mean reorganizing our own house in a radical sense, expanding our tools and visions beyond 'business-as-usual' – a task that has just begun in several fields of scholarship. Our attempt in this vein is, thus, by definition, exploratory and programmatic.

1. Human dimensions and the human sciences: a call to arms

Together with such 'natural' phenomena as solar forcing, volcanic activity, and natural selection, human activity must now be considered a 'driver' of global environmental change. Some authors have therefore suggested that this emerging epoch in planetary history should be called the 'Anthropocene' (Crutzen and Stoermer, 2000; Steffen et al., 2011), a successor to the last interglacial epoch, the 'Holocene.' Most of the writings related to the Anthropocene suggest that it started in the late eighteenth century, when the rapidly growing combustion of fossil fuels began to change the global atmosphere's global composition (Tickell, 2011). Since then, the impact of human activity has begun to equal that of geological forces in both speed and intensity. It has created a completely novel situation that poses fundamentally new research questions and requires new ways of thinking and acting.

While the insight that humans have become one of the dominant factors in shaping the globe is not new, the Anthropocene concept is one of the latest and most influential concepts attempting to capture this insight. Previous concepts range from Stoppani's '*anthropozoic era*' (1873), Vernadsky, Le Roy, and Teilhard de Chardin's '*noosphere*' (1922), Catton's '*Homo colossus*' (1980), Revkin's '*anthrocene*' (1992), and Samways's '*homogenocene*' (1999), to the more recent 'Great

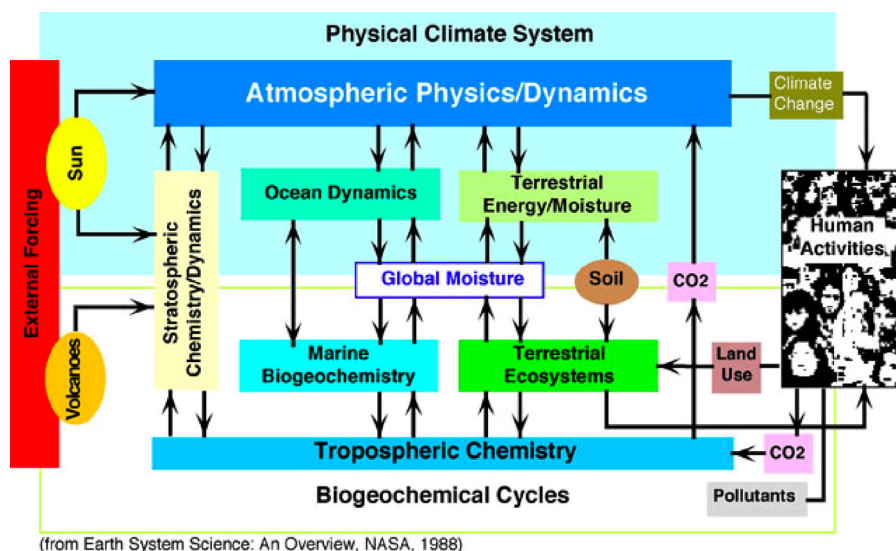


Fig. 1 – The Bretherton diagram (simplified version).

Acceleration' (Schimel et al., 2007). The growing acceptance of the Anthropocene idea is the recognition of a gradual but accelerating switch from a nature-dominated to a human-dominated global environmental system (Costanza et al., 2007). In a rapidly evolving environmental context, the human condition is more unique than ever before – the environment is the result of human 'enviroming' activities that form the environment (Sörlin and Warde, 2009). The Anthropocene 'strata' form part of our surrounding environment because we, for example, live in and drive on anthropogenic 'rock' constructions that we call houses and roads.

Despite the recognition of human activity's growing influence on environmental change, major social science and humanities funding agencies have generally been absent in funding global change research. Nevertheless, virtually all social sciences and humanities disciplines have at some point taken an interest in human–environment interactions. The canon of these disciplines contains many intellectual resources that could be helpful with 'thinking the Anthropocene.' Generally, however, organized disciplinary and interdisciplinary initiatives focused on the systematic interrogation of environmental issues only started to emerge from the 1970s onward. Anthropology responded to the challenge early, which led to a series of competing approaches to studying humans and the environment. These approaches include cultural ecology (1950s), ecological anthropology (1960s), and historical ecology (1990s) (Crumley, 2007). In the remaining human sciences, ecological economics and environmental sociology emerged in the 1970s and ecolinguistics in the 1990s.

In general, the humanities show a similar trajectory, with environmental history, environmental philosophy (particularly ethics and aesthetics), and literary ecocriticism all emerging in the 1970s. More recently, the more inclusive term 'environmental humanities' has been gaining ground. Recent manifestations of this term include programmes at several universities across the world; a new journal based in Sydney; a programme for the humanities and social sciences at the Institute for Advanced Study at Princeton; the Environmental Humanities

Laboratory at the Royal Institute of Technology in Stockholm; and the Environmental Humanities Project at Stanford University.¹ This rapidly growing interest in environmental issues reflects the full range of human disciplines' increasing awareness that something essential needs to be done (Chakrabarty, 2009; Sörlin, this issue).

Yet, despite this rich and diverse set of approaches to the relationship between humans and the environment, contributions to global change research by the social sciences and the humanities have been relatively marginal. So far there are no 'planetary humanities.' This state of affairs is graphically illustrated by the unspecified box for 'human activities' included in the 1988 natural science diagram of the 'earth's system' – the so-called 'Bretherton diagram' (see Fig. 1) which reduced the scope of the human sciences to an unspecified box of 'human activities' within a natural-science diagram of the earth system. The 2001 Open Science Conference – *Challenges of a Changing Earth: Global Change* – which adopted a declaration² recognizing the increasing role of humans in changing the earth system, was a welcome change. It called for a new system of global environmental research that would draw strongly on a wider disciplinary research base and integrate issues beyond the various disciplines as well as across academic and practitioner approaches to the environment and development. The humanities and social sciences should, indeed, make essential contributions to issues such as understanding the drivers of and barriers in societal organizations and human behavior, as well as the role of cultures in resilience capability.

Another sign of positive change was Fig. 2 diagram in the *International Human Dimensions Programme on Global Environmental Change* (2010). This diagram implies that the social sciences (in a broad sense) are as important as the natural sciences and are assumed to take greater responsibility for dealing with responses to global environmental change. This is in marked contrast to the marginal or over-simplified,

¹ <http://ehp.stanford.edu/>.

² www.essp.org/index.php?id=41.

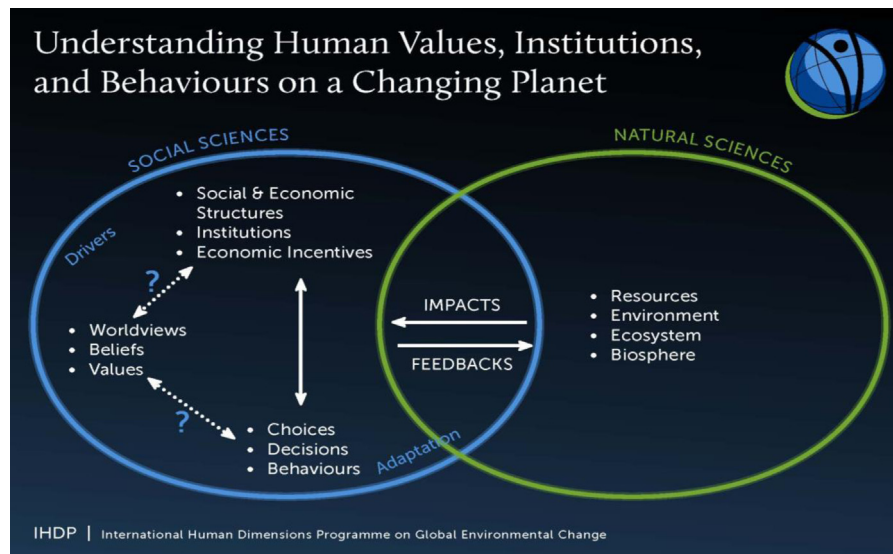


Fig. 2 – Beyond the Bretherton diagram.

mechanistic role of human activities in the Bretherton diagram.

Nevertheless, Fig. 2 only represents partial progress. It still seems to assume an autonomous, reified social world, with inputs and outputs, whose causal mechanisms can be understood from outside, much as the natural sciences might represent natural systems. This figure might encourage the framing of the social sciences as a subordinate research partner by separating the social and natural worlds, and confining the relevance of social sciences to the former: there is no place for ‘environment’ among the social sciences. This fails to recognize that the environmental is already part of what the social sciences and humanities encompass as a relevant part of their knowledge.

Fig. 2 also fails to recognize the important role that the humanities and social sciences can play in understanding the character and status of the natural scientific knowledge of nature. Global environmental research, the (implicit) assumptions and approaches embedded in it, as well as the formulation of problems and solutions, should be more important social and humanities research topics. Such research must go beyond the sterile polarization characteristic of the 1990s’ ‘science wars’: social sciences and the humanities’ disciplines can surely take up the ‘meta-responsibility’ of analyzing and reflecting on the nature of global environmental change research in general. This requires that it be framed in a way that moves it beyond a confinement to the domain of the ‘natural’ in academic and public discussions and also fully integrates the humanities and social sciences.

CHALLENGE 1: The environment must be understood as a social category and efforts must be made to integrate the humanities and social sciences more fully into our understanding of the environmental. Simultaneously, it is important to further encourage the ongoing ‘environmental turn’ in the humanities and social sciences. These ambitions should be supported with concerted efforts to articulate plans and programmes for long-term research that will give them substance.

2. Limits and boundaries: human as much as natural

The discourse on the human species’ increasing power over nature has been in creative tension with a discourse on natural limits and boundaries. The global public discourse on resource constraints and scarcity is more than 200 years old; however, it has become more pronounced and empirically grounded. The *Limits to Growth* report of the Club of Rome (Meadows et al., 1972) stated that resources were finite and that increased per capita use and growing demographic numbers were far stronger drivers than the technological innovation that might increase resource efficiency. Limits were considered dangerous and compelling because reaching them would ignite a competition for resources, leading to starvation and potentially civilizational collapse.

The current discourse on limits has been fundamentally changed and brought more into line with the Anthropocene’s emphasis on the coupling of human society and earth systems. One of its recent manifestations is the ‘planetary boundaries’ article by Rockström et al. (2009), which investigates effects of human actions on various planetary systems, in order to identify ‘a safe operating space for humanity’. The absoluteness of resource limits has been relativized in recognition of improving economies and lower rates of starvation and malnutrition. The ‘new’ planetary boundaries are the problems caused by human action: the effects on the oceans, the atmosphere, species, and soil. Humanity is still overstressing the planet, not primarily by reaching the limits of resource availability, but rather by approaching or even transgressing the limits of anthropogenic disturbance absorption and ecological resilience – what the planet can absorb.

Approaches such as these serve to clarify the broader terms of reference of human–earth interactions (Richardson et al., 2011). However, people, citizens, and societies should get a much more prominent place in the scientific description of the state of the planet and the world. In increasing detail, we get to

know ever more of the transgression of the limits of natural ‘systems,’ although the environmental effects on humans do not seem to belong in these equations. This omission is probably because scientific language lacks the nuances to appropriately explain these effects. Some of the most promising research in the humanities and social sciences specifically addresses how environmental degradation and the deliberate translocation of dirty industries to poor nations, or poor regions of rich nations, affect the citizens of these regions. This is more than evenly distributed side effects from environmental stress; it is a political geography of equity and justice, implying lives and life qualities that invite comparisons between countries such as the United States and India and, in more general terms, comparisons between those with full stomachs and the empty-bellied. Perfectly possible acts that are legal, and sometimes even virtuous, under the current economic system, because of their contribution to job-creation and economic growth, have flip sides that, if they were registered as instantaneous acts, would be criminal. Instead, they impose on the global South a ‘slow violence’ of lower life expectancies, declining health and increased inequalities that rarely register in the media (Nixon, 2011).

‘Humanist’ and social science research needs to be drawn upon in order to complement natural science approaches to planetary limits and boundaries (e.g., Clark et al., 2001; Pardo et al., 2003). Although the rise of ‘ecosystem thinking’ and ‘resilience thinking’ (e.g., Nowotny et al., 2001; Walker and Salt, 2006; Fazey, 2010) represented an important advance for the natural sciences, this is sometimes seen as too restrictive for social sciences and the humanities. Social sciences and humanities generally view systemic boundaries as suitable constructs for a mechanistic world created by humans for analytical purposes and projected onto reality, rather than as an intrinsic property of the observed world. While this may also be true for much systems thinking in the natural sciences, systemic descriptions used tentatively for heuristic purposes can often ‘take on a life of their own’ and act as barriers to new thinking and alternative approaches.

It is important to historicize and contextualize claims about limits and boundaries. Their rationale includes Earth system functioning, but they are also human-centered. The boundaries are based on reasonable global average figures over the last ten millennia, with the argument that this was the period that saw humanity flourish. However, this masks both quantitative and qualitative differences in the human impacts on the planetary systems and differences in the consequences of these for human society, let alone for other species. There is a need to pay more attention to the social distribution of the planetary impacts, which are not always easily quantifiable. The imbalance in fresh-water availability, for instance, can hardly be resolved by global redistribution, which poses particular governance problems. ‘A safe operating space for humanity’ might be a useful tool on the global scale, but is a fiction on smaller scales.

The notions of ‘ecological debt’ and ‘climate debt’ have been used to try to capture how the global North’s excessive historic use of the atmosphere’s absorptive capacity has closed off similar development routes for the global South (e.g., Martínez-Alier, 2002). The very language and metrics used in climate policies and negotiations can mask such issues

(Roberts and Parks, 2007). In this context, social scientists and humanities scholars should not just provide knowledge about the drivers, barriers, incentives, and rewards that might enable ‘successful’ negotiations and behavior change, but should also work with movements from the global South. Together they can develop frameworks for thinking about ways of ensuring that humanity lives within natural limits that do not implicitly reproduce notions of human-nature relations that we already know are harmful to nature or humans, or perpetuate structural and historical global inequalities.

CHALLENGE 2: The notions of planetary limits and boundaries need to be sensitive to human experience and the nature constructed by humans, embedded in a scientific framework that includes issues of distribution, geography and equity as well as environmental effects on humans.

3. Anthropocene society

The notion of the Anthropocene, highlighting as it does the exceptional role of humans in the refashioning of life on earth, could be seen as an anthropocentric construct. After all, there are good grounds for speaking of *distributive* agency, which emphasizes that the Anthropocene is not the result of *Homo sapiens* acting in isolation, but is only made possible through a diverse network of technological, cultural, organic, and geological entities (Connolly, 2011). Nevertheless, the assumption that the history of the earth has now entered a new epoch is a highly useful one with important implications. The earlier history of humans (e.g., since the appearance of *Homo sapiens* approximately 200,000 years ago) is defined by the type and level of knowledge and technology and includes a certain type of relationship between humans and their environmental resources and services. Just as previous historical epochs had, for instance, Stone Age societies, we now live in Anthropocene societies, although no-one has yet tried to articulate the full implications of this (however, see Dalby, 2007).

The sciences have long offered compelling evidence and concepts that speak to the new realities of global environmental change. Together with the ‘Anthropocene,’ we now understand the human dominance of the planet with concepts such as ‘the great acceleration,’ ‘thresholds,’ and ‘tipping points.’ These concepts help frame the contemporary mind. At the same time, it is remarkable how little these concepts tell us about the process, the driving forces, and the social consequences of the changes they imply. There is an increasing need for concepts and narratives from the humanities and social sciences that can address this short-coming. There is also a growing literature that deals with the issue and tries to articulate what the new human condition in the Anthropocene might be in ethical, historical, and philosophical terms (Zalasiewicz et al., 2011).

Perhaps the most pressing task involves addressing the short-term and medium-term question of how to navigate the transition to a fully Anthropocene society during a period in which the prevailing social values and institutions are still those of an earlier epoch. In the current time, the emerging awareness of the anthropogenic environmental change coexists with a disconnect between insight and action. This is a

huge and interesting challenge to the humanites and social sciences. Isn't in fact a concept such as 'Anthropocene sustainability' a *contradictio in adjecto*? How could we regard human-led planetary transformation as a sustainable project? Hernes (2012) has recently argued that our time is one of a growing sense of despair about a political system that constantly tries to prove itself through its capacity to deliver growth, but seems largely incapable of dealing with obvious and undeniable environmental threats. The future is simultaneously becoming increasingly hollow, filled with worry, concern, and even fear as we become aware of national and global politics' lack of capabilities. Political initiatives around sustainability often amount to little more than simulacral politics, providing the illusion of a transition to sustainability while sanctioning the continued profligate use of natural resources (Blühdorn and Welsh, 2008).

However, simplistic ideas of the 'greening' of the modern world are likely to be misleading. On its own, a shift in global consciousness would not turn material practices around among the soon-to-be ten billion inhabitants of the earth and re-establish more sustainable relationships of humanity with the planet. Some of the influential sustainability paradigms assume smooth adaptation, primarily through improved technologies, but rarely discuss global power relations, the functional aspects of the economic systems, or the fundamental issues of value formation. This is a grave underestimation of the problem. Our suggestion is that, instead of one-sidedly stressing smoothness and continuity, we should draw on the growing work in all fields of science that suggests the fundamentally disruptive and discontinuous character of our current phase of societal and planetary development.

It is likely that the culture and social institutions of future societies in the Anthropocene epoch will take novel – and probably highly diverse – forms. The mental and civic infrastructures of societies – principles of morality, duty, and responsibility; criteria of success; ideas about where society is going – have changed dramatically over time and also differ widely across present cultures. There is no reason why this should not be the case in the future as well. Anthropocene societies, especially if they are to become sustainable societies, may differ greatly from not only Stone Age or Medieval societies, but also from current capitalist societies. The social sciences and humanities need to analyze emerging societies in order to determine the extent to which and the way in which they appear *anthropocenic* in their values, culture, institutions, and cosmologies, in ways that distinguish them from past societies. For example, one important dimension of Anthropocene societies is likely to be their relationship with technology. Scholars such as Beck, Lash, and Giddens have argued that most of the current environmental risks are directly or indirectly man-made; furthermore, the societal structures developed for managing and reducing human-induced risks have become the source of further environmental and social risks (e.g., Beck et al., 1994). Anthropocene societies could thus be characterized as involving humans being basically in conflict with themselves through the structures and systems that they have themselves created in order to improve their lifestyles and well-being.

But surely the most striking feature of the Anthropocene is that it is the first geological epoch in which a defining geological force is actively conscious of its geological role. The Anthropocene therefore really commences when humans become aware of their global role in shaping the earth and, consequently, when this awareness shapes their relationship with the natural environment. This is thus not just a new geological epoch; it also potentially changes the very nature of the geological by clearly marking it as a domain that includes intentionality and meaning. Conversely, it also marks a transformative moment in the history of humanity as an agent, comparable perhaps to the development of technology and agriculture. Accounts of the Anthropocene are dominated by the natural sciences' struggle to accommodate such insights. This struggle recalls Foucault's (1970) account of the inability of seventeenth century science's 'classical' epistemology to represent the act of representation itself, so that humans only appeared as objects rather than subjects. The task of understanding Anthropocene societies will involve the development of ways of theorizing about such complex changes in the nature of the earth system.

CHALLENGE 3: It is now time for us to articulate the culture of emerging Anthropocene societies by drawing upon natural scientists, humanities scholars, and social scientists, emphasizing the new fusion of the natural and the ideational. In regard to the transition to fully Anthropocene societies, adapted to the new human condition, how can the contemporary syndromes of anxiety, drift, and self-delusion be transformed into a more positive task of building a culture of sustainability?

4. The new human condition: moving beyond dualisms

One of the pressing tasks on the environmental agenda is to identify the novelty of the current condition for humanity as a species. One source of insight is Hannah Arendt's *The Human Condition* (1958), a treatise of political philosophy on the various forms of human activity that relate humans to one another and to the material world. Arendt suggested that humans' being-in-the-world had been disrupted in the modern age, resulting in alienation from the common, artifactual human world and from nature. She used this analysis to think about the changing character of politics, science, freedom, and thinking itself (Szczepanski, 2003). A key challenge for social sciences and the humanities is thus to explore the extent to which the human condition, as analyzed by Arendt, has changed in the Anthropocene era and the nature of this change. This presents a real challenge to the humanities and social sciences: does our conception of the human have to change?

Several scholars have seized upon the moment of climate crisis to articulate how the sense of time and the direction of history are changing. The very nature of the historical enterprise may also be altering as the age-old humanist distinction between natural history and human history becomes less and less tenable (Chakrabarty, 2009). More broadly, humanities and social science scholars have drawn attention to the importance of developing an approach that

synthesizes environmental and social theories (e.g., Cronon, 1996; Descola and Palsson, 1996; Biersack and Greenberg, 2006). Nature has often been presented as one half of a pair – nature/culture, natural/social, and so on. This is still echoed in some earth-system notions that are fundamentally dualistic, ‘linking,’ ‘connecting,’ and ‘coupling’ the two systems of the earth and humans as if they were different realities. But recently, environmental discourse has increasingly emphasized the need to move beyond the stark dualism of the natural and the social (e.g., Palsson, 2006; Ingold, 2011).

Some of the main contemporary driving forces against dualism relate to empirical findings. For instance, it is now patently clear that the ‘natural’ climate of the globe has a lot to do with ‘artificial’ tangible and intangible human services and goods. Some Arctic volcanic eruptions might even be attributed to human activities; a recent study on Iceland’s Vatnajökull ice cap suggests that melting glaciers can increase volcanic activity over timeframes that are relevant to humans (Pagli and Sigmundsson, 2008). Similarly, social scientists and humanities scholars increasingly address issues such as health threats, food availability, local pollution, weather extremes, climate change, and related mitigation or adaptation technologies and strategies, including those linked to bio-engineering and geo-engineering (e.g., Crate and Nuttall, 2007; Szerszynski and Urry, 2010).

The recent transdisciplinary effort to address questions related to the environment has undoubtedly been partly informed by the growing problems of late modernity. These problems include those posed by rapidly expanding human populations, ever more efficient technologies of extraction and exploitation of natural resources, and the near collapse of entire ecosystems and animal populations. Consequently, political theory has been busily zooming out, emphasizing the interconnected world of Gaia and detrimental anthropogenic signatures globally. In the process, our world of concern has been vastly expanded. Human activities are altering not just the climate of the globe and the conditions in outer space, but also the structures of bodies and genomes.

Indeed, there are good grounds for conflating the notion of ‘environment,’ the key term in the current discussion, and the notion of the individual organism. Organisms are partly regulated by a host of environmental forces that leaves their mark on their genomes. The results of a number of recent studies suggest that early environments – particularly nutritional environments (the kind and quantity of food) – condition the possibility for gene expression in humans and other animals. These environments thus potentially affect our health and well-being. Such ‘epigenetic’ regulation seems to be prevalent in the human genome. In other words, the lives of our parents and ancestors, as well as their communities’ traditions and conditions in all their complexities – from dietary factors and exposure to toxic substances to behavioral habits – are embodied and memorized in our genomes. They turn on some genes and silence others, leaving a lasting embodied impact – in a somewhat neo-Lamarckian fashion. Although food has always been seen as an important part of the environment within which humans dwell (Ingram et al., 2010), Landecker emphasizes that ‘our moment is a historically specific one in which food is being understood, studied, depicted, engineered and ingested as a set of molecules, which

exist in a cloud around us, and over which we often have limited individual control’ (2011: p. 190). Human intervention seems to be practically everywhere and the products of nature – of ‘nature’s handiwork’ in the classic sense – seem to be largely the same as the products of humans. This is the Anthropocene on a nano-scale.

CHALLENGE 4: The new ‘human condition’ characterized by rapidly growing human impact in both the environment and life itself represents unprecedented conceptual and political challenges. Thus, traditions of Western thought are repeatedly confronted with their internal limits and intellectual tipping points. This is illustrated by the dualism of nature and society central to many disciplines. How can their flexibility be enhanced and adapted to the Anthropocene? Could we benefit from applying the same theoretical frameworks to both the nano-world of bodies, cells, and genes and the giga-world of the globe?

5. Managing in the Anthropocene: core challenges for the social sciences and humanities

The complex and somewhat chaotic implications of anthropogenic environmental change undermine our capacity to respond along the lines of the modernist ‘management’ of the past, emphasizing human mastery and control. Unfortunately, the social and political change that is needed for sustainability is poorly understood. Thanks partly to developments in several academic fields, including ecological economics, the academic and political debates on environmental and societal governance have increasingly emphasized the limits of the neoliberal market for adequately and sustainably dealing with the major environmental threats we face. Consequently, a concerted social science and humanities effort is essential to analyze the complexities of the real world and the different institutions and social arrangements involved, and to explore alternatives and potential avenues for mobilization. The works of Ostrom (e.g., 2005) have carved out an important transdisciplinary research domain in this respect.

The capacity of states to govern authoritatively on their own has been significantly reduced, particularly in the environmental context. The patterns of communication that connect states, scientific institutions, and publics have also been altered dramatically in the recent past. The nation or state has become intensely connected and informationalized, creating new ways of ordering society, but also new vulnerabilities and dependencies. The emergence of networked communication technologies has created new ways of doing science and has granted minority voices and ‘citizen experts’ a new salience in research and decision-making. In this changing context, solutions for today’s pressing problems cannot always be found within political institutions or dominating scientific disciplines. Instead, we see the rise of transnational, polycentric networks of governance, new citizen-actors, and strikingly hybrid scientific enterprises such as normal research (e.g., Funtowicz and Ravetz, 1993), action research (e.g., Stringer, 1999), and mode-2 research (Nowotny et al., 2001).

At the same time, the authority of science has been changed. Politicians have long relied on science as a steering device and legitimizing resource for policy decisions (Ezrahi,

1990). However, the ‘staging’ of science is now done in new ways and tensions inherent to science must be mediated in and across new settings. New forms of openness and exposure (such as ‘Climategate’ and WikiLeaks) are emerging, as are new forms of participation and engagement (e.g., citizen science, user-led innovation, participatory sensing, and crowdsourcing). While ‘Climategate,’ which started in 2009, is a limited affair in the broad scheme of things, it is nevertheless an important example, because it illustrates the potential problems of mistrust between science and the larger community (Skrydstrup, this issue), as well as the influence of the media and their political shackles. Given that science is in many ways the product and instrument of humans’ wish or will to help control and exploit nature, it is desirable to have a system of multiple sources of knowledge and legitimacy (e.g., Orlove et al., 2008). An overly powerful science may not be a solution but part of the problem in our ‘post-modern’ societies (Greenberg, 2001). Thanks to a potentially powerful tool such as the Internet, we have now entered an era of, at least potential, ‘knowledge democracy.’

Not only have the agents and the measure for environmental change been redefined, the goals themselves and indexes have changed. Our growing awareness of the planet’s vulnerability has to compete with the desire for and the omnipresent discourse on economic growth (as represented by the GDP index). More than three dozen new, multidimensional indexes and indicators have been proposed in the last decades (e.g., the Human Development Index, Happy Planet Index, Global Innovation Index, and the Genuine Progress Indicator). These indexes are more salient, credible, and legitimate than GDP because they relate to the social and environmental pillars of sustainable development (Brundtland et al., 2012). To date, none of these has received widespread attention. We should – among others – be considering the future two generations ahead and be realizing that it is perfectly possible, and absolutely necessary, for the basic measuring tools of sustainable societies to improve. We must stop using evaluation and reward systems that are, in practice, counter-incentives for sustainability. Recently, however, the call for more inclusive wealth indicators, including built, financial, social, human and natural capital, is gaining momentum; see, for example, the Declaration of the 2012 Planet under Pressure Conference.³

Currently, there is increasing awareness that the concepts and tools of economics do not simply measure economies but *perform* them, constituting and shaping them profoundly (Callon, 1998). This means that social scientists and humanities scholars need to turn their attention back to themselves. One step would be to massively research the roots of the social measurements of success, the roles and functions of reward systems, to investigate and critique their methodologies and tacit and explicit assumptions, and to analyze their implementation politics. Just as we think of stem cell medicine and genetics research as the foundation of a New Medicine, and we regard nanotechnology as the dawn of a New Technology, our work should be guided by the possibility of social sciences and humanities research as the

intellectual input for a New Political Economics that can discard the most dysfunctional elements of the present. This is particularly important in our time and day as we have been living in a period that has emphatically neglected the need for fundamental change. In fact, since the demise of Soviet-style communism, it has been touted as a metaphysical truth that the current system of western capitalism should be spread wholesale and that this ‘globalization of the inevitable’ is also the ‘end of history’ (Fukuyama, 1992). Less than a generation later, this way of thinking has proven unfounded. The history of sustainability has barely begun, and our mission is to organize social thought and social reflection that are on par with the magnitude of the issues.

Whilst doing this, we should also take responsibility for and question the desirability of possible future societies as well as question the directionality of the change we will inevitably get. In a set of important papers, Stirling has observed (e.g. 2009) how little effort the contemporary race for ‘innovation’ has expended to question the direction of this innovation and the economic growth it purports to stimulate. It is as if growth itself is now the common good we seek; by contrast, growth was initially considered simply as a means to achieve what was valuable and could one day even be enough; it would at that point cease and leave us in a benign stationary state (Mill, 1848, book IV, ch. VI, esp. p. 753). The mismatch between the rhetoric of innovation and the need to articulate the properties of future sustainable Anthropocene societies in which we strive to live is glaring.

CHALLENGE 5: To remedy the lack of understanding of the Anthropocene, it is essential to enhance and intensify the social sciences and humanities’ work on how directionality could be articulated, democratically anchored, and implemented in the search for new technologies, medical knowledge, economic paradigms, and forms of social organization. The understanding and facilitating of our world’s transition toward sustainability is, to borrow a conventional phrase, a ‘core challenge’ to which social sciences and the humanities should make a marked contribution.

6. Conclusion

Our discussion has broadly identified the terrain of new research priorities in social sciences and the humanities pertaining to global environmental change in the Anthropocene. We suggest that it is essential to fundamentally rethink the environment-humanity relationship. To characterize the Anthropocene by means of quantitative data is one thing; to describe and understand how it perceives human interaction, culture, institutions, and societies – indeed, the meaning of being human – is truly another and a major challenge for the scholarly, literary, artistic, practitioner, and policy communities. We suggest that a massive effort is needed to further develop and implement a grand research scheme broadly along the lines discussed above: What now matters more than anything is our capacity to respond rapidly and efficiently to linked societal and environmental challenges.

Given that the causes and impacts of environmental change are increasingly related to human activity, it is vitally important to study human behavior, social arrangements, and human–environmental interactions on a much grander scale

³ http://www.planetunderpressure2012.net/pdf/state_of_planet_declaration.pdf.

than ever before. Unfortunately, in most institutional and cultural contexts, research budgets still tend to reflect the old idea of relegating humans and their impact to the margin of the grand scheme of things. Much depends on the ability of the social science and humanities to demonstrate bold, creative thinking in the environmental domain, so as to provide intellectual and social rationale for the investment that is required.

In the preceding discussion, we identified five specific challenges relating to the Anthropocene, the humanities, and social sciences:

- (1) Efforts must be made to integrate the humanities and social sciences more fully into transdisciplinary environmental change research programmes and to further encourage the ongoing ‘environmental turn’ in the humanities and social sciences.
- (2) Planetary limits and boundaries ideas need to incorporate human experience and must be sensitive to context and to the nature constructed by humans, embedded in a framework that includes issues of equity and environmental effects on humans.
- (3) It is time now to articulate the culture of emerging Anthropocene societies, drawing upon natural scientists, humanities scholars, and social scientists to emphasize the new fusion of the natural and the ideational, transforming the contemporary syndromes of anxiety, drift, and self-delusion into a more positive task of building a culture of sustainability.
- (4) We must explore how Western thought traditions, hitherto heavily dependent on the dualism of nature and society, can confront their internal limits and intellectual tipping points. Their flexibility needs to be enhanced and adapted to the human condition of the Anthropocene.
- (5) To remedy the lack of understanding of how to steer society in the Anthropocene, it is essential to further develop social sciences and the humanities work on how directionality could be articulated, democratically anchored, and implemented in the search for new technologies, medical knowledge, and ideas of economic and social organization.

If our species and our societies are to continue to thrive, it is of utmost importance that we identify the ideas and practices that nurture both our species, our societies, and the planet. Our best laboratory for this is the past, where long-term, medium-term, and short-term variables can be identified and their roles evaluated. Arguably, however, we simply *must* experiment more, e.g., as the climate becomes more chaotic (Clark, 2010). Thus integrating our understanding of human history with that of the earth system is a timely and urgent task. The outlining of some of the earth-system components central to the metabolisms and maintenance of human bodies and the security of communities is very important. However, our constructs, understanding, and actions are necessarily situated in biological and social relations and, furthermore, embedded in culture.

Because culture is fundamental to human life, it cannot be separated from its biophysical environment. We are only part of a complex network of elements and relations that make up planet earth, but we are the only part that can be held responsible. Not only has this enormous ecosystem within

which we live been influenced by events and conditions far away but, as we have seen, it literally reaches into the depths of our bodies. Recently, feminist theory has addressed what we have identified, following Arendt’s lead, as the ‘new human condition’ of the Anthropocene, outlining what it means for the sociality and responsibility of humans. Gibson-Graham (2011) suggest in this vein that what is needed is both a new ethics of care, relating to the global world as one does to a family, and a new form of regional development. Can we extend our solidarity, they ask, to the more-than-human, to other life forms and life in general? ‘If we can,’ they conclude, ‘that would certainly usher in a new mode of humanity and a new form of belonging’ (2011: 17).

The ‘earth system’ may be an effective key metaphor for the interconnectedness of our bodies within the biosphere, but for such a metaphorical association to make sense the system will have to allow a central role for humans – for the *Anthropos* – in what the Greeks called the ‘household’ (*Oikos*) of life. As Connolly indicates in the quote we began with, the modern academe is ‘disoriented’ when confronting the continuing surprises of this household; it is indeed ‘time to modify old extrapolations of possibility and desirability’ (2011: p. 150). Overall, the ‘naïve’ belief in human ‘mastery’ of the forces of nature must be tempered by responsibility and humility, by respect for other agents, cultural differences, and other disciplines. This is the crux of Anthropocene society, the new human condition.

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