

Accounting and accountability in the Anthropocene

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Abstract

Purpose – The purpose of this paper is to interrogate the nature and relevance of debates around the existence of, and ramifications arising from, the Anthropocene for accounting scholarship.

Design/methodology/approach – The paper's aim is achieved through an in-depth analysis of the Anthropocene, paying attention to cross-disciplinary contributions, interpretations and contestations. Possible points of connection between the Anthropocene and accounting scholarship are then proposed and illuminated through a case study drawn from the seafood sector.

Findings – This paper develops findings in two areas. First, possible pathways for further development of how accounting scholarship might evolve by the provocation that thinking about the Anthropocene is outlined. Second, and through engagement with the case study, the authors highlight that the concept of stewardship may re-emerge in discussions about accountability in the Anthropocene.

Research limitations/implications – The paper argues that accounting scholarship focused on social, environmental and sustainability concerns may be further developed by engagement with Anthropocene debates.

Practical implications – While accounting practice might have to change to deal with Anthropocene induced effects, this paper focuses on implications for accounting scholarship.

Social implications – Human well-being is likely to be impacted if environmental impacts accelerate. In addition, an Anthropocene framing alters the understanding of nature–human interactions and how this affects accounting thought.



Originality/value – This is the first paper in accounting to seek to establish connections between accounting, accountability and the Anthropocene.

Keywords Stewardship, Accountability, Accounting, Anthropocene, Sustainability science

Paper type Conceptual paper

1. Introduction

Accounting scholarship often finds “new associations between accounting phenomena and aspects of the wider social and economic environment” (Robson *et al.*, 2017, p. 35) in a way that enlivens both accounting and the context in which accounting operates. This paper builds upon this dynamic by focusing on the relationship between accounting and the natural environment (see Gray, 1992, 2010; Maunders and Burritt, 1991; Milne, 1996; Hopwood, 1976, 2009) but extends analysis beyond that currently represented in the literature. Specifically, the aim of this paper is to interrogate the nature and relevance of debates around the existence of, and ramifications arising from, the Anthropocene for accounting scholarship.

In brief, the idea that we are living in the Anthropocene has gained salience across many disciplines since Paul Crutzen coined the phrase in 1999. As human impacts on the natural environment have intensified and have generated system-wide effects (e.g. biodiversity loss and global climate change), it has been suggested that earth has transitioned from Holocene (meaning “wholly recent”) to a new geological epoch: the Anthropocene (meaning “humanly recent” – see Corlett, 2015; Lewis and Maslin, 2015; Malhi, 2017; Ruddiman, 2013; Steffen *et al.*, 2011; Waters *et al.*, 2016), where human action is a driver of global environmental change (Rockström *et al.*, 2009, p. 472). Regardless of whether this proposition is sustained in a strict geological sense (see Section 2), the idea of the Anthropocene is motivating and informing debates in many disciplines, including those linked to researching organizations (Ergene *et al.*, 2018; Heikkurinen *et al.*, 2016; Hoffman and Jennings, 2015; Jennings and Hoffman, forthcoming; Whiteman *et al.*, 2013; Wright *et al.*, 2018). Building off this literature, the paper proceeds in three parts.

First, an in-depth examination of the Anthropocene is presented, drawing from its origins in geology, specifically stratigraphy. Like all concepts, the Anthropocene gives rise to ideological implications with respect to: the concept itself, candidate starting dates for the Anthropocene and various descriptors attached to the concept. The proliferation of uses and disciplinary readings of the Anthropocene has led to several versions of the Anthropocene being developed. Taking the multiple readings seriously, the paper will identify distinctions made between these readings and controversies engendered by them as a precursor to considering how the Anthropocene could be understood within, as well as shape, accounting scholarship.

Second, we introduce issues that may emerge as accounting scholars engage with the Anthropocene: split between practice based and conceptual implications. In a practice sense, we suggest that accounting will be called to function in a setting where global scale environmental effects engender and are affected by social and economic changes in complex, rapid and chaotic ways. These dynamics already exist in some settings and are likely to intensify: the nature and impact of such intensification is a defining characteristic of the Anthropocene. The conditions where human and economic life will play out will have implications for accounting as it seeks to function as a technology of control and a means of narrating what responsibilities emerge for organizations in the Anthropocene. These elements build directly on existing accounting scholarship. In addition, this paper considers if there is anything particular about accounting in the Anthropocene. To open out this question, we introduce a key conceptual tool from Anthropocene-related scholarship: that of telecoupling (Liu *et al.*, 2015). Telecoupling seeks to identify how a change in one part of a socio-economic-ecological system creates effects elsewhere. The potential for accounting to provide information about these inter-connecting effects is substantial but presently, we argue, underappreciated both within and beyond the accounting discipline. At the same time, we also recognize that our propositions only scratch

the surface of possibilities and that collectively accounting scholars are likely to create Anthropocene inspired propositions, drawing from longstanding critical and inter-disciplinary accounting literature that address the nature and functioning of accounting (Chua 1986; Meyer, 1986; Gallhofer and Haslam, 1997, 2003; Miller and Power, 2013; Tinker, 1991).

Third, and following a sustainability science approach (see Kates *et al.*, 2001; Lang *et al.*, 2012; Wittmayer and Schöpke, 2014 and in accounting Bebbington and Larrinaga, 2014; Moggi *et al.*, 2018), the paper uses a case study focused on one sphere of Anthropocene level disruption: that of biodiversity change in the ocean engendered by seafood production (drawing from Österblom *et al.*, 2015, 2016; Österblom, Jouffray, Folke and Rockström, 2017). It is here that the inter-disciplinary authorship of the paper becomes apparent and we narrate why this case study has been selected to help problematize (Thomson and Bebbington, 2005) accounting-Anthropocene intersections. Österblom *et al.* (2015) identify what they term “keystone actors” in the seafood sector, namely corporations who between them control significant percentages of catches and turnover in industry sub-sectors and of fish species (the keystone actor nomenclature follows the idea of a keystone species from ecology – see Paine, 1966, 1969). The organizations identified are ecologically and economically significant agents in the Anthropocene. A subset of these keystone actors are part of a practice-based research engagement with the aim of transforming their collective impact (Österblom, Jouffray, Folke and Rockström, 2017). The co-authors of this paper (in combination with a larger group of researchers) work together on this co-designed learning initiative. The case study is used to develop three propositions for how accounting scholarship might contribute to explorations of the Anthropocene in this particular setting. While these particular propositions may have broader salience, they do not constitute a definitive view of how accounting and Anthropocene scholarship might develop: this is an exploratory paper, drawing insights from an ongoing case study.

One final scene setting element is necessary. Given the inter-disciplinary nature of the co-author team, we draw on both natural and social science literature and hence have a large and wide array of literature to try to “stitch” together in a single paper. To reflect adequately the literature that informs this work, the paper has a large number of references, with the references related to each sub-element of the paper not fully representing the depth of literature available to draw from for that sub-element. To deal with this problem, we have included those references that should enable an interested reader to access the original source material that informs a paper, to the extent that we judged that this literature is new to *Accounting, Auditing and Accountability Journal's* readership. With this in mind, we include all references related to the topic of the Anthropocene that we used to inform the paper. The marine governance literature (while highly relevant to the case setting) is not central to accounting scholars' interests and hence we included the bare minimum of references related to the ocean/seafood dynamics. Finally, accounting literature references are focused on the core of the arguments: assuming that those reading this journal will be familiar with the themes developed in that literature and will be more interested in how we develop our thoughts on the intersections between accounting and the Anthropocene. In this way, we hope that this paper will trigger conversations in our readers' heads (see Patriotta (2017) for a provocation on the role of a reader) as they think of prior literature that is central to their interests in conjunction with Anthropocene themes: Otter (2018) call this “thinking with” the Anthropocene. With this route map outlined, we start at the conceptual beginning of this journey: an exploration of the Anthropocene.

2. A short history of the Anthropocene[1]

The idea of the Anthropocene emerges from longstanding concerns about the state of the physical environment that crystallized in sustainable development being used as a way to articulate concerns about the social-economic-environmental characteristics of human impacts (Bebbington and Larrinaga, 2014). Sustainability practice, policy and scholarship have been concerned with articulating how societies can be organized and motivated to

ensure socially just and ecological sound development (Gray, 1992, 2010; Bebbington, 2001; Milne, 1996; Bebbington and Larrinaga, 2014; Unerman and Chapman, 2014; Bebbington *et al.*, 2017). In contrast, the Anthropocene relates to the nature and functioning of the earth system and the role of human actions in driving those dynamics. The Anthropocene, therefore, is not a new word for sustainable development. Rather, it replaces the Holocene as a way to characterise the context in which sustainability might be pursued.

The idea of the Anthropocene was popularized by earth system scientists and those looking to understand how global systems of production and consumption might be governed as a matter of an “empirical reality and political necessity” (Biermann, 2014, p. 9). The Anthropocene framing, therefore, takes sustainable development debates into a new phase because the concept implies that the “environmental crisis is epochal in this particular, specialized sense” (Davies, 2016, p. 2) and is “so far-reaching that it cannot be [...] understood without setting it in the context of geological time” (Davies, 2016, pp. 4-5). To understand the significance of this geological setting, it is necessary to appreciate how a scientific understanding of “deep time” has evolved.

Rudwick (2014) documents how modern western understandings of the age and nature of the earth emerged. The first conceptual leap in this journey was made when an understanding of fossils developed that indicated that the history of the earth was longer than the history of humanity (the earth is currently dated as being 4.5bn years old – an estimate that was only possible with the advent of x-ray technology). Geologists (since approximately 1800) sought to describe the various ages of the earth by mapping and describing the various “strata” found on and below the surface of the planet, thereby developing the science of stratigraphy. Strata layers suggest that the earth had changed over its history: the way in which such changes arose became the subject of controversy, with two schools of thought emerging. The first (gradualism) believed that change was an incremental, slow moving phenomenon, while the other (catastrophism) believed that change was sudden and abrupt. Accepted opinion oscillated between these positions and a consensus has formed around a revised form of the latter school (neo-catastrophism), that posits that tipping points exist in the planetary system with rapid change being possible, driven by biological, chemical and geological assemblages (for an overview, see Clark and Yusoff, 2017). Changes in these systems have historically been associated with large-scale changes in the biosphere (hence the particular salience of global climate change and concerns about tipping points in the climate system) and their knock-on effects.

While it is uncontroversial to assert that human actions are affecting the environment (e.g. through biodiversity loss; modification of the nitrogen cycle and increasing greenhouse gas concentrations – Rockström *et al.*, 2009), the requirements of describing these various impacts as constituting a distinctive geological epoch are more stringent. The “rules” for identifying a geological epoch require the presence of two elements. First, there needs to be a “golden spike”, which is a “single physical manifestation of a change recorded in a stratigraphic section, often reflecting a global-change phenomenon” (Lewis and Maslin, 2015, p. 172) with such a section being measured within ice cores, sediments or in the fossil record. Second, the particular impact identified needs to be accompanied by an array of other associated impacts (“auxiliary stratotypes, indicating widespread changes to the Earth system occurring at that time”, Lewis and Maslin, 2015, p. 172). What this means, is that although (for example) the impact of copper smelting by the Romans is detectable in ice cores it would not qualify as a precursor to a geological epoch because it did not reflect a global phenomenon (being localized to Europe), nor was it associated with an array of other changes arising at the same time (Lewis and Maslin, 2015). In contrast, it is argued that current environmental change creates both a golden spike and auxiliary changes consistent with a new geological epoch (the International Commission on Stratigraphy has yet to decide if the Anthropocene will be a geological epoch – as of July 2019).

Several candidate dates for a golden spike marking the start of the Anthropocene have been proposed, of which two are discussed here to provide an indication of the debates that dating raises (Lewis and Maslin (2015, p. 175) outline a wider range and see also Ruddiman (2013) who suggests a starting date of some 7,700–5,550 years ago linked to the advent of farming: an example of the “early Anthropocene” thesis). One proposed date – the “Orbis” spike – relates to a dip in atmospheric CO₂ found in an ice core (at its lowest in 1610), believed to be associated with the colonization of the Americas. During this time (known as the “Colombian Exchange”), the “new world” indigenous population decreased by approximately 50m due to disease and conflict. The abandonment of farming land and subsequent uptake of carbon in vegetation, and hence its loss to the atmosphere, led to the golden spike. After this date (and constituting the auxiliary stratotypes), it is argued that “humans on the two hemispheres were connected, trade became global [...] [leading to] the beginning of the modern ‘world-system’” (Lewis and Maslin, 2015, p. 175).

A more recent candidate starting date – the “bomb” spike of 1964 – is associated with the peak in radioactive markers arising from nuclear testing (after the first detonation in 1945, nuclear markers increased until the Partial Test Ban Treaty of 1963). This date is also associated with what is called the “great acceleration” (dated at around the 1950s, where population levels, resource use and pollution effects all increased exponentially: Steffen *et al.*, 2011). The bomb spike presently appears to be the most likely candidate for the start of the Anthropocene (Waters *et al.*, 2016) but it is also possible to argue that the impacts cascading from the Orbis spike created the possibilities for the birth of the industrial revolution which itself eventually led to human impacts of the “great acceleration” and the bomb spike.

While choosing the marker and start date of the Anthropocene appears to be a technical exercise for stratigraphers, these determinations “matter” because alternative dates have important ideological ramifications. For example, the Orbis spike “implies that colonialism, global trade and coal brought about the Anthropocene [...] [highlighting] unequal power relationships between different groups of people, economic growth, the impacts of globalized trade and our current reliance on fossil fuels” (Lewis and Maslin, 2015, p. 177). Earlier dates (e.g. the “early Anthropocene”) might “in political terms, ‘normalize’ global environmental change” (Lewis and Maslin, 2015, p. 171). Further, if dates around the Industrial Revolution were to be used as a starting point, it may “be used to assign historical responsibility for carbon dioxide emissions to particular countries or regions” (Lewis and Maslin, 2015, p. 171) or to particular economic actors or social classes (see Heede, 2014).

In parallel, Baskin (2015) asks what particular humans we have in mind when we think of the Anthropocene and suggests that while a small percentage of the global population drove the “great acceleration” to call our current time, the Anthropocene is to imply that all humans are equally implicated because “humanly recent” does not identify which humans are responsible for the observed impacts. Likewise, a focus on undifferentiated human agents obscures the role that particular powerful actors and institutions played in creating the Anthropocene. These distinctions have emerged as a point of tension between disciplines, with natural scientists sometimes being accused of decentering these issues. Such debates, however, also challenge the norms of social sciences and humanities. For example, Chakrabarty (2009, p. 220) not only acknowledges the “obvious value in our postcolonial suspicion of the universal” but also argues that whether “we blame climate change on those who are retrospectively guilty [...] or those who are prospectively guilty [...] the fact that human beings have in the process become a geological agent points to a shared catastrophe that we have all fallen into” (Chakrabarty, 2009, p. 218). Debates about ideological and distributional aspects of the Anthropocene are unlikely to abate and suggest continued engagement with questions of the role(s) of research in understanding, informing and co-producing knowledge about our human existence (Castree, 2014b; Hamilton *et al.*, 2015).

Alternative phrases for describing the “Anthropocene” have also been suggested. For example, Baskin (2015) suggests “Capitalocene”, “Econocene” or “Ereomzoic” (the age of loneliness or emptiness), in which “the implicit diagnosis is different, and a different set of normative solutions or prescriptions suggest themselves” (Baskin, 2015, p. 15). Other nomenclature (Revkin, 2016) includes the Plasticene (after polluting plastics); Pyrocene (after human mastery of fire); Misanthropocene (reflecting human self-loathing); Manthropocene (reflecting a gendered reading); Chthulucene (chthon means “earth” in Greek and is linked to things that dwell in or under the earth, see Haraway, 2015); Technoscene (after the role of technology); Anglocene (Bonnieuil and Fressoz, 2015, after British colonization) and Noosphere (Malhi, 2017, after the role of human thought in creating technological change that has driven global change). These alternative namings eloquently point to the contestation inherent in the idea of the Anthropocene.

While the application of a particular form of scientific investigation (stratigraphy) to define the Anthropocene “encode[s] deep interpretive commitments” (Davies, 2016, p. 47), different framings of the Anthropocene also emerge across disciplines. For example, Davies (2016, p. 48) argued that for the humanities and social sciences, the “most obvious questions to ask are less about the origins of human environmental impact and more about the implications of the Anthropocene for social organization”. Indeed, Davies (2016, p. 41) noted that the Anthropocene has “picked up a variety of incompatible meanings, each implying different concepts and commitments. The word’s complexity means that there is little to be gained by talking about ‘the Anthropocene’ without specifying which version you mean”. With this in mind, Brondizio *et al.* (2016, p. 321) draw from Bonneuil and Fressoz (2015) to suggest a typology of narratives associated with the Anthropocene, each of which suggests different arenas for debate (see Table I – these motifs will be revisited later in this paper). These contrasts lead Brondizio *et al.* (2016, p. 319) to suggest that the Anthropocene can be seen to refer to “a new geological epoch, a widely-used metaphor for global change, a novel analytical framework, a meme about the relationship of society to nature, and the framing for new and contested cultural narratives”. Similarly, Lorimer (2017) identifies five ways in which the Anthropocene has been mobilised in academic, artistic and popular media: scientific question, intellectual zeitgeist, ideological provocation, new ontologies and science fiction (see also Malhi, 2017). Indeed, Lorimer (2017) views the Anthropocene as a “boundary object” (Star, 2010) that enables new discussions and connections across epistemic communities (as will become apparent in Section 4, this has been the case in the development of this paper).

Narrative	Description
Naturalist	Focuses on “what, how and when [...] humans have altered the Earth system” and seeks to provide “scientific and technological knowledge [...] regarding adaptation to and mitigation of the impacts of global change”
Post-nature	The Anthropocene reflects a post-modern perspective where “the dichotomy between nature and culture is dissolved”. The separation of nature and culture is a characteristic of modern knowledge systems of the Global North and (in de la Cadena’s discussion of the “anthropo-not-seen”) is particularly informative to understanding more-than-human entanglement of people, things and places (de la Cadena, 2015; Lorimer, 2017)
Eco-catastrophist	Focuses on the “vulnerabilities of society and the danger of unknown social and environmental tipping-points”
Eco-Marxist	Focuses on the particular role of capitalism in “promoting growth and inequality and technological advances, while at the same time causing environmental disasters” (see also Malm, 2016)

Source: All quotes from Brondizio *et al.* (2016, p. 321)

Table I.
Typology of
Anthropocene
narratives

In addition, the Anthropocene – and associated “planetary boundaries” concept – has prompted work in the fields of geography, environmental humanities and the arts (see e.g. Bonneuil and Fressoz, 2015; Castree, 2014a, b, c, d; Hamilton *et al.*, 2015; Lorimer, 2017; Otter, 2018). These writers stress that a single conception of the Anthropocene is not going to emerge and that ongoing debates around the implications and framing of the concept reflect lively intellectual engagement. Moreover, the openness of what the Anthropocene might mean (and may entail for discipline focused study) is its strength. As Otter (2018, p. 570, emphasis in original) notes:

[...] literatures are often at their most provocative, dynamic, and exciting when concepts are pliable and molten. The urgency and stakes of these debates makes them essential reading for all scholars, irrespective of discipline. The Anthropocene is clearly important to think *with*. Moreover, beneath the conceptual jousting, there are real and profoundly alarming phenomena here – climate change and biodiversity loss, for example – about which there is no serious disagreement at all.

Scholars have also raised questions as to how existing social science framings are challenged by the Anthropocene (see Clark and Yusoff, 2017, and the special issue of *Theory, Culture & Society* on geosocial formulations and the Anthropocene). For example, Chakrabarty (2009, p. 199) observes that he “realized that all my readings in theories of globalization, Marxist analysis of capital, subaltern studies, and postcolonial criticism [...] while enormously useful in studying globalization, has not really prepared me for making sense of this planetary conjuncture within which humanity finds itself”. In a similar vein, McGonigle and Starke (2006, p. 326) argue that “despite its often progressive ambitions [...] social theory [possesses] a deep inattention to just how much the ongoing appropriation of the ‘natural’ world underpins our social wealth”. For example, the political ideal of “freedom” “stands on an ever-expanding base of fossil fuel use” (Chakrabarty, 2009, p. 208) and “[c]limate, [...] cannot now be regarded as the passive backdrop of history, if indeed” it ever was (Otter, 2018, p. 572). These quotes illustrate how the Anthropocene has the power to disrupt existing social science preoccupations and to challenge how we conceive of what might be the objects of study. For example, Otter (2018) suggests that we expand our focus from class, race, gender and culture to include (for example) coal as a defining analytical category. In the case study that follows, the “fishing power” of a number of companies is the analytical category that is used to define the focus of work – captured by the idea of a “keystone actor”.

In summary, a discourse with its roots in stratigraphy has introduced the idea that the magnitude of human impacts on the environment warrants the naming of a new geological epoch (noting that making such an assessment in real time to a precision of a few decades is scientifically suspect). Such a proposition is “undoubtedly a core aspect of contemporary thinking about the environment” (Malhi, 2017, p. 78) and “radically unsettles the philosophic, epistemological and ontological ground on which both the natural sciences and social sciences/humanities have traditional stood” (Baskin, 2015, p. 10). The “working out” of how this unsettling might emerge and what will be unsettled (we suggest) has only just begun and is likely to be a collective task. Within this paper, and drawing on the various readings identified in Table I, the Anthropocene as a novel analytical framework that creates an opportunity to reflect on the discipline of accounting will be our focus.

3. Accounting in the Anthropocene

This paper has argued that the concept of the Anthropocene can be understood in multiple ways with different implications arising from ways of conceptualizing the issues at stake. What these conceptions have in common, however, is that environmental change will drive changes in social and economic systems (as well as being driven by them). This has led (Olsson *et al.*, 2017) to argue, the “Anthropocene concept presents an important opportunity to recalibrate [...] scholarship that examines [...] social change-making theories and

practices". It is our contention that accounting is one domain in which this can be pursued. It is also our contention that accounting has yet to develop a stream of work that is motivated directly by the Anthropocene. For example, no mention of the Anthropocene was found in a search of titles, abstracts and keywords in *Accounting, Auditing and Accountability Journal*; *Accounting Forum*; *Accounting, Organizations and Society* and *Critical Perspectives on Accounting* (journals where one might expect to see the Anthropocene picked up on). This is not to say, however, that there is no literature focused on the concerns that emerge in the Anthropocene or that analytical categories that are relevant to the Anthropocene have not been previously considered in accounting. Indeed, this has been a longstanding premise of interpretive and critical accounting scholarship (Chua, 1986).

Baskin's (2015) "Capitalocene" and Brondizio *et al.*'s (2016) "Eco-Marxist" perspectives on the Anthropocene are cognate with the concerns contained within critical accounting scholarship addressing the contradictions inherent in capitalism and the extent to which it undermines social justice and ecological integrity (see e.g. Maunders and Burritt, 1991; Lehman, 1999; Gallhofer and Haslam, in press). Feminist and eco-feminist readings of environmental accounting (see e.g. Hines, 1991; Cooper, 1992) as well as deep ecology concerns (Birkin, 1996) are cognate with Manthropocene and Chthulucene readings. Broadly speaking, environmental accounting publications related to global climate change, water cycles and biodiversity change (there are too many papers in these areas to sensibly reference here) could also be seen as being related to Anthropocene themes.

What Olsson *et al.*'s (2017) provocation suggests, however, is that the Anthropocene is a qualitatively different "sort" of globalization to that previously experienced. This suggests that accounting scholarship might transform beyond its current form and focus when "thinking with" the Anthropocene (Otter, 2018). We do not believe that a single journal article is capable of doing anything other than develop the proposition that an Anthropocene inspired accounting is possible. This paper does not and could not present a definitive view. We hope, however, that our work will provide impetus to ongoing discussion in the literature as well as in other formats (such as roundtables) that more easily facilitate dialogue. Moreover, in our search for accounting literature that most strongly "spoke" to Anthropocene themes we found that the seminal critical and environmental/sustainability accounting papers were the most relevant because these papers sought to lay out the groundwork for subsequent "normal science" work elaborating the themes identified (but see also Bebbington and Larrinaga, 2014).

With these observations in mind, the rest of this section draws inspiration from Brondizio *et al.*'s (2016) characterization of the Anthropocene as a novel analytical framework and three elements of accounting and accountability intersections are presented. In brief, these are, that: accounting practice remains largely the same, but the context in which accounting tools and technique attempt to exert control and support accountability changes; new forms of account emerge to reflect a changed view of organizational responsibilities in the Anthropocene; and new conceptual tools (outside of organizational and accounting literatures) will become relevant for accounting. This follows what Table I identifies as a "naturalist" inquiry: that is, one that focuses on how and when accounting knowledge might be developed to identify and provide visibility about organizations who are critical in the Anthropocene. Each of these areas will be considered briefly in turn.

In the first instance, the Anthropocene implies that humanity now inhabits a "tightly intertwined social-environmental planetary system" (Donges *et al.*, 2017; see also Österblom, Crona, Folke, Nyström and Troell, 2017) with system-wide effects emerging from collective human activity. Some of these effects arise from more homogeneous and simplified ecosystems where the feedback loops designed to keep a system in balance are weakened (Crona *et al.*, 2016) while in other settings negative feedback loops are reinforced (Nyström *et al.*, 2012). In addition, the Anthropocene creates new forms of connectivity leading, for example, to regional collapses driving larger scale impacts (see Berkes *et al.*, 2006; Eriksson *et al.*, 2015).

Finally, biomes (communities of plants and animals that share a common environment) that had previously been seen as functionally distinct are becoming inter-connected (Deutsch *et al.*, 2007; Naylor *et al.*, 2000). These new connections produce non-linear effects (often framed as tipping points and reflecting a neo-catastrophist viewpoint) with changes in production systems having knock on impacts on human well-being and economic systems.

These observations imply the operating conditions under which accountants will be asked to provide information to enable organizational control will be more complex and also more tightly linked to global environmental change, although the source of these impacts might be obscured (Bebbington and Larrinaga, 2014; Bebbington and Thomson, 2013; Scholtens, 2017). For example, full cost accounting (as a way of connecting organizational impacts that are not fully identified by current economic systems – see Unerman *et al.*, 2018) might become a more salient tool as externalities could be seen as an early indication of future system shifts of the type noted above (e.g. negative feedback loops and non-linear effects). Previously, full cost accounting and other forms of sustainability assessment have been characterized as more of a tool to engage in accountability linked discussions (Bebbington *et al.*, 2007; Frame and Cavanagh, 2009). An Anthropocene reading, therefore, creates a potentially new functionality for an existing accounting technique. Likewise, accounting information might contribute to the task of taking “deliberate, integral and adaptive steps to reduce dangerous impacts on the Earth System, effectively monitoring and changing behaviour to form feedback loops that stabilize this intermediate state” (Steffen *et al.*, 2018, p. 8256). Data that support planning processes, risk assessment and decision making would fall into this category and would draw in management accounting scholarship and practice (see Bebbington and Thomson, 2013).

Second, as the Anthropocene places a stronger focus on interactions with an adaptive earth system, we need ways to articulate interactions and the responsibilities that arise from these interactions. This will involve an extension to an accounting that currently focuses on impacts on economics systems: for example, Bjørn *et al.* (2017) note that as yet few companies recognize environmental limits in their reporting. Accounting scholarship that focuses on the “bio” of “bio-geo-chemical” assemblages of the earth system also provide an indication of how this work might proceed (see Feger and Mermet, 2017; Russell *et al.*, 2017). In practice terms, the relatively new process of natural capital accounting and reporting may gain salience as organizational dependencies on the natural world become more evident (e.g. <https://naturalcapitalcoalition.org/> and www.naturalcapitalproject.org). In a similar vein, the advent of experiments with context-based sustainability reporting prefigures a possible evolution in reporting (for the practice community in this area see www.sustainableorganizations.org/context-based-sustainability-cbs/ and see Byrd *et al.*, 2013; McElroy and Thomas, 2015). Moreover, sector level accounts of impact (and sector level responses to vulnerability) may be necessary to better articulate collective organizational impacts and strategies to address them, entailing an extension of current reporting practices that focus on individual entities and possibly new forms of social organization for collective actions (see also section 4, proposition 2). These potential changes have also been recognized (at least in embryonic form) by scholarship that focuses on planetary boundaries: often framed as “grand challenges” in the management/accounting literature (see Antonini and Larrinaga, 2017; Bebbington and Thomson, 2013; Ferraro *et al.*, 2015; George *et al.*, 2016; Heikkurinen *et al.*, 2016; Hoffman and Jennings, 2015; Whiteman *et al.*, 2013). In addition, work that focuses on organizations that are charged with the maintenance of landscape/catchment scale ecosystems (in the form of urban systems, national parks, water companies and environmental protection agencies) might provide insights into how responsibility and accountability co-evolve under Anthropocene conditions (for work that prefigures such a focus see e.g. Dam and Scholtens, 2012; Larrinaga and Pérez, 2008; Thomson *et al.*, 2014).

Third, it is likely that key concepts that draw from Anthropocene inspired work might find connections within the accounting discipline. One concept that may be relevant is that of “telecoupling”: a term used to denote both socioeconomic and environmental interactions

among coupled human and natural systems that emerge over distances (Liu *et al.*, 2015). In particular, Davies (2016) observes that the questions posed by the Anthropocene are “characteristically full of devious chains of cause and effect; of intricate braids that link economies to ocean currents and ecosystems to plate tectonics [...] far-distant perturbations that prove to be coupled by hidden bonds” (Davies, 2016, pp. 8-9). This is the essence of telecoupling, that aspects that were previously seen as distinct come to be recognized as interlocking systems and effects. This concept is especially pertinent in the context of this paper because the case study arises from a conceptual attempt to workout telecouplings between companies and the ocean.

Re-framing organizations using a telecoupling lens might also lead us to see organizations as being places (possibly “obligatory passage points” – following Callon, 1984) where impacts on wider systems may be observed and influenced (see Galaz *et al.* (2018) for a particularly pertinent example). Likewise, organizations themselves are coupled through financial markets. For example, stock exchanges (as markets for ownership rights) are known to influence organizational actions (e.g. limiting the extent to which the long term is considered) associated with impacts upon ecological systems globally (Dimson *et al.*, 2015; Heinkel *et al.*, 2001; Scholtens, 2006). Moreover, banks provide funding that results in environmental transformation (including through project finance) and have sought to develop the means of taking wider impacts into account (see e.g. Scholtens and Dam, 2007, on the equator principles and in seafood, Jouffray *et al.*, 2019). It is an open question as to the potential conceptual links between telecoupling and accounting framings such as actor network theory (Mouritsen and Justesen, 2011) or assemblages (Neu *et al.*, 2009) but it is likely that there are possibilities for theoretical co-development of ideas in these areas. While it is beyond the scope of this paper (and the space available here), social theorists are also engaged in understanding what the Anthropocene might mean for society (Latour, 2017) and for accounting as a social science.

In summary, it is argued that the idea of the Anthropocene unsettles philosophical, epistemological and ontological grounds on which disciplines rest (Baskin, 2015; Chakrabarty, 2009). This is a grand claim that warrants unpicking as it implies that a new sense of what drives our existence and what “matters” in academic inquiry will emerge. In accounting, it may mean that rather than organizations being conceived of as primarily economic entities, their ecologically embeddedness in telecoupled systems becomes a defining feature. Likewise, a focus on the environmental impacts of individual organizations may give way to an interest in collective impacts of ecologically significant industries (the notion of what is an entity to account for changes in this move). Moreover, the potential for rapid environmental change (linked to neo-catastrophism formulations of the Anthropocene) is inherent in this framing, suggesting also that “step wise” change in impacts and a stronger focus on how dependent companies are on ecological functioning may well be sought. These themes are imbued in the case study that is used to further elaborate accounting and accountability in the Anthropocene.

4. The case of seafood production

As Malhi (2017, p. 99) notes, “the concept of the Anthropocene can be judged in its utility [...] [in providing] a new [...] framing for thinking about the unique challenges facing a burgeoning humanity on a finite planet [...] [with such a framing] organizing thought and facilitating new forms of identity and conduct”. With this in mind, this section seeks to illuminate through a case study what Anthropocene infused accounting scholarship may entail. Foundational to such a case study is the recognition, that seafood production is an area where human activities in a finite ocean are creating planetary scale effects. Further, the case is motivated by a naturalist approach (see Table I) whereby researchers aim to empirically “get to grips” with the Anthropocene, generate relevant knowledge on global change through inter-disciplinary research, and engage with non-researchers to develop

possible approaches to ocean stewardship (see also Bebbington and Larrinaga, 2014). As of 2019, we are six years into a planned 12-year programme of work with this case study.

The narration of the case study starts in 2013, long before accounting researchers were involved and emerged from two years of data gathering and a sustained deliberative process tracing the intensification and spread of human activity due to globalization and enabled by the transnational corporation. The natural science researchers utilized the planetary boundaries framework (Rockström *et al.*, 2009) to develop an opening hypothesis that transnational corporations have global environmental impacts (in this respect they are Baskin's (2013) powerful actors and institutions of the Anthropocene). Through an analysis of the largest 160 seafood companies (as measured by turnover), Österblom *et al.* (2015) identified 13 companies who between them account for 11–16 per cent of the global marine catch (rising to 19–40 per cent of the largest and economically most important fish stocks that play an important role in ecosystems functioning). These companies are termed “keystone actors” and “a) dominate global production revenues and volumes, b) control globally relevant segments of production, c) connect ecosystems globally through subsidiaries, and d) influence global governance processes and institutions” (Österblom *et al.*, 2015, p. 5). Between them, these keystone actors are “catching, farming and handling more than 208 species from 974 subsidiaries and associates operating in 102 countries and territories” (Österblom *et al.*, 2015, p. 5). As a result, this is a cohort of companies who are intimately and reflexively connected to the Anthropocene and who are also economically significant.

These findings formed the foundation for an ongoing co-designed practice-based experiment (between the Stockholm Resilience Centre and a subset of the keystone actors) that seeks to address the ecological and social impacts arising from their combined actions (see proposition two and Österblom, Jouffray, Folke and Rockström, 2017). Aligned to this partnership, there is an ongoing programme of research to address emergent themes and questions arising in relation to seafood production, involving natural scientists alongside accounting and finance scholars (including those in the author team on this paper). How this partnership emerged is detailed below.

Since forming the inter-disciplinary research collaboration, a central intellectual framing of the work has been the examination of the “playing out” of Anthropocene effects drawing from the “home” disciplines of the co-authors and has shaped our collective and evolving researcher and discipline identities. This is exemplified in the characterization of significance of this cohort of companies. While the accounting/finance co-authors might be drawn to the economic characterization of these companies (which might tell us something about their ability to co-ordinate across the planet), the natural science-based author cohort notice the species that are being caught/farmed by the companies as well as the locations in which these activities are taking place. From an Anthropocene perspective, both of these aspects “matter” and hence this has been a valuable conceptual lens that has enabled a common approach to be developed. These two perspectives are not more or less right than each other, they are different ways to characterise the dynamics of the Anthropocene and, in combination, have proven powerful for research and practice (see also Patriotta (2017), who discusses the tension between novelty and convention within disciplines). Before moving to the detail of the accounting-Anthropocene-related propositions that have emerged from this case, however, some knowledge of both the ocean and the seafood sector is necessary in order to ground the accounting discussion in its ecological and social context.

While over 3bn people rely on seafood as a major source of protein (and micronutrients), the overall ecological condition of global fish stocks is poor and declining (Food and Agriculture Organization of the United Nations, 2016). Seafood production is undertaken by a multitude of individual actors around the world (Pauly and Zeller, 2016) and has been characterized by a history of overexploitation and substantial ecosystem degradation (Jackson *et al.*, 2001). This is the result of transnational mobility of both fish and fishing

fleets (Berkes *et al.*, 2006). At the same time, many fish stocks have ranges that overlap jurisdictional and national boundaries, creating mismatches and gaps in governance (Young, 2003). Moreover, industrial fishing operators have access to financial and technical capital that allows them to roam international waters in search of fish, taking advantage of the weak governance of the “high seas” (Cullis-Suzuki and Pauly, 2010; McCauley *et al.*, 2016) and to actively evade regulations when in place. This has created a classic “prisoner’s dilemma”, where no single actor will gain from behaving in a sustainable manner. Governments, in turn, have struggled to align their national regulations to combat illegal, unreported and unregulated fishing (Agnew *et al.*, 2009; Flothmann *et al.*, 2010) or to develop strong regulatory institutions at the international scale (Cullis-Suzuki and Pauly, 2010). Consequently, capture seafood production has been “locked” into a practice of overexploitation of valuable stocks in weak regulatory environments.

Presently, globalization and industry consolidation are reducing the number of economic actors and leading to an increased concentration of power among a small number of large transnational corporations. Vertical and horizontal integration across wild capture fisheries, feeds and aquaculture production is accelerating. While aquaculture is characterized as a growth sector that will satisfy the expanding demand for fish protein (it is the fastest growing food sector globally), it is still dependent on wild fish for feeds (Troell *et al.*, 2014). However, in response to declining fish catches, aquaculture production is also increasingly shifting towards crop-based feeds, such as soy, which further creates impacts in land-based settings (Fry *et al.*, 2016). Similarly, fish-based products are also found in feeds for hogs and poultry production (Naylor *et al.*, 2000), itself a further level of connectivity between sectors that might otherwise be thought to be distinct.

Governing companies in the seafood sector is complex since organizations are headquartered across the globe (and hence subject to varying state governance regimes) as well as having operational impacts in diverse environments (often subject to regional fisheries governance – see Pinsky *et al.*, 2018). As such, organizations in this industry are subject to (and manage) multiple sources of normativity arising from various bodies and interact with state, supra-state and non-state actors. It is within this context that this case has been used to generate three propositions for how accounting scholarship might respond to the demands of the Anthropocene.

In brief, the propositions developed are, that: novel research objects and samples are likely to emerge as accounting adopts an Anthropocene framing; inter- and trans-disciplinary engagements are likely to develop/be required so that organizational impacts can be identified and potentially transformed; and stewardship may re-emerge (and be reconceptualised) in discussions around organizational accountability in the Anthropocene. Drawing from the typology of Anthropocene narratives proposed in Table I, this is a “naturalist” inquiry: that is, it focuses on how and when humans have altered the ocean system through the actions of economic entities, namely seafood companies. In addition, there is a focus on transforming these impacts, in line with the naturalist approach’s focus on adaptation and mitigation. Each proposition is now further explored:

P1. Novel research objects and samples are likely to emerge as accounting adopts an Anthropocene framing.

There is a need to identify organizations (as well as cohorts of entities) that have Anthropocene scale effects: that is, their collective impacts materially affect earth system processes. Indeed, this approach generated the “keystone actors” identified by Österblom *et al.* (2015 – see Table II) where they “treat size and importance of keystone actors as [...] a central phenomenon of the Anthropocene”.

From an accounting perspective, this collection of companies is different from that which might usually be developed in accounting. For example, these firms are not united by

Company	Headquarters	Firm description
Maruha Nichiro	Tokyo, Japan	A globally operating seafood company active in most segments of seafood production
Nippon Suisan Kaisha (Nissui)	Tokyo, Japan	A globally operating seafood company active in most segments of seafood production
Thai Union Frozen Products	Samutarakorn, Thailand	The world's largest canned tuna producer and fifth largest shrimp farmer
Marine Harvest (currently Mowi)	Bergen, Norway	The world's largest salmon producer and the most actively traded stock in the seafood sector
Dongwon Group	Seoul, South Korea	A national (75% of Korean canned tuna market share) and world leading tuna producer (together with Thai Union)
Skretting (subsidiary of Nutreco)	Stavanger, Norway	A leading salmon feeds producer
Pescanova	Pontevedra, Spain	The world's largest shrimp producer and the largest fishing company in the European Union
Austevoll Seafood	Strebø, Norway	The world's largest fishmeal company and second largest salmon producer
Pacific Andes	Hong Kong, China	The world's second largest fishmeal producer
EWOS (currently Cargill Aqua Nutrition)	Oslo, Norway	A leading salmon feeds producer
Kyokuyo	Tokyo, Japan	Similar to Maruha Nichiro and Nissui, but with more limited operations
Charoen Pokphand Foods (CP Foods)	Bangkok, Thailand	The world's largest shrimp farmer and the largest shrimp feeds producer
Trident Seafood	Seattle, USA	The largest seafood company in North America

Table II.

Keystone actors in the seafood sector

Source: Österblom *et al.* (2015). With some revisions for mergers and acquisitions, a subset of these companies came together to form Seafood Business for Ocean Stewardship (see Box 1)

country of incorporation nor are they all listed on a common stock market (two common framings for selecting organizations of interest in the accounting/finance literature). Moreover, a number of the companies are not listed on stock exchanges at all but, rather, are privately owned or part of larger conglomerates. At the same time, there are points of continuity with prior accounting research, namely it focuses on larger organizations that operate in the same industry (similar to Adams and Kuasirikun, 2000; Bebbington *et al.*, 2012; Jose and Lee, 2007; O'Sullivan and O'Dwyer, 2015).

One outcome of gathering together such a diverse sample of organizations is that it provides the opportunity to further interrogate understandings of the nature of corporate agency. For example, country of incorporation has been observed to influence organizational actions and sometimes reporting of actions/outcomes. This arises because state governance (in some countries) requires certain levels of performance and reporting of the outcomes from actions. In addition, non-state disclosure requirements (from private actors such as stock exchanges and accounting standards setters) are viewed as being relevant to both actions and disclosures. The contrasts evident in the Österblom *et al.* (2015) sample, therefore, provide the opportunity to interrogate the relative influence of these prior analytical distinctions. Moreover, Österblom *et al.*'s (2016) analysis of the largest 100 seafood companies (of which the keystone actors are a subset) identifies that 46 of these firms are headquartered either in Japan, the USA or Norway. Existing literature suggests that these three countries would be expected to have distinctive approaches to corporate social responsibility (Hoepner *et al.*, 2016; Kang and Moon, 2012; Scholtens and Kang, 2013) and hence this larger sample may provide insights into how these three countries' governance and reporting requirements influence environmental performance in the seafood sector.

In summary, the first proposition developed in this paper is that an Anthropocene framing might lead to the development of research samples in accounting that are predicated on an ecological measure of significance. The ability to generate such samples relies on the ability to identify the ecological characteristics of samples (see also *P2* below) as well as to identify sectors that are generating Anthropocene scale impacts. Given the perceived stakes at play in the Anthropocene (especially from a neo-catastrophist perspective), identifying the economic entities that are driving environmental (and associated social and economic) change begs the question as to how to engage these organizations in programs of change. Indeed, a focus on the collective impact and agency of groups of companies that create global scale effects leads directly to our second proposition:

P2. Inter- and trans-disciplinary engagements are likely to develop/be required so that organizational impacts can be transformed.

This proposition has been developed from the inter- and trans-disciplinary nature of the case study, with inter-disciplinarity being necessary in order to understand the drivers of impact and trans-disciplinary work being necessary to change those impacts (see also Bebbington and Larrinaga, 2014; Lang *et al.*, 2012; Wittmayer and Schöpke, 2014). These aspects are separately discussed below – while noting that they are, of course, inter-connected.

Inter-disciplinarity

It has been intimated that the case study reported on here commenced in around 2013 and at that stage did not include the accounting and finance co-authors on this paper. By chance, and noting serendipity often drives research, Bebbington heard about the Österblom *et al.* (2015) work late in 2014 at an invite only sustainability science workshop and “watched the literature” (i.e. searched for the paper authors and title at regular intervals) for the published paper. The journal outlet (*PLOS One*) was not known before this time. Herein is the first observation in narrating how this inter-disciplinary partnership formed: chance plays a role in finding out about work that might spark interactions. At the same time, chance sometimes needs help: Bebbington spent some years working on getting an invite to the workshop as she suspected that there were interesting conversations going on there and had been previously inspired by sustainability science framings (the Stockholm Resilience Centre is a sustainability science focused entity). The development of a working relationship took about two further years to foster with Bebbington visiting Stockholm early in 2016 and again in 2017 to develop relationships. In addition, in the middle of 2016 a joint workshop was arranged (involving most of the co-authors on this paper) where a more focused conversation was fostered. This workshop involved us presenting to each other from our disciplinary perspectives to try to find points of intersections: this paper is a product of work that was started then. Finally, the accounting/finance co-authors already knew each other before this research engagement, through a mixture of previous co-authorship (Bebbington, Larrinaga and Russell) and working at the same institution (Bebbington, Russell and Scholtens): Österblom, Crona and Jouffray have a longstanding history of collaboration. Our experience accords with other reflections on inter-disciplinary work: that it takes time to create a team and that repeated intellectual and social engagement is necessary to the progress. Writing this paper, as a concrete task around which to focus discussions, has also been important in coming to understand each other.

Inter-disciplinary understandings have also been fostered by being engaged in gathering empirics together for the practice-based element of the work. To date, research methods have included: archival data (to identify fish catches); financial databases (for company characteristics and ownership profiles); interviews (with a spectrum of company members as well as other stakeholders); documentary analysis (e.g. of corporate reporting and codes

of conduct); participant observation (in problem solving workshops and dialogues); questionnaires focused on company activities and views; and big data analysis (e.g. to map where vessels are on the ocean). These research methods and the data produced are less “foreign” to us: in contrast with conceptual concerns and framings that we bring to the data. In this respect, it has taken more time to build mutually sophisticated understandings of economic and ecological systems with each of us expanding our reading into each other’s disciplines work. While accounting scholarship has considered aspects of inter-disciplinary (Bebbington *et al.*, 2017; Correa and Larrinaga, 2015), Russell has interviewed the members of the inter-disciplinary research team (including but not limited to these co-authors) and we hope a paper reflecting on individual and collective identities will emerge and will expand on what is contained here. Finally, a significant benefit of this inter-disciplinary approach is the ability to identify the specific entities that have the most significant ecological impacts (cf. Bebbington and Larrinaga, 2014; Bebbington and Thomson, 2013).

Trans-disciplinarity

Alongside presenting data on keystone actors, Österblom *et al.* (2015, pp. 7-8) argued that “studies of complex system dynamics illustrate how increasing connectivity can facilitate critical transitions, including both positive change or unwanted collapse”. In addition, Österblom *et al.* (2015, p. 11) suggested that active “leadership in sustainability initiatives by [...] keystone actors could result in dramatic cascading effects throughout the entire seafood industry”. The process of developing the data set for the 2015 paper created the base for developing a practice-based experiment to explore these propositions and to change impacts on the ground.

Österblom, Jouffray, Folke and Rockström, (2017), narrate the process of moving from a curiosity driven science to sustained engagement with the keystone actors (characterized a process of co-production where scientists are operating as theoretically and empirically informed “honest brokers” to facilitate transformative change). This has resulted in the creation of an initiative that is made up of the chief executive officers (CEOs) of a subset of the keystone actors supported by operational staff who have responsibilities related to areas that are being addressed. The initiative is called Seafood Business for Ocean Stewardship (SeaBOS) and has preceded though a series of “dialogues” between CEOs and their staff and researchers from the Stockholm Resilience Centre and other institutions. The dialogues have resulted in a set of commitments being developed in 2016 (see Box 1) – this initiative is a continuing process that can be tracked through the web address of the initiative (<http://keystonedialogues.earth/>). This science-business partnership is also still in an early phase of development, and the risks associated with the approach (including the risk of “green washing”) have been outlined by Österblom, Jouffray, Folke and Rockström (2017).

These are non-trivial commitments that address systemic problems in seafood production. While there is not sufficient space here hence to articulate the significance of all the commitments, an example will help sustain this point. High profile investigative journalist work (Mendoza *et al.*, 2016) as well as United Nations agency reports (ILO, 2017) point to forced labour being present in seafood fisheries supply chains (see also Kittinger *et al.*, 2017; Nakamura *et al.*, 2018), driven by the nature of global value chains (Bair, 2017). With global estimates of somewhere in the range of 800,000–1,000,000 workers affected (ILO, 2017), a commitment to eliminate “modern slavery” (using the initiative’s language) is an ambitious undertaking. The systemic nature of this problem means that actions will involve more than these corporations and will include tools that extend beyond accounting and reporting practices (in Davies (2016) terms, the Anthropocene has implications for social organization).

Box 1. Keystone dialogues commitments

Outline: this is an initiative between science and business, with an ambition to engage with governments and other stakeholders for positive change. It is not only about supplying sustainable seafood to consumers; it is about becoming stewards of the world's ocean and aquaculture environments.

We will act on the following:

Improve transparency and traceability in our own operations, and work together to share information and best practice, building on existing industry partnerships and collaborations

Engage in concerted efforts to help reduce IUU fishing and seek to ensure that IUU products and endangered species are not present in our supply chains

Engage in science-based efforts to improve fisheries and aquaculture management and productivity, through collaboration with industry, regulators and civil society

Engage in concerted efforts to eliminate any form of modern slavery including forced, bonded and child labour in our supply chains

Work towards reducing the use of antibiotics in aquaculture

Reduce the use of plastics in seafood operations and encourage global efforts to reduce plastic pollution

Reduce our own greenhouse gas emissions

Secure new growth in aquaculture, by deploying best practices in preventive health management, including improved regulatory regimes

Collaborate and invest in the development and deployment of emerging approaches and technologies for sustainable fisheries and aquaculture

Support novel initiatives and innovations for ocean stewardship.

Taking an accounting perspective, three observations emerge with respect to this work. First, accounting tools are necessary for achieving the outcomes articulated in “Keystone dialogues commitments” such as improving transparency (to the extent that reporting may do this), mapping supply chains, developing carbon reduction targets and identify supply chains associated with modern slavery and IUU fishing. As such, the generic skills that accounting scholars may bring to this setting will be of use to researchers for whom accounting has been hitherto an unknown or underappreciated academic discipline.

Second, the accounting literature often expressed frustration due to a perceived lack of action by corporate bodies in pursuing sustainable development (Gray, 2010). At the same time, there is relatively little engagement with corporations and cohorts of companies who are seeking to transform their impacts (but see Adams and McNicholas, 2007; Bebbington *et al.*, 2009). This initiative has been consciously designed as a learning experiment with the key agents of change being the cohort of CEOs in dialogue with the science partners. This work requires the cultivation of personal relationships (with the CEOs and operational staff involved in achieving the commitments) as well as the ability to facilitate conversations across cultures and languages given the mix of headquarters of those in the initiative (Cash *et al.*, 2003). Likewise, the process of building and sustaining trust, building on existing initiatives and generating new connections between actors remains an ongoing and evolving task (Clark *et al.*, 2016; Cvitanovic *et al.*, 2015; Cvitanovic *et al.*, 2016). The engagement is being systematically studied in order to illuminate how this process evolves with Österblom, Jouffray, Folke and Rockström (2017) providing the first set of reflections:

P3. Stewardship may re-emerge in discussions around organizational accountability in the Anthropocene.

In this case, the idea of “ocean stewardship” emerged from the engagement between companies and science partners as a way to articulate the normative ideal being sought: the commitments in “Keystone dialogues commitments” provide some sense of the dimensions for stewardship. This begs the question as to what, if anything, accounting scholarship

can bring to SeaBOS's focus on stewardship as well as (reflexively) posing questions for the absence of stewardship notions in accounting in more recent times. Central to social/environmental accounting is the normative ideal of organizational responsibility for impacts that arise from their activities with responsibility being determined by legal requirements, on the basis of voluntary undertakings and emerging from the social contract (Gray *et al.*, 1988). In addition, there is an underpinning belief that accounting and reporting may enable regimes of accountability to develop that support the discharge of organizational responsibility to relevant "others" (including share- and stake-holders, see Gray, 1992). Living in the Anthropocene complicates these notions.

First, in complex socio-ecological systems where impacts are telecoupled the ability to clearly identify responsibilities of an individual actor is unlikely to be straightforward due to the complexity of tracing responsibilities and also due to entanglement of potentially responsible entities. Second, and relatedly, impacts may arise from the collective impacts of organizations in a sector or in a particular location (keystone actors in the language used in this paper), further complicating accountability. Third, the Anthropocene implies a different type of scale and significance of impacts whereby collective impacts give rise to system-wide effects (and from that potentially cascading effects). All of these aspects call into question the adequacy of notions of individual accountability and responsibility (see also Roberts (2009, 2018) for discussions of accountability that address these ideas, albeit not in response to the Anthropocene). The idea of stewardship of the ocean emerges from these complications.

Stewardship has salience within literature that address the management of natural resources in environmental sciences (Bennett *et al.*, 2018; Chapin *et al.*, 2010) as well as in voluntary initiatives such as Marine Stewardship Council and Forestry Stewardship Council (regardless of the impact of these initiatives are, their use of stewardship is what is of relevance to our line of argument here). Stewardship also has salience for accounting (Gjesdal, 1981) and management (Davis *et al.*, 1997) scholars as a way of articulating organizational responsibilities, albeit that its use as a conceptual framing device has waned over time (Contrafatto, 2014; Contrafatto and Bebbington, 2013). The hallmark of stewardship thinking is that it extends an accountability focus and seeks to articulate the need to take care of and nurture resources for current and future generations and thereby inspire economic and organizational transformations towards sustainable development (Contrafatto, 2014). The SeaBOS initiative is also seeking change in these directions.

Stewardship has also been examined in other fields with Mathevet *et al.* (2018) identifying various stewardship perspectives that, while underpinned by anthropocentric or ecocentric ethics, differ when viewed through a political-economy lens. Mathevet *et al.* (2018) identified four archetypes of stewardship delineated by degrees of change (reformist or radical) and the extent to which changes are incremental or associated with efforts to produce a new societies and economies (prosaic or imaginative). In brief, their work enables us to understand how stewardship operates across different spaces and uses different forms of knowledge and expertise. Further, their work highlights issues associated with stewardship such as the place and authority of science in determining "appropriate" actions, how to take a plurality of values "seriously", and the potential for stewardship framing to change rules, values and governance arrangements.

This third proposition, therefore, suggests that the concept of stewardship might be revisited by accounting scholars as they engage with Anthropocene debates (drawing on previous accounting work as well as explorations in natural science). Any engagement with stewardship should also be sensitive to the criticisms some approaches to stewardship attract. For example, critiques suggest that stewardship may highlight ecological rather than socio-economic concerns (Ponte, 2012); focus on individual choices and behaviours rather than on the political economic origins of such approaches (Castree, 2015) and favour technocratic approaches that do not address the need for socio-political change (Robbins

(2004) – these objections will be familiar to critical and social/environmental/sustainability accountants). In the context of the Anthropocene, some stewardship approaches are also criticized because they fail to consider humanity's place and agency in the world (Stengers, 2015; Taylor, 2017). While re-examining the idea of stewardship may be valuable for accounting scholars, the concept is not without challenges. What stewardship does imply, however, is that in the Anthropocene there is a need to expand the aspects for which organizations may be held accountable and how such accountability may be determined and discharged. In addition, we hypothesize that stewardship is not merely a stronger form of accountability but reflects a fundamentally different set of relations (the full consideration of this possibility is beyond the scope of this paper).

Taken together, this section has used a case study to ground a discussion of how the discipline of accounting may engage in the Anthropocene. Using this empirical site of engagement, we have taken to heart Malhi's (2017, p. 99) observation that framing "matters in academic and political discussion by organizing thought and facilitating new forms of identity and conduct". The propositions developed focused on the aspects of methodological choices, research engagement and conceptual framing. We must stress that these are not exhaustive or prescriptive propositions but are ones that emerge from a specific research and practice-based inter-disciplinary collaboration being undertaken by the co-authors on this paper. These propositions have helped us develop connections between our "home" disciplines and the idea of the Anthropocene. Another starting point in terms of systems affected and researchers involved would undoubtedly result in different propositions for an accounting-based conversation on the implications of the Anthropocene. For example, a concern with identity, culture and power would lead to a different empirical setting and/or to a different set of reflections as would a focus on post capitalist forms of organizing.

5. Concluding comments

The Anthropocene is poised to do considerable "work" in the popular and the academic literature, both not only as a formal Epoch (should that be decided) but also as a concept that motivates reflection in disciplines beyond stratigraphy. As Olsson *et al.* (2017) observe, if our existing disciplines are "falling short of confronting the factors that have contributed to the Anthropocene [...] [they may also fall] short of confronting issues that may threaten the resilience of humans and numerous other species on Earth [...] [and if we ignore] the game-changer posed by understanding the concept of the Anthropocene [...] [scholarship] may quickly become irrelevant" (pp. 4-5). With this provocation in mind, this paper sought to characterise the Anthropocene (and contestation arising from Anthropocene debates) for the accounting literature. While suggesting some possible generic points of connection, the paper also outlined a case study to illustrate how accounting scholarship might contribute in an inter-disciplinary Anthropocene infused study in the seafood sector. These propositions are not definitive or exhaustive. Rather, they have drawn from the experience of the paper's co-author team as well as the practice-based experiment that we are collectively engaged in. Other scholars are likely to, and should, generate additional observations as to what an Anthropocene-accounting hybrid would be.

This paper was also motivated by a concern that the idea of the Anthropocene could become a "fashionable [...] [and shortly thereafter a] rather worn out and déclassé" (Davies, 2016, p. 6) idea that would be used to merely "garnish" academic discourse (once it is separated from the stratigraphic meaning of the term). This paper contends that this would be a lost intellectual opportunity because the Anthropocene represents a paradigm shift in our understanding of environmental change and requires accounting – as one social science – to work alongside earth system sciences understandings of the nature and functioning of world (Clark and Gunaratnam, 2016; Lövbrand *et al.*, 2015). In this respect, the work builds on earlier sustainability science and accounting reflections (especially

Bebbington and Larrinaga, 2014) to more fully and formally imagine an “ecological turn” in accounting scholarship (see Scholtens (2017) for a finance example). As we have argued, the Anthropocene prompts a more holistic approach to research investigations and, as such, de-centres disciplinary perspectives as well as familiar objects of enquiry such as organizational entities. This does not mean, however, that the interests and relevance of accounting are not important. Rather, accounting scholarship and conceptual underpinnings (including accountability and stewardship) remain central to accounting’s engagement in Anthropocene studies.

To close, and returning to the history of how “deep time” was “discovered”, Rudwick (2014, p. 306) observes that understanding the history of the earth as well as the functioning of the cosmos:

[...] reduced humanity in size: the Earth [...] became just one planet orbiting one star in an inconceivably immense space, while human existence on Earth became just the last moment in an inconceivably vast span of time. In neither dimension, however, did these dramatic changes affect the perennial questions surrounding the purpose of human existence and the task of constructing societies, based on both justice and compassion, in which human lives can be lived to the fullest.

Indeed, Brondizio *et al.* (2016, p. 322) note that the planet has been “shaped by the cumulative history of social transformations” and that the “Anthropocene is thus [...] [the] result of a particular history of global economic and political arrangements”. The nature and purpose of organizations, how these entities are governed, their impacts and ways we might conceptualize and understand their functioning are important to address Anthropocene issues. Accounting scholarship is well placed to be informative in this task. Through the case study, we also hope that as accountants (and as partners in this inter-disciplinary team) we may also contribute to systems transformations while also acknowledging the caveats that apply to any such endeavour.

Note

1. In 2014, a new journal was published called *The Anthropocene Review* (<http://anr.sagepub.com/>). This trans-disciplinary journal contains research articles (drawing from across disciplines) as well as a “perspectives and controversies” section that illuminates debates in this area. Other journals that have emerged include *The Anthropocene Review*; *Elementa: Science of the Anthropocene* and *Earth’s Future*. These are not, however, the only places that the Anthropocene is actively debated. Existing journals that have special issues on the Anthropocene include *Global Environmental Change* (in 2015), *Geographical Research* (in 2015), *Philosophical Transactions of the Royal Society* (in 2011) and *Theory, Culture & Society*, (in 2017). The Anthropocene has also been considered in popular culture outlets.

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