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Assessing the Emancipatory Nature of Chinese Extinction Accounting*

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ABSTRACT

The majority of research into corporate reporting on biodiversity and conservation generally concludes that such reporting is dominated by impression management, corporate self-interest and an anthropocentric mindset. This has led many researchers to dismiss corporate reporting, focusing increasingly on the activities of NGOs, the public sector and government level reporting. However, recent work has explored the potential for a corporate reporting (and reporting by other entities) to encapsulate emancipatory elements, where such elements demonstrate at least an intention to be transformative and emancipatory in the sense of improving conservation, enhancing biodiversity protection and, critically, preventing species extinctions. Extinction accounting that provides details on how a company is protecting/restoring habitat, enhancing biodiversity, and taking a dynamic approach to conservation could, potentially, lead to ecological and environmental improvements. Chinese listed companies have not, to date, received attention from researchers in relation to extinction accounting. This paper seeks to analyse an extensive sample of Chinese listed companies in a high ecological impact sector to assess the extent to which their biodiversity disclosures are dominated by impression management, in order to identify any elements of the reporting that could be interpreted as emancipatory extinction accounting. We respond to a call from the literature to research extinction accounting by companies in developing economies, given the paucity of the research in this area. Our findings suggest that despite a strong tendency for companies to reveal impression management and self-interest in their disclosures, there are examples of emancipatory extinction accounting, where they appear to be eliciting genuine transformation in their conservation behaviours and activities. Further, we identify species-specific, species-centric reporting as a significant element of extinction accounting, demonstrating the way in which emancipatory extinction accounting is growing and evolving in practice. This represents a significant contribution to the existing literature as previous research in the mining industry found only anthropocentric' legitimacy-dominated extinction accounting. It is encouraging that elements of an emancipatory extinction accounting are beginning to emerge in reporting practice in a high impact sector in a developing economy.

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Introduction

Human civilisations rely on ecological, or ecosystem ‘services’ that are ‘provided’ by biodiversity, and that ensure humans’ needs for life (WWF 2018). Threats to biodiversity represent threats to the survival of the human race. There is now substantial evidence suggesting that we are entering a sixth period of mass extinction on Planet Earth and that this may be construed as a business risk and an issue for accounting and reporting (Atkins, Gräbsch, and Jones 2014; Atkins and Maroun 2018; Maroun and Atkins 2018; Atkins and Atkins 2019a). The most recent WWF Living Planet Reports indicate wildlife populations are severely threatened (WWF 2018, 2020). Global wildlife populations have reduced by 68% since 1970 (WWF 2020), and humanity now requires 1.5 planets’ worth of resources to satisfy their needs for future, with this pressure being multiplied due to the double effect of growing human population and higher ecological footprints per capita (McLellan et al. 2014).

There is a growing body of academic accounting research exploring accounting for biodiversity and conservation not only by the corporate sector but also by the public sector, by NGOs and other organisations. This area of research is increasingly global in extent. There is, however, little research considering accounting for biodiversity and accounting for conservation and conservation activities within a Chinese context despite the high level of biodiversity in China combined with industrial activity. There is no extant research into extinction accounting in China. China has some of the richest biodiversity on the planet, boasting almost 14% of global vertebrates (Li 2015) but is also one of the leading countries purchasing, processing and consuming key commodities, with current industrial production placing great pressure on biodiversity (WWF China 2015). Currently, China is significantly threatened by biodiversity loss, caused by over exploitation of resources, loss and degradation of the living environment, environmental pollution and climate change (Zang et al. 2016). Although China has taken strides to address biodiversity loss, establishing almost 3,000 nature reserves (Li 2015), the overall trend of biodiversity degradation has not been fundamentally reduced; issues of species habitat loss and fragmentation, and invasion of alien species continue to present challenges to biodiversity conservation (Wei 2015). The 2020 UN Biodiversity Conference intended to be held in China (CBD 2020b), aimed to develop a Post-2020 Global Biodiversity Framework to promote the transformative changes that needed to achieve the 2050 Vision of Living in Harmony with Nature (CBD 2020a). This would provide opportunities for China to show its performance on biodiversity conservation (Shanahan 2020), and to share its experiences on ecological civilisation with international community (IISD 2019). For example, China’s largest private sector tree-planting initiative: Alipay’s Ant Forest, has received the 2019 UN Champions of the Earth Award (UN Environment 2019), and the 2019 UN Climate Action Award (UN Climate Change 2019). Over 500 million users planted over 100 million trees in some of China’s most arid regions (Ant Financial 2020), and over 39,000 mu of conservation land are guarded through the platform (China Daily 2018). However, research shows that Chinese companies still have far to go if they are to tackle biodiversity loss and species extinctions in an effective manner: The GoldenBee CSR Index Report (2013), published by China WTO Tribune and GoldenBee (Beijing) Management Consulting found that only about 21% of Chinese companies’ reports disclosed biodiversity information.

In this paper we analyse reporting on biodiversity and species protection produced by a high environmental impact sector in order to assess whether or not these accounts suggest any genuine transformation, in relation to the existing emancipatory extinction accounting frameworks.

Although there has been some criticism in the academic accounting literature of attempts to develop reporting forms and models for corporates in the area of biodiversity, and more recently extinction accounting, mainly on the basis that these will be subsumed by impression management, this does not imply that further research is not required. Indeed further work that searches for emancipatory elements and behaviours is necessary in order to isolate best practice and define examples that companies can follow. Further, as mentioned in Cuckston (2018) further work in the area of corporate reporting on biodiversity, conservation and extinction needs to explore and develop stronger theoretical frameworks that can lead to transformational activities. Recent work has explored the potential for such corporate reporting to demonstrate emancipatory elements revealing some corporate efforts to alter their behaviour in order to genuinely enhance biodiversity and even save species.¹ Such efforts could still be dominated by a PR, greenwashing discourse (as suggested by Hassan, Roberts, and Atkins 2020) but may also demonstrate a change in attitude, a move towards an ecological logic, within the corporate sector. This could be for a number of reasons including genuine commitment by members of the boardroom to ecological issues and a desire by those with decision-making power to 'save the planet' (Atkins and Atkins 2019a). Another increasingly important driver of emancipatory reporting reflecting genuine behavioural change among the corporate community on conservation and ecological welfare, is the impact of the responsible investment community. Leading investment institutions worldwide are increasingly engaging directly with companies to pressurise them to take conservation and species preservation seriously as evidenced from the recent literature (Atkins, Atkins, and Maroun 2019; Atkins and Macpherson 2019; Atkins et al. 2020; Atkins and Macpherson, forthcoming). Further, Covid-19 appears to be acting as a catalyst, focusing institutional investor attention on biodiversity issues and encouraging investors to demand improvements in biodiversity reporting (Atkins et al. 2020).

A cynical approach that denies any possibility for companies to genuinely address issues relating to biodiversity loss and species decline is in our view counter-productive and does not allow anyone, or any organisation, to be given the benefit of the doubt. Of course, a primary focus can be on researching the accountability of wildlife and nature-oriented NGOs and other pro-conservation organisations, but this does not mean that corporate reporting and accountability for the planet should be ignored or side-lined. Despite suggestions that corporate species-related accounting research that does not focus on financial materiality or a clearly identified causal relationship, is flawed, there have been several attempts to demonstrate the need for companies to disclose species protection and extinction prevention information due to financial materiality of bees as pollinators (Atkins and Atkins 2016a), rhinoceros due to impacts on ecotourism (as well as the impact of financial organisation to rhinoceros decline due to financing) (Atkins et al. 2018), and all species due to their individual and idiosyncratic contribution to ecosystem health and survival (Atkins and Maroun 2018; Atkins and Atkins 2019b). Further, where companies have an accountability due to their impact of their operations on species populations then there is an accountability requirement for

stakeholders, and even an ethical motivation for such disclosures, in addition to any financial materiality requirement.

It is only by adopting a multi-faceted approach to conservation across all forms of organisation and at all levels, that real progress and genuine change may be progressed. It is only by encouraging an emancipatory accounting that we will witness at least progression towards transformation and change (Gallhofer and Haslam 2019, discuss 'progress' towards an emancipatory outcome).

Companies working with wildlife NGOs, such as the WWF, can – and must – alter their behaviour to the benefit of ecosystems, habitats and species of flora and fauna. Recent research finds increasingly constructive engagements taking place between conservation NGOs and companies on biodiversity, conservation and species protection (Atkins et al. 2016a). Their reporting and accounting mechanisms for such partnerships and behavioural transformations represent, in our view, a core means of discharging their accountability to interested parties and stakeholders. Where such accounting and reporting mechanisms reveal emancipatory elements then a potential transition to a more ecologically sound corporate sector worldwide may be under way. Ignoring these potentialities and writing them off as unable to break away from 'business as usual', or to pursue any reporting for reasons other than impression management and reputation management, defies the potential for corporates, and those who run them, to change their attitudes. As outlined in a recent book on integrated reporting, extinction accounting, and attempts to develop and implement this emerging framework in practice, are far more than 'natural capital accounting' (Büchling and Atkins 2020), being motivated by a transformational intentionality.

In summary, although corporate reporting on biodiversity has been widely criticised in the academic accounting literature, for being dominated by impression management, it remains important, in our view at least, to explore ways in which such reporting content is evolving around the world. Specifically we aim to explore the extent to which evolving extinction accounting practice by Chinese listed companies displays emancipatory elements rather than being imbued with impression management. Where emancipatory elements may be detected, they can be identified, highlighted and used as signifiers of best practice that can lead future extinction accounting practices. We focus specifically on the mining sector given the high environmental and ecological impact of these companies (Hou 2014), and the higher level of biodiversity disclosures compared with other sectors (China WTO Tribune et al. 2013). We respond to calls from the literature to explore extinction accounting in developing economies (Roberts et al. 2021) and also we contribute to literature by presenting the first attempt to investigate evidence of emancipatory extinction accounting in Chinese companies. Further, we contribute to the literature by demonstrating a shift in mining companies' disclosures from being associated more with accounting for biodiversity than emancipatory extinction accounting (see Adler et al. 2017). This paper also aims to highlight the importance of species-specific accounting as a crucial element of extinction accounting. Lastly we contribute to the literature by providing an exhaustive summary of the ways in which extinction accounting may be differentiated from accounting for biodiversity in the burgeoning field of extinction accounting research, in [Figure 2](#).

The remainder of this paper is structured as follows. In section two we discuss the literature in the area of accounting for biodiversity. Section three outlines the research

method. In section four, the findings of an interpretive analysis of Chinese listed company disclosures are reported and the paper concludes with a discussion in section five.

Accounting for biodiversity, conservation and extinction

Biodiversity conservation is a complex issue that cuts across different regions, disciplines and organisational forms, thus participation from a wide range of stakeholders, and cooperation among them, are crucial to effective biodiversity conservation. We consider, from a normative standpoint, that companies have an important role to play in conservation, given they are a primary source of negative impacts on biodiversity. Yet, corporate participation in biodiversity conservation is deemed insufficient (Zhang and Liu 2015). In relation to biodiversity conservation, urgent efforts are required from individuals, families, communities, organisations and countries (Rousseau 2015). Tackling the current extinction crisis is the responsibility of each and every individual as ‘saving the planet’ is motivated for many by the need to save the future of the human race. All human-created disciplines need to be aligned to respond to the challenge of biodiversity loss.²

Since the concept of ‘business participation in biodiversity’ was identified by the Convention on Biological Diversity (CBD) in 1996 (CBD 1996), ‘Business and Biodiversity’ has gradually developed as an important issue in CBD negotiation. As a result, the ‘Global Partnership for Business and Biodiversity’ (GPBB) initiative was established in 2011, with a forum held every year (Wang, Wu, and Liu 2015). Moreover, the Aichi Biodiversity Targets, formulated in 2010, placed significant emphasis on companies’ role in biodiversity conservation. Companies are encouraged to integrate biodiversity conservation and enhancement into their accounting and reporting systems (CBD 2013). In order to promote corporate involvement in biodiversity conservation, a global initiative, the Economics of Ecosystems and Biodiversity (TEEB) was established, which aimed to indicate the economic benefits of ecosystems and biodiversity, and the costs of biodiversity loss, thus, to ‘make nature’s values visible’ by mainstreaming the values of biodiversity and ecosystem services into decision-making at all levels (Bishop et al. 2010).

As corporate accounting and accountability for biodiversity are increasingly demanded by society, various reporting standards and guidance have incorporated biodiversity indicators. The Global Reporting Initiative’s (GRI) guidelines include guidelines for reporting information on species and habitats affected by an organisation’s operations; the impact of the organisation’s operations, products and services on biodiversity; and how the organisation manages these impacts (GRI 2011). These indicators have been widely used in academic studies to investigate corporate reporting for biodiversity (Rimmel and Jonäll 2013; Van Liempd and Busch 2013), and to develop further a reporting and evaluation framework for biodiversity conservation (Samkin, Schneider, and Tappin 2014; Atkins, Gräbsch, and Jones 2014). In the most recent version (GRI 2018) of the GRI Standards, biodiversity-specific disclosure items in the biodiversity section (GRI 304) are in line with the G4 guidelines, while further providing a list of specific requirements with suggestive examples. This is intended to assist organisations in improving their understanding of biodiversity disclosure items and to gain clear ideas of their reporting content (GRI 2018). GRI in this area has, however, been criticised for further embedding business as usual and the status quo, rather than adopting a transformative approach.

The construction of biodiversity accounting has emerged to be able to record, measure and disclose biodiversity (Jones 2010) allowing the potential for companies to collaborate and communicate with other stakeholders, such as NGOs and governments to provide integrated interdisciplinary solutions for biodiversity loss (Jones 2014). Academic research has found a low level of corporate disclosures on biodiversity, as indicated by the limited quantity and quality of relevant information (e.g. Rimmel and Jonäll 2013; Van Liempd and Busch 2013). Impression management is identified in current biodiversity reporting, including content-repeating behaviour (Rimmel and Jonäll 2013), limited disclosures on actual performance (Van Liempd and Busch 2013), lack of financial data, cherry picking, and show-casing best practice case studies (Atkins, Gräbsch, and Jones 2014). Accountants' current knowledge on biodiversity is inadequate, especially in the area of valuation (Freeman and Groom 2013), the relevant training is needed not only for biodiversity reporting, but also other aspects of environmental reporting (Atkins, Gräbsch, and Jones 2014). The public sector as well as the private sector should mainstream biodiversity accounting to demonstrate their environmental stewardship and accountability to concerned stakeholder groups (Siddiqui 2013). Lastly, there is an urgent need to explore further the emancipatory potential of accounting for biodiversity if accounting and reporting can play any part in 'saving the planet' (Jones and Solomon 2013).

Current biodiversity reporting approaches are essentially anthropocentric: companies are mainly focusing on the most 'useful' species for humans, and their disclosures on biodiversity are trend to focus more on risk management (Jones and Solomon 2013; King with Atkins 2016). In contrast, from a non-anthropocentric perspective, nature is valuable in its own right and biodiversity has its intrinsic value, human species has no right to destroy other species (Christian 2014). From a deep ecology perspective, companies are reporting biodiversity for the 'wrong' reason, failing to protect biodiversity for intrinsic value reasons. Disclosing species-related information and impacts purely on the basis of financial materiality is inadequate for massive organisations that have a pervasive impact on nature. However, anthropocentric approaches currently practised by companies are still considered preferable to inaction (Atkins, Gräbsch, and Jones 2014).

Inspired in part by Tregidga's (2013) study which focuses on specific species, Jones and Solomon (2013) suggest that the detailed reporting of specific species could effectively demonstrate companies' accountability. Moreover, they argue that the term 'biodiversity' does not address the urgency of species extinction, companies would be more responsive and motivated when they are accounting for their 'contribution to extinction of life on earth', or to report how their conservation actions can help to prevent species extinction. A collection of studies (Atkins and Atkins 2016b) on a specific species, bees, investigates how the business world is reacting to declining trends in bee populations, in the interests of long-term corporate sustainability. By recognising the importance of pollinators (Houdet and Veldtman 2016), and the risks of pollinator decline toward business in terms of corporate responsibility (Romi and Longing 2016) and financial performance (Atkins and Atkins 2016b), companies' actions tend to be more proactive and educative (Atkins et al. 2016b; Jonäll and Rimmel 2016).

With the growing emphasis on corporate accountability for specific endangered species, a new form of accounting named 'extinction accounting', has emerged through a series of studies (King with Atkins, 2016; Atkins et al. 2018; Maroun and Atkins 2018; Atkins and Maroun 2018; Atkins and Atkins 2019c; Atkins and Maroun

2020; Büchling and Atkins 2020). This may be perceived as a natural evolution from biodiversity accounting, with more emphasis on communicating the urgency for a form of corporate reporting (Atkins and Maroun 2018). Merely reporting on species in a manner similar to biodiversity accounts analysed (e.g. Atkins, Gräbsch, and Jones 2014) is likely to result in a 'fossil record' of species lost (Atkins and Maroun 2018). Compared with earlier biodiversity accounting studies, which found corporate reporting characterised by descriptive, compliance-driven and legitimacy elements, extinction accounting attempts to encourage companies to recognise their unique ability to prevent and even reverse extinction trends (Atkins et al. 2018). The development of such reporting practices demands that accounting have an emancipatory potential, being more transformative and progressive than current reporting forms (Gallhofer and Haslam 2019; Maroun and Atkins 2018).

The extinction accounting framework builds, as mentioned earlier, on the tradition of emancipatory accounting which has developed over the past 40 or so years in the academic accounting literature. Specifically, we look to an accounting that can act as an agent of social welfare and, as an 'emancipatory project', designed to encourage changes in mind-sets (Gallhofer and Haslam 2003) enacting social change (Gallhofer and Haslam 1996), such that, '[I]n the context of extinction accounting, bringing about social change translates as preventing species extinctions ...' (Maroun and Atkins 2018, 107). In a recent paper, emancipatory accounting has been identified as evolving as forms that attempt to progress towards an emancipatory, transformational outcome within the existing systems rather than forms that require deep systemic overhaul (Gallhofer and Haslam 2019). This is the approach inherent in the emancipatory extinction accounting framework rendered explicit in Atkins and Maroun (2018), Atkins, Atkins, and Maroun (2019) and Atkins and Maroun (2020), and which forms a crucial element in an innovative extinction governance framework (King, Atkins, and Maroun, *forthcoming*). It is the emancipatory element of extinction accounting which differentiates it, in our view, from more general biodiversity reporting, as it requires a progressive emancipatory outcome towards conservation and preservation of species. Further, the proponents of extinction accounting see the term itself as well as the emancipatory nature of an extinction accounting as able to communicate the urgency of species loss and an urgent need to act far more effectively than existing forms of biodiversity accounting (Atkins and Maroun 2018), which seems to be driven primarily by impression management, reputational issues and anthropocentric concerns (Jones and Solomon 2013). An emancipatory extinction accounting could transform corporate practices such that they shift away from a dominant anthropocentric approach to species to a more balanced perspective, with consideration of deep ecological views at the heart of the reporting. Rather than providing an historic fossil record of species loss, which could be the product of an impression management-fuelled biodiversity accounting, extinction accounting which is emancipatory, or at least has emancipatory elements, has the intention of saving species from extinction. Figure 1 presents the most recent published version of the extinction accounting framework, modified for Chinese mining industry context.³

Further, Maroun and Atkins (2018) suggest that both anthropocentric and non-anthropocentric factors should be considered. This is believed as the necessary compromise in the short-term to ensure companies' commitment to discharging their accountability for biodiversity. This approach is considered consistent with a middle range thinking and

represents praxis, adopting neither a positivist financial valuation approach nor a radical deep ecology approach but a practical middle way (Büchling and Atkins 2020).

There has been growing critique of Western dualism and its impact on the design of accounting, with a feeling that more insights may be gained from Eastern philosophies (Gallhofer 2018) such as Taoism (Christian 2016, 2019). Zhao and Atkins (2019) investigated the emergence of extinction accounting in China by focusing on one of the most famous endangered species: the giant panda. The study found that corporate initiatives for panda conservation and protection are led by the government and NGOs, with

Element	Purpose	Elements
1 Extinction accounting context	Describe the extinction risk in the context of the Chinese mining company and the diverse reasons for wanting to address this risk	Record a list of plant and animal species, identified as endangered by the IUCN Red List, whose habitats are affected by the Chinese mining company's activities Report where, geographically, the Chinese mining company's activities pose a threat to endangered plant and animal species, as identified by the IUCN Red List Report potential risks/impacts on these specific species arising from the Chinese mining company's operations (equivalent to the existing GRI principles to this point) Incorporate images (such as photographs, etchings, botanical drawings example) of vulnerable, threatened, endangered, critically endangered species which are affected by the Chinese mining company's operations and which the company has a duty of care to protect as well as aesthetic narrative elements Report full details (narrative as well as financial figures) relating to any fines or ongoing claims relating to endangered species legislation arising from the Chinese mining company's activities (e.g. CITES) as well as locational information relating to specific species within their habitats Report corporate expressions of moral, ethical, emotional, financial and reputational motivations for preserving species and preventing extinction (to respond to diverse needs and requirements of different stakeholders/readers)
2 Action-focused reporting	Explain the actions the Chinese mining company takes and plans to take to reduce extinction risk	Report actions/initiatives taken by the Chinese mining company to avoid harm to, and to prevent extinction of, endangered plant and animal species including efforts to protect habitats and local ecosystems
3 Partnership reporting	Complement action-focused reporting by explaining broader partnerships/initiatives formed to combat/reverse extinction trends	Report partnerships/engagement between wildlife/nature/conservation organisations and the Chinese mining company which aim to address corporate impacts on endangered species and report the outcome/impact of engagement/partnerships on endangered species, habitats and ecosystems
4 Analysis and reflection	Evaluation of extinction prevention initiatives against aims/targets to inform changes to actions and partnerships	Report assessment and reflection on outcome/impact of engagement/partnerships and decisions taken about necessary changes to policy/initiatives going forward
5 Assessment	Audit of affected species/populations/biomes	Report regular assessments (audit) of species populations in areas affected by the Chinese mining company's operations as well as assessments of habitat degradation or improvement
6 Reporting	Provide an account of the progress made to date on preventing or mitigating extinction, planned future actions and risk exposure	Report assessment of whether or not the Chinese mining company's initiatives/actions are assisting in prevention of species extinction and habitat protection Report strategy for the future development and improvement of actions/initiatives: an iterative process Ensure that the whole process of 'extinction accounting' is integrated into corporate strategy and is incorporated into the company's integrated report, the company's business plan, corporate strategy and risk management/internal control system not resigned to separate sustainability reports or websites. Potential liabilities relating to future possible legal fines/claims relating to endangered species impacts. Discussion of ways in which the Chinese management company is working to prevent future liabilities related to harming endangered species. Provide pictorial representation of success in conservation – and of failure (i.e. species loss, local extinctions)

Figure 1. An emancipatory extinction accounting framework. This framework has been adapted from the framework published in Atkins and Maroun (2020) for the Chinese mining industry context.

only a limited number of companies providing disclosures relating to pandas. This seems to be due primarily to insufficient awareness of panda decline among Chinese companies, lack of external pressure, and limited engagement with other stakeholders. Similar findings were found for rhinoceros conservation (Sibanda and Mulama 2019) but the authors highlight the significant potential of corporate participation and engagement in biodiversity conservation. However, Büchling and Maroun (2019) point out that a focus on high profile species cannot fully reflect the emancipatory extinction accounting

Characteristics of accounting for biodiversity	Characteristics that differentiate extinction accounting from accounting for biodiversity
Biodiversity accounting inadequate because of the term 'biodiversity' itself, as it is not "...immediately understandable, sounds scientific and does not perhaps convey either the notion of accountability for species and wildlife, nor does it communicate the urgency of species extinction 'being overly scientific'" (Jones and Solomon, 2013, p.683)	The term 'extinction' itself focuses the reader and preparer on the urgency of species loss and biodiversity decline. By focusing on species rather than 'biodiversity' there is less vagueness of potential for obfuscation (Atkins and Maroun, 2018)
Biodiversity accounting tends to be largely descriptive (Jones and Solomon, 2013; Mansour and Maroun, 2016; Gaia and Jones, 2017)	Extinction accounting goes further than description and incorporates reporting on action taken, strategies implemented and partnerships with conservation NGOs (Maroun and Atkins, 2018)
Biodiversity accounting tends to be entirely anthropocentric in nature (Jones and Solomon, 2013; Atkins et al., 2014; Adler et al., 2018)	Extinction accounting combines anthropocentric with non-anthropocentric intentions and elements (Maroun and Atkins, 2018). Indeed, extinction accounting is species-specific and species-centric (for example the bee accounting framework in Atkins and Atkins, 2016). Species accounting is a dominant element in extinction accounting as it focuses on preventing species extinction and hones in on accounting for impacts on specific species as well as efforts to conserve them
Little if any emancipatory potential evident in biodiversity accounting (Jones and Solomon, 2013, Atkins et al., 2014)	Extinction accounting displays elements of an emancipatory nature where the organization is making efforts to save species and be transformative in their operations (Maroun and Atkins, 2018)
Biodiversity accounting is imbued with impression management and greenwash (Hassan et al., 2020)	Extinction accounting is not motivated only by reputational issues or impression management efforts (Atkins et al., 2019)
Biodiversity accounting is generally narrative (Jones and Solomon, 2013)	Extinction accounting is hybrid in form incorporating quantitative, qualitative and even pictorial elements (Atkins and Maroun, 2018; 2020)
Biodiversity accounting tends to be driven by Codes of Practice such as GRI, and represents compliance with minimum disclosure recommendations (Atkins and Maroun, 2018)	Extinction accounting goes further than complying with best practice and disclosure recommendations (Atkins and Maroun, 2018)
Biodiversity accounting is motivated entirely by legitimacy (Adler et al., 2017) or by financial materiality and risk management concerns (Jones and Solomon, 2013)	Extinction accounting reveals motivations in addition to legitimacy, reputation and financial materiality including cultural heritage, emotional elements and deep ecology motivations (Atkins et al., 2018)
Accounting for biodiversity tends to be static often with information repeated in boiler plate fashion year on year (Jones and Solomon, 2013)	Extinction accounting is dynamic, demonstrating transformational change year on year, with an emphasis on the impact of initiatives and strategies which have positive (but sometimes disappointingly negative) effects (Atkins and Maroun, 2020).
Species treated as part of a broad environmental impact assessment	Species need to be treated as stakeholders to whom the company has an accountability (Hassan et al., 2020)

Figure 2. Differentiating between accounting for biodiversity and extinction accounting.

ethos, which should include all flora and fauna. As emphasised by Maroun and Atkins (2018), the construct of extinction accounting is rooted in the need for emancipatory transformation of corporate attitudes and behaviour. It seems timely to extend this work to investigate extinction accounting practice and identify any emancipatory elements for Chinese listed companies more widely. It may be argued that companies in China bear no financial risk and that there is no financial materiality to themselves from panda decline or extinction. Yet companies with high environmental impact affect panda populations by their destruction of habitat, encroachment on panda territory, pollution. Companies may not have to disclose because of financial materiality but because of the need to discharge accountability; and ultimately they should disclose because they 'can'. Further, they can make a difference to conservation through actions, funding, partnering as well as through disclosure, and, from our normative perspective, if they can, they should. Companies have the power and ability to assist in conservation and in a period of existential crisis regarding species and biodiversity they have a moral and ethical duty to harness this potential and engage in emancipatory change for the betterment of species human and non-human.

In the paper, we focus specifically on analysing emergent extinction accounting practice by Chinese mining companies, especially by seeking to identify emancipatory extinction accounting elements. In order to make explicit the theoretical and practical differences between accounting for biodiversity and extinction accounting, as it is evolving in the academic accounting literature, we summarise these in [Figure 2](#):

The shift from accounting for biodiversity to extinction accounting is an evolution in corporate disclosure practice that was first identified as a new form of accounting, distinct from philanthropic accounting in accounting for the rhinoceros (Atkins et al. 2018). There were elements in the rhinoceros reporting that differed distinctly from an accounting driven entirely by financial risk considerations: there were emotional elements and concerns about cultural heritage which acknowledged motivations far removed from merely philanthropic giving. This new form of extinction accounting Specifically, it is stated explicitly in the literature that,

... extinction accounting is differentiated from biodiversity accounting or reporting, because, in addition to only describing the state of biodiversity and raising awareness, the accounting can be used to prevent extinction. (Atkins and Maroun 2018, 760)

A recent paper provides a comprehensive and critical review of the growing body of extinction accounting research (Roberts et al. 2021) and provides a call for research that explores emancipatory elements especially in developing countries, given the paucity of extinction accounting research in these economies. Our paper responds to this call by focusing on researching extinction accounting by Chinese companies.

Research method and data collection

As highlighted by Boiral (2016), mining companies have severe impacts on biodiversity as their activities lead to degradation of indigenous vegetation, fragmentation of habitats, and erosion and pollution of soils on which many species are relying for their survival. Moreover, the mining industry has been identified as the industry disclosing the most biodiversity information (Rimmel and Jonäll 2013; Atkins, Gräbsch, and Jones 2014). In China,

the extractive industry (including oil, gas and mining companies) has been identified as creating the most significant impact on biodiversity when compared to other industries (Hou 2014) and research (China WTO Tribune et al. 2013) on CSR reporting in China indicates that the extractive industry discloses the most information on biodiversity conservation, its reporting quality being higher than the industry average. Therefore, biodiversity reporting provided by Chinese listed extractive companies seems appropriate as a means of assessing the progress of biodiversity reporting in China, as it may represent best practice. These companies are listed on one of two stock exchanges in mainland China, namely Shanghai stock exchange (SSE) and Shenzhen stock exchange (SZSE). The sample for our study includes all the A-share-listed companies under the extractive industry category in both the SSE and SZSE. The Chinese government has encouraged the construction of an ecological civilisation since 2012, joining the CBD's Global Partnership for Business and Biodiversity (GPBB) in 2014 (Wang, Wu, and Liu 2015). Considering the Chinese government's political influence, corresponding action from companies is anticipated. To examine the companies' performance throughout this particular period, our study focuses on the companies' narrative reporting on biodiversity from 2013 to 2015. There are 69 listed extractive companies (40 listed in SSE, 29 listed in SZSE) identified for this period. Their annual report, sustainability report and website were reviewed to identify disclosures relating to biodiversity. In identifying the relevant content, terms such as biodiversity, ecosystem, habitats, ecosystem services, conservation and restoration, applied in previous studies (Rimmel and Jonäll 2013; Atkins, Gräbsch, and Jones 2014), as well as information on specific species. In addition, terms particular to the Chinese context, such as green mines, tree planting, ecological environment and ecological civilisation, are identified as indirect biodiversity disclosures, given their significant influence on biodiversity. The disclosures were analysed via interpretive content analysis, commonly used in previous studies in discovering corporate disclosures on sustainable and environmental issues (Tregidga and Milne 2006; Laine 2005, 2009, 2010), as well as on biodiversity (Atkins et al. 2018). Our chief aim was to identify emancipatory elements in the reporting in order to distinguish these elements from disclosures imbued with impression management. To this end, we implemented a similar approach to earlier work that analysed South African integrated reports by, '... assess[ing] the extent to which they are consistent with the tentative extinction accounting framework proposed in the recent literature' (Maroun and Atkins 2018, 108). The earlier interpretive, and to some extent critical, analysis identified illustrations of emancipatory extinction accounting by South African companies on, inter alia: increases in Canadian toad populations; a substantial and effective coaching through conservation project to prevent rhinoceros poaching, and; a massive media campaign to raise awareness of rhinoceros poaching.

The current study involved numerous rounds of reading. In the initial stages, one researcher read through each corporate report and website in identifying references to biodiversity related issues. A closer reading of the text was carried out, once an initial reading was complete, significant extracts were identified from the reports to form themes. The themes identified from the analysis were classified into two general categories in explaining the current status of biodiversity reporting in China. The majority of reports analysed were written in Chinese, with only a smattering of companies providing an English version. To minimise misunderstanding or errors arising from the language barrier, all translated quotations were reviewed and discussed by the authors, who are native speakers of

Chinese and English respectively. The companies analysed in our study are coded by number for ease of discussion and a full list of these companies is provided in [Table 1](#).

Below we provide a list of keywords used in our interpretive analysis to identify biodiversity and conservation disclosures in English and Chinese.

Chinese	English (translated)
生物多样性	Biodiversity
物种	Species
栖息地	Habitats
生态系统	Ecosystem
生态服务	Ecosystem services
保护	Conservation
生态恢复	Ecological restoration
绿色矿山	Green mines
生态文明	Ecological civilisation
生态环境	Ecological environment
人工繁殖	Artificial reproduction
植树	Tree planting
绿化	Greening

The analysis sought to identify elements in the Chinese reporting which represented elements of an emancipatory accounting as described in [Figure 1](#) above. Further, we specifically sought to identify elements of emancipatory extinction accounting as defined in the second column of [Figure 2](#). The characteristics which we have summarised as differentiating extinction accounting from accounting for biodiversity are those specific elements and characteristics that we used as a basis for our analysis and for detecting and identifying examples of emancipatory extinction accounting.

Analysis of biodiversity and conservation disclosures by Chinese companies

Our research found that over half of the companies analysed do not produce separate sustainability reports containing biodiversity and/or conservation related information. However, there was some indication that companies are gaining an awareness of biodiversity and conservation issues, as quantity and quality of their biodiversity reporting improved over the three-year period. Through an interpretive content analysis of both direct and indirect biodiversity-related information disclosed by the companies selected, numerous themes were identified by carefully reading the data in relation to existing literature and classifying them according to themes arising from the analysis. We were especially interested in identifying disclosures that appeared to be imbued with impression management and, in contrast, examples of disclosures that seemed to contain emancipatory elements. Our analysis is presented in two part, namely: (i) Disclosures characterised by self-interest and impression management, and (ii) Disclosures characterised by emancipatory elements.

Disclosures characterised by self-interest and impression management

Disclosures motivated by risk management and risk reduction

Many of the companies' disclosures analysed focused primarily on pollution control and emission reduction, which seems to be motivated by a risk management motivation,

Table 1. Extractive Chinese listed companies analysed.

No.	Stock Code	The Stock Exchange	Company Name (Chinese)	Company Name (English)
1	600532	SSE	山东宏达矿业股份有限公司	Shandong Hongda Mining Co., Ltd
2	600711	SSE	盛屯矿业集团股份有限公司	Chengtun Mining Group Co., Ltd
3	600193	SSE	上海创兴资源开发股份有限公司	Shanghai Prosolar Resource Development Co., Ltd
4	600766	SSE	烟台园城黄金股份有限公司	YanTai Yuancheng Gold Co., Ltd
5	600714	SSE	青海金瑞矿业发展股份有限公司	Qinghai Jinrun Mineral Development Co., Ltd
6	603993	SSE	洛阳栾川钼业集团股份有限公司	China Molybdenum Co., Ltd.
7	601101	SSE	北京昊华能源股份有限公司	Beijing Haohua Energy Resource Co., Ltd
8	600882	SSE	山东华联矿业控股股份有限公司	Shandong Hualian Mining Holdings Co., Ltd.
9	600157	SSE	永泰能源股份有限公司	Wintime Energy Co., Ltd.
10	600971	SSE	安徽恒源煤电股份有限公司	Anhui Hengyuan Coal Industry and Electricity Power Co., Ltd.
11	601225	SSE	陕西煤业股份有限公司	Shaanxi Coal Industry Company Limited
12	600489	SSE	中金黄金股份有限公司	Zhongjin Gold Corporation Limited
13	600348	SSE	阳泉煤业(集团)股份有限公司	Yang Quan Coal Industry (Group)Co., Ltd
14	600397	SSE	安源煤业集团股份有限公司	Anyuan Coal Industry Group Co., Ltd
15	600547	SSE	山东黄金矿业股份有限公司	Shandong Gold Mining Co., Ltd
16	600403	SSE	河南大有能源股份有限公司	Henan Dayou Energy Co., Ltd
17	600259	SSE	广晟有色金属股份有限公司	Rising Nonferrous Metals Share Co., Ltd.
18	600188	SSE	兖州煤业股份有限公司	Yanzhou Coal Mining Company Limited
19	600583	SSE	海洋石油工程股份有限公司	Offshore Oil Engineering Co., Ltd.
20	600123	SSE	山西兰花科技创业股份有限公司	Shanxi Lanhua Sci-tech Venture Co., Ltd
21	600508	SSE	上海大屯能源股份有限公司	Shanghai Datun Energy Resources Co., Ltd.
22	600028	SSE	中国石油化工股份有限公司	China Petroleum and Chemical Corporation (2013, 2014, 2015)
23	600121	SSE	郑州煤电股份有限公司	Zhengzhou Coal Industry & Electric Power Co., Ltd.
24	600311	SSE	甘肃荣华实业(集团)股份有限公司	Gansu Ronghua Industry Group Co., Ltd.
25	600395	SSE	贵州盘江精煤股份有限公司	Guizhou Panjiang Refined Coal Co., Ltd.
26	600139	SSE	四川西部资源控股股份有限公司	Sichuan Western Resources Holding Co., Ltd
27	601088	SSE	中国神华能源股份有限公司	China Shenhua Energy Company Limited
28	601857	SSE	中国石油天然气股份有限公司	PetroChina Company Limited
29	601699	SSE	山西潞安环能能源开发股份有限公司	Shanxi Lu'an Environmental Energy Development Co., Ltd.
30	601666	SSE	平顶山天安煤业股份有限公司	Pingdingshan Tianan Coal Mining Co., Ltd.
31	600988	SSE	赤峰吉隆黄金矿业股份有限公司	Chifeng Jilong Gold Mining Co., Ltd.
32	600497	SSE	云南驰宏锌锗股份有限公司	Yunnan Chihong Zinc&Germanium Co., Ltd.
33	601001	SSE	大同煤业股份有限公司	Datong Coal Industry Co., Ltd.
34	601918	SSE	国投新集能源股份有限公司	SDIC Xinji Energy Company Limited
35	601898	SSE	中国中煤能源股份有限公司	China Coal Energy Company Limited
36	601958	SSE	金城钼业股份有限公司	Jinduicheng Molybdenum Co., Ltd
37	601899	SSE	紫金矿业集团股份有限公司	Zijin Mining Group Company Limited
38	601168	SSE	西部矿业股份有限公司	Western Mining Co., Ltd.
39	601808	SSE	中海油田服务股份有限公司	China Oilfield Services Limited
40	601069	SSE	西部黄金股份有限公司	Western Region Gold Co., Ltd.
41	000409	SZSE	山东地矿股份有限公司	Shandong Geo-mineral Co., Ltd
42	000426	SZSE	内蒙古兴业矿业股份有限公司	Inner Mongolia Xingye Mining Co., Ltd
43	000552	SZSE	甘肃靖远煤电股份有限公司	Gansu Jingyuan Coal Industry and Electricity Power Co., Ltd.
44	000506	SZSE	中润资源投资股份有限公司	ZhongRun Resources Investment Corporation

(Continued)

Table 1. Continued.

No.	Stock Code	The Stock Exchange	Company Name (Chinese)	Company Name (English)
45	000571	SZSE	新大洲控股股份有限公司	Sundiro Holding Co., Ltd.
46	000603	SZSE	盛达矿业股份有限公司	Shengda Mining Co., Ltd
47	000629	SZSE	攀钢集团钒钛资源股份有限公司	Pangang Group Vanadium Titanium & Resources Co., Ltd.
48	000655	SZSE	山东金岭矿业股份有限公司	Shandong Jinling Mining Co., Ltd
49	000688	SZSE	建新矿业股份有限公司	Jianxin Mining Co.,LTD
50	000693	SZSE	成都华泽钴镍材料股份有限公司	Chengdu Huaze Cobalt & Nickel Material Co., Ltd
51	000697	SZSE	陕西炼石有色资源股份有限公司	Shaanxi Ligeance Mineral Resources Co., Ltd.
52	000758	SZSE	中国有色金属建设股份有限公司	China Nonferrous Metal Industry's Foreign Engineering and Construction Co., Ltd.
53	000762	SZSE	西藏矿业发展股份有限公司	Tibet Mineral Development Co., Ltd
54	000780	SZSE	内蒙古平庄能源股份有限公司	Inner Mongolia PingZhuang Energy Resources Co., Ltd
55	000813	SZSE	新疆天山毛纺织股份有限公司	Xinjiang Tianshan Wool Tex Stock Co., Ltd
56	000937	SZSE	冀中能源股份有限公司	Jizhong Energy Resources Co., Ltd.
57	000968	SZSE	太原煤气化股份有限公司	Taiyuan Coal Gasification Company, Limited
58	000975	SZSE	银泰资源股份有限公司	Yintai Resources Co., Ltd.
59	000983	SZSE	山西西山煤电股份有限公司	Shanxi Xishan Coal and Electricity Power Co., Ltd
60	002128	SZSE	内蒙古霍林河露天煤业股份有限公司	Huolinhe Opencut Coal Industry Corporation Limited of Innermongolia
61	002155	SZSE	湖南辰州矿业股份有限公司	Chenzhou Mining Group Co., Ltd.
62	002207	SZSE	新疆准东石油技术股份有限公司	Xinjiang Zhudong Petroleum Technology Co., Ltd.
63	002554	SZSE	华油惠博普科技股份有限公司	China Oil HBP Science & Technology Co., Ltd
64	002629	SZSE	四川仁智油田技术服务股份有限公司	Sichuan Renzhi Oilfield Technology Services Co., Ltd.
65	002683	SZSE	广东宏大爆破股份有限公司	Guangdong Hong Da Blasting Co., Ltd.
66	300084	SZSE	兰州海默科技股份有限公司	Lanzhou Haimo Technologies Co., Ltd.
67	300157	SZSE	恒泰艾普石油天然气技术服务股份有限公司	Land Ocean Energy Services Co., Ltd.
68	300164	SZSE	西安通源石油科技股份有限公司	Tong Oil Tools Co., Ltd.
69	300191	SZSE	潜能恒信能源技术股份有限公司	Sino Geophysical Co., Ltd

probably due to these issues being prioritised by the government. This would be inkeeping with a risk management and internal control motivation underlying accounting for biodiversity, as outlined in Atkins, Gräbsch, and Jones (2014). The majority of our sample tended to perform conservation activities such as soil reclamation, vegetation recovery, and compensation in the wake of environmentally destructive operations, for example, Company No.60 establishes its principle for mining site rehabilitation as:

Damage one place, recover one place, carry out soil reclamation of each refuse dump. (Huolinhe Opencut Coal Limited 2013, 12)

The company acknowledges damage caused to the local environment by its operations and focuses on recovery, reporting on its partnership with research institutions, saying they,

... cooperate with research institutions like Chinese Academy of Sciences Shenyang Institute of Ecological Application and Beijing Traffic Science Research Institute ... to achieve

the quick succession process of the diversity of reclamation plants and the recovery of vegetation in refuse dump. (Huolinhe Opencut Coal Limited 2013, 12)

The report does not indicate any specific species that need to be protected. Without such detail, it may be challenging for readers to believe the company can recover the local environment to its original state, despite its disclosures. Company No.28 discloses how they integrate environmental management into the full life cycle of their industry chain. Before operations begin, they state that they,

... endeavour to reduce the occupation of arable land ... environmental protection facilities are designed, built and commissioned together with the main project. (Petro China Limited 2015, 33)

Then, during operations they state they have.

... comprehensively checked and rectified environmental pollution and ecological damages; and reduced the impact on the ecological environment through noise reduction, emission reduction and other means ... [we] put a lot of effort into the conservation of soil and water and into restoring the vegetation, working hard to restore the ecological environment and protect the biodiversity of our operation areas. (Petro China Limited 2015, 33)

It is notable that the company uses words such as 'endeavour', 'lots of effort', 'work hard' without demonstrating successful outcomes. Although these disclosures suggest commitment, they would be more convincing were the company to disclose more specific and detailed disclosures, including what they have done, what has worked and where they have not been so successful. 'Green drilling' was used to demonstrate the integration of habitat conservation into their well-drilling cycle. This 'green drilling' approach has been widely applied in the company's global operations, suggesting that the company has recognised the importance of biodiversity to sustainable development. Inkeeping with earlier research into this industry in a different geographical context (Adler et al. 2017), this type of reporting remains motivated by anthropocentric concerns (Adler, Mansi, and Pandey 2018) and imbued with greenwash (Hassan, Roberts, and Atkins 2020).

Disclosures motivated by impression management and 'Beautification'

Impression management can be found in disclosures where the focus is more on 'beautification' of sites than on conservation of species and biodiversity. For example, Company No.27 states that they:

... pay attention to biological sand control ... and strive to protect and significantly improve the ecological environment along the railway ... 17 million Yuan has been invested to beautify the railway line and surrounding environment. (China Shenhua Energy Limited 2013, 84)

Clearly the company's actions appear more concerned with 'beautification' which is suggestive more of impression management than genuine ecological improvement. Indeed, this seems to represent disclosure of physical impression management in practice! The company also discusses another project where they are working with local government to recover local collapsed pits created by former small coal mines (mostly private illegal mining enterprises), and disclose how they are restoring the area as a sight-seeing green industrial demonstration park (China Shenhua Energy Limited 2013, 83).

Although this could demonstrate the company's generous commitment to local ecological conservation this could also be interpreted as a public relations exercise.

The theme of 'beautification' (the Chinese for beautification is 美化) is also found in Company No.37's reports where they state that their conservation projects could create 'beautiful working and living environments' for employees. However, they are also creating a plant community based on scientific selection and planting, to provide ecological services such as air cleaning, sound insulation and dust filtration (Zijin Mining Group Limited 2013). Such ecological conservation goes beyond mere legislative requirements although the motivation seems to derive primarily from self-interest as they treat ecological environmental issues as opportunities to glean benefit from ecological services. Another example where conservation and biodiversity protection may be motivated more by self-interest is where Company No.37 discloses developing an eco-tourism industry alongside its 'green mine' project. This involves building an ecological farm, tea garden and other scenic spots in the mine area, which could attract 50,000 tourists every year (Zijin Mining Group Limited 2013). Further, Company No.35 talks of building an ecological industry chain for its land rehabilitation project. This ecological construction includes a high level eco-agriculture facility base, and national mine park with tourist facilities such as an 'ecological avenue', an artificial lake, and an ecological restaurant. Indeed, the company has received awards from local and national government (China Coal Energy Company Limited 2013, 2014, 2015). There is credible benefit to the local community in that the project provides employment for surrounding residents by establishing facilities for greenhouse planting and livestock breeding but not necessarily for biodiversity, conservation and nature. Again we see a reporting closer to accounting biodiversity than extinction accounting as it reveals impression management and greenwash (Hassan, Roberts, and Atkins 2020). The characterisation of strategies of beautification represents a cultural form of impression management in our view.

Disclosures characterized by repetition, legal compliance and awards received

Repeated content is one of the issues that usually exists in companies' disclosures and can be interpreted as being primarily motivated by impression management (Solomon 2013). Our study found different forms of repeated content. Firstly, Company No.30 discloses the same mission statement for three years, the detailed activities and performance are disclosed in a similar pattern with slight improvement over the years. The company's focus is consistently on pollution control and emission reduction, with no disclosures focusing on biodiversity or conservation (Pingdingshan Tianan Coal Mining Limited 2013, 2014, 2015). A consistently repeated mission statement might indicate that companies' awareness is unlikely to have improved. Some companies repeatedly disclose the same performance across the years sampled. For example, Company No.18 repeatedly lists three of its mining sites that have been awarded as national green mine experimental unit in its 2013 and 2014 CSR report, and add one more mining site in 2015 CSR report. For the same greening project, in 2013, the company disclosed they were:

... .. planting 65,469 trees and shrubs. (Yanzhou Coal Mining Limited 2013, 50)

While in 2014, it discloses that they had:

... .. planted over 60,000 trees and shrubs. (Yanzhou Coal Mining Limited 2014, 43)

Apart from slight rephrasing, the remaining content of the paragraph in these two CSR reports was identical. Such disclosures indicate that these companies may be exaggerating their practices (which may be few and far between) to demonstrate their conservation performance. They repeatedly use earlier disclosed content to enrich disclosures which reveal limited efforts and achievements for the current year. Many conservation disclosures tended to solely focus on **compliance with laws and legislation**, as Company No.52 states that:

... the company is strictly obeying requirements from the regional environmental protection department, complying with local, national, industrial environmental protection legislations. (China Nonferrous Metal Limited 2013, 9)

However, the company did not provide any specific reference to these legislations. The content of this type of disclosures seemed vague and limited, with information on specific legislation, financial investment, and specific planned objectives, rarely provided. This suggests that these companies appear to participate in environmental conservations in a passive manner, merely complying with regional or national legislations rather than be responsible for their impact on regional environment or species. Moreover, their focus on legislation is mainly on pollution and emission issues, with less concern placed on ecological systems or species. This could indicate their limited awareness. China Molybdenum Limited (No.6) discloses its national conservation performance, by stating that,

... in 2015, no environmental pollution accident occurred, the company has not been criticised by the superior government environmental protection department. (China Molybdenum Limited 2015, 15)

Similarly, China Nonferrous Metal Limited (No.52) stated that,

... no significant environmental conservation accident occurred in 2013. (China Nonferrous Metal Limited 2013, 9)

These companies only attempt to comply with basic requirements, with no further achievements provided, indicating insufficient awareness or insufficient emphasis on conservation issues. Some companies also tend to disclose **awards received** in order to demonstrate their conservation performance. Hassan, Roberts, and Atkins (2020) found a positive relationship between the incidence of biodiversity disclosures and awards gained by the company, interpreting this as evidence of impression management. For example, Company No.49 demonstrates 'good' performance because a subsidiary,

... has been recognised by the Ministry of Land and Resources as a national level green mine demonstration unit. (Jianxin Mining Limited 2014, 22)

However, this performance is then repetitively disclosed in the company's annual reports for three years. As discussed earlier, repeated disclosures might occur because it does not have any further achievements during that period. In contrast, Company No.32 states that it is strictly complying with the 'Environmental Conservation and Recovery Governance Program for the Mining Industry' to achieve green mine construction in its 2013 CSR Report. Following this, in its 2014 CSR Report, the company discloses that three of its subsidiaries have been awarded the 'national green mine experimental unit'. As seen from [Figure 2](#), compliance with principles such as GRI or minimum disclosure requirements

believes a form of accounting for biodiversity rather than any form of emancipatory extinction accounting.

Conservation Disclosures with Emancipatory Elements

Based on the majority of the prior literature on accounting for biodiversity, our findings of impression management and corporate self-interest are unsurprising. However, we did identify some examples of potentially emancipatory extinction accounting and species accounting. Such emancipatory elements include: companies acknowledging their negative impacts and explaining how they intend to restore the ecological environment; companies explaining long-term dynamic and transformational conservation projects they are developing; outlining conservation efforts for specific species, and; developing partnerships to enhance biodiversity and enact conservation. These elements of extinction accounting are consistent with those defined and summarised in the second column of [Figure 2](#). These findings are suggestive of a shift in Chinese reporting towards an extinction accounting that may be differentiated from accounting for biodiversity. Of course, it is still possible to dismiss these efforts as PR-motivated or again imbued with impression management, but in some cases we felt that the disclosures seemed to be transformational, eliciting and engendering change, or at least progression towards change (Gallhofer and Haslam 2019). For example, some companies acknowledge the negative impacts they have created on the ecological environment, with Company No.22 admitting that,

... operations like exploration and development of oil and gas, and the construction of oil and gas transformation pipeline will unavoidably affect the current ecological environment. (China Petroleum and Chemical Limited 2013, 41)

The company's response is to focus on ecological restoration and land rehabilitation. Company No.52 states that the company aims to,

... gradually achieve the transformation of development and utilization of mineral resources from the traditional mode which consume mineral resources and damage the ecological environment, to the new mode which respect natural ecology and comprehensively utilize the mineral resources. (China Nonferrous Metal Limited 2013, 9)

To implement such transformation, the company emphasises emissions reduction and recycling of production waste. Although these activities are insufficient to lead to emancipatory transformation, they do address their negative impact on the ecological environment, which the majority of companies tend to neglect in their reports. This initiative might have emancipatory potential by reminding companies about their obligations to reduce or even alter the negative impacts that they have brought to the ecological environment.

Some companies disclose continuous dynamic projects to which they have committed substantial investment and resources, which are to some extent suggestive of a transformative and more emancipatory approach to conservation. Indeed, these isolated reporting elements are suggestive of an emergent form of emancipatory extinction accounting. As identified in [Figure 2](#), one of the characteristics of extinction accounting which differentiates it from biodiversity accounting is a dynamic form of reporting rather than static repetition of data and information year on year. Extinction accounting has to be dynamic, demonstrating change and transformation if it is to be emancipatory. For example,

Company No.22 established the 'Clear Water and Blue Sky' programme in 2013, which aims to promote green and low carbon development in response to climate change. In following years, the company continued to disclose progress and performance of the programme, including implemented projects, invested funds, and selected case study. Moreover, the programme updates itself with additional projects and investments every year, to keep up with the updated policy and regulations (China Petroleum and Chemical Limited 2014, 2015). Ecological conservation is part of the 'Clear Water and Blue Sky' programme. In 2014, the company sets up a 'Biodiversity Conservation' programme which specially focuses on biodiversity conservation around company's operating site. The procedures for biodiversity conservation in different stages of operations are disclosed continuously. For example, during the operation:

... when [we] discover protected animals ... we report them to the forestry bureau in a timely manner and perform protection procedures; when we discover protected plants ... we carry out conservation procedures like transplantation, and timely report to forestry bureau. (China Petroleum and Chemical Limited 2014, 19)

Company No.28 has continuous projects for ecological restoration, such as the restoration of the marine environment and fishery resources, aiming to:

'... restore the marine environment and fishery resources of the subsea pipeline project', we released two million black sea bream into the sea, and expect to add about 100 tons of black sea bream in surrounding waters of Dapeng Bay and Daya Bay (Petro China Limited 2013, 31).

The company also has a transnational pipeline which crosses some nature reserves and other sensitive areas. In order to conserve the 'ecological diversity of transnational waters', the company has set up special funds to build fish breeding stations to:

... conduct fish reproduction and releasing, carry out research on artificial reproduction of burbot, and monitor water quality and aquatic life. (Petro China Limited 2014, 32)

This company is investing in a long-term biodiversity conservation project; the funded station and research could improve and further measure future performance in order to minimise the company's operational impact on biodiversity around the pipeline. They have also established a green belt along the highway in desert since 1993, with continuous maintenance and conservation, with the highway being rewarded as one of the 'Top 10 Most Beautiful Highway' in China in 2014 (Petro China Limited 2014, 31). Company No.39 has a specific project named, 'Conserve marine life' and continuously discloses the progress of the project year on year. In 2013, the company points out its action procedures when discovering protected marine species in its operation site. In 2014, the company takes a further step by providing training for its employees to improve their awareness and abilities to conserve protected marine species. Certain employees need to be qualified as Marine Mammal Observers (MMO) to effectively observe and record the time and location of certain marine species. The qualification of MMO and observations are also disclosed by the company (China Oilfield Services Limited 2014, 29). In 2015, as the result of the training and actions for observation, the company discloses photos and comments from employees. Indeed, corporate efforts to train employees in conservation may be interpreted as transformational and emancipatory. Company No.39 provides training and education for employees to become Marine Mammal

Observers, the related training certificate, observation form and recorded behaviours are disclosed in company's reports. These employees are required to:

... perform effective observation and record the time and location of the appearance of marine mammals. (China Oilfield Services Limited 2014, 29)

When employees see protected rare animals like sea turtles, whales and dolphins during offshore platform operations, they need to report to managers to decide whether to stop the operation. This helps the company reduce its impact on these species. Further, the company also carries out training for environment conservation legislations for employees in different positions, thus, to comprehensively improve employees' awareness and skills for environmental conservation (China Oilfield Services Limited 2015). Company No.32 provides details of the external environment conservation specialists invited for the training, as well as the details of employees who have been trained (Yunnan Chihong Zinc and Germanium Limited 2013). Further, the company also organises public events, knowledge tests and contests, and other forms of activities to further improve employees' awareness and management skills for environmental conservation (Yunnan Chihong Zinc and Germanium Limited 2015). Company No.37 carries out an 'environment safety month' event every year by inviting government professionals to provide training to improve employees' knowledge on environment conservation management. As a result, the company carried out 'enhancement and releasing' activity in Tingjiang River. It also organised an internal contest to select a set of enterprises that qualified as 'superior environment, beautiful ecology' within the Group (Zijin Mining Group Limited 2015).

These examples show that companies are taking action to improve their employees' awareness and skills for environment conservation as well as biodiversity conservation. Most of them actively engage with stakeholders who have professional knowledge to ensure the quality and relevance of the training. Such initiatives could have emancipatory potential as companies are trying to spread the awareness and knowledge to their employees, thus, to improve the companies' capacity for implementing conservation projects.

Species-specific disclosures

As discussed in the extinction accounting literature, emancipatory disclosures focused on species can and should lead to genuine change in corporate behaviour and ultimately to extinction prevention. Our analysis found that some companies appear to be more concerned about species dwelling in habitats affected by their operations than others. Company No.22 discloses that one of its subsidiaries has an extensive 'grove' within its operating site, which people call 'the egret garden', inhabited by hundreds of egrets, commenting,

... The egret has high requirements from the quality of its living environment; thus, it can be considered as an ecological indicator for the regional environment. (China Petroleum and Chemical Limited 2014, 20)

The concept of an 'ecological indicator' suggests that the egret in this case may be seen as a 'canary in a coal mine', as its health represents that of other species in the same habitat.

Company No.39 discloses information relating to sea birds that frequent their offshore platform, pointing out that employees attend to sea birds on the deck injured in a storm. Employees feed the birds, bind their wounds, and release them after they are cured (China Oilfield Services Limited 2014). In this case, the company considers its operating platform as a temporary habitat for surrounding species, and encourage its employees further improve the services that the platform can provide for those species. Moreover, the company provides training for employees to observe marine species, as one of the training results, it discloses the employees' perceptions from their observation, such as,

... on the way to the offshore platform, [we] come across three *phoca largha* [a species of seal] lazily lying on the thick ice, leisurely enjoying a sunbath. As a national priority protected animal, *phoca largha* has a high standard of environment, as the Bohai Sea have set up a *phoca largha* conservation zone. (China Oilfield Services Limited 2015, 31)

These observation records could demonstrate employees' awareness and knowledge about biodiversity around the company's operating site. Moreover, a non-anthropocentric view could be discerned from the words that they use to describe these species as they are talking about the animals as though they have their own intrinsic value and not regarding their relationship with humans.

Company No.34 is carrying out a long-term 'fish multiplication' project, whereby the company releases highly protected fish species such as *Silurus Lanzhouensis*, White Silver Carp, Fancy Carp, and Bighead Carp in to the Yellow River, and aims to maintain the ecological balance of the Yellow River (SDIC Xinji Energy Limited 2013). The company is also establishing an initiative for other water areas and is adopting a scientific approach by cooperating with ecological technology partner to improve its performance. Before releasing these fish, specialists check fish quality and size, add a 'right ear tag' on samples (around one fifth of total released fish) in order to carry out performance assessment for the following project. The company also carries out research on artificial reproduction to improve performance, such as achieving higher fertility rates, and expanding the number of species to maintain genetic balance, detailed quantitative information and a list of species is provided to demonstrate its performance (SDIC Xinji Energy Limited 2014). For each fish releasing activity, the company will arrange specific release places, and number and size of different released fish species, thus, to ensure the successful supplement of endangered rare fish resources. This continuous project not only reduces the hydropower project construction's negative impact on fish resources, but also actively improve the regional ecological environment and aquatic living resources (SDIC Xinji Energy Limited 2015). Working with local institutions and ecological technology organisation allows the company to adopt a more scientific means of implementing its 'fish multiplication' project. The project not only supplements endangered fish resources in various water areas, but also makes breakthroughs on artificial reproduction for various fish species. This finding is not dissimilar to the identification of emancipatory toad accounting in earlier work (Maroun and Atkins 2018). This evidence of species-specific accounting by these Chinese companies strongly suggests the emergence of emancipatory extinction accounting, as defined in Figure 2 in the second column.

Some companies provide detailed information for their greening project by disclosing the name and number of planted species. For example, the Company No.27 discloses that, to beautify the railway line and surrounding environment, the company expands 2,946

square metres greening area by planting Rose, *Ulmus pumila*, Cypress, and Clover, it also planted 640 trees including 92 *Pinus sylvestris*, 486 *Populus bolleana* Lauche, and 62 *Syzygium aromaticum* (China Shenhua Energy Limited 2014).

Disclosing innovative approaches to stakeholder engagement on biodiversity and conservation

We discovered some innovative stakeholder engagement approaches from the companies' disclosures. For example, the Company No.2 is cooperating with Xiamen WWF on an 'earth hour' event, which aims to lead and spread the 'green for all' concept. Moreover, in order to improve teenagers' environmental protection awareness, the company carries out activities in schools and select environmental protection ambassador from students. Furthermore, for the community, the company organises activities like 'low carbon green life' knowledge contest, and invite citizens to visit company's environmental protection facilities, thus, to appeal public to conserve environment (Shengtun Mining Group Limited 2013). In 2014, the company organises its employees to join outdoor activities, thus, to encourage them to participate in environmental protection works, and influence surrounding public's awareness. What is more, the company is an active sponsor and participant of the tree planting activities which organised by local government (Shengtun Mining Group Limited 2014). The company is not only improving the conservation awareness for its employees, but also for the regional communities. Various approaches are designed and implemented based on regional stakeholders and available activities. It can be noticed that the company is trying to demonstrate its leading role in environmental protection by disclosing these stakeholder engagement activities. However, it tends to put the company in a relatively dominant position, rarely concerns the communication with its stakeholders. The company does not have disclosures directly related to biodiversity, which might due to lack of attention or awareness.

In another example, one of the subsidiaries of the Company No.28 is actively communicating the status of its construction of environmental protection facilities through news media and social networks, and invites representatives of regional community residents, environmental organisations, experts, scholars, entrepreneurs, college students and PLA soldiers to visit project plants before the official acceptance of the project. It aims to encourage public supervision and suggestions, and ensured the project meets residents' expectation of a clean environment and considers the interests of local residents (Petro China Limited 2013). The company is innovatively utilised new media platform to widely, publicity and timely engage with stakeholders. The active invitation for representatives of stakeholders demonstrates its concerns with public opinions. It indicates that, with significant development of communication technology, companies are under great pressure from public. One concern raised from the company's disclosures is, the company does not clarify whether this subsidiary's approach is widely applied in company or just limited in this subsidiary.

Although these cases did not directly indicate companies' concerns for biodiversity, the result of stakeholder engagement for ecological conservation issues would indirectly benefit regional biodiversity. Moreover, biodiversity issues could be raised by engaged stakeholders, the public's awareness and demand for biodiversity related conservation could drive companies' attention and practices. Therefore, these innovative approaches

of stakeholder engagement have emancipatory potential to benefit the regional biodiversity. These cases indicate that companies need to create effective communication platform to engage with stakeholders. They also need to adjust communication and disclosures approaches to demonstrate their accountability to the public.

Concluding discussion and recommendations

The analysis showed that the majority of the companies' biodiversity and conservation reporting was disappointing, being dominated by impression management and self-interest, falling far behind any attempt at an emancipatory form of extinction accounting. Where biodiversity conservation was disclosed it is often a marginalised or unrepresented topic, suggesting inadequate engagement between companies and conservation stakeholders. This is consistent with the majority of the prior literature and suggests that the lion's share of the companies' reporting is more consistent with accounting for biodiversity and all the characteristics of this reporting as identified in column one of [Figure 2](#).

We did however isolate disclosures characterised by some elements consistent with an emancipatory extinction accounting framework, as described in [Figure 1](#) and as identified in column two of [Figure 2](#). This was especially the case for species-specific disclosures and where companies discussed close partnerships or engagement with conservation NGOs, research institutions, local communities, and/or local government. These stakeholders are equipped with specialised resources in providing conservation project, biodiversity survey, conservation training, and operation improvement services that assist companies in participating in biodiversity conservation. Some companies focused on educative initiatives, attempt not only to influence their employees, but also local communities and citizens, thus, to improve the attitude and behaviour of the general public. Similar practices were identified in previous studies (Atkins et al. 2016b; Jonäll and Rimmel 2016; Maroun and Atkins 2018) for extinction accounting. These cases demonstrate that these companies have integrated a form of extinction accounting into their operations and tend to lead the emancipatory transformation. In promoting these emancipatory initiatives in China, firstly, the companies could incorporate their overseas experiences and practices on biodiversity conservation into their domestic operations. Secondly, integrated thinking could be incorporated into companies' reporting practice to help them acknowledge the value of all types of resources and their interconnections. This would encourage companies to integrate species extinction into their decision-making and operation processes, thus, to be accountable for the short-, medium- and long-term value creation. Thirdly, as integrated thinking is embedded in the integrated reporting, the integrated reporting is a perfect vehicle for extinction accounting and further foster the emancipatory potential of species protection (King 2016; Maroun and Atkins 2018).

Overall, this study identifies problems relating to impression management and corporate self-interest that are in line with the problems discovered by previous studies, such as the practice of impression management and anthropocentric oriented practices (Jones and Solomon 2013; Rimmel and Jonäll 2013; Van Liempd and Busch 2013; Atkins, Gräbsch, and Jones 2014). These issues are as prevalent among Chinese companies as they are among UK, German, Swedish and Danish companies previously studied. Adopting a holistic approach means that no part of the system can be ignored or exempted from playing their part in enhancing and conserving biodiversity and protecting

species, habitats and ecosystems. Although research that builds new and more effective frameworks for NGO accountability and ecological reporting at governmental, public sector and NGO level is critically important to the future of the planet, exploring ways of rendering corporate reporting on biodiversity and conservation more emancipatory and less imbued with impression management remains critical in order to promote a systems based solution to the current mass extinction crisis. Furthermore, an emancipatory extinction accounting may convey the urgency required to address species and biodiversity loss, as highlighted in the latest Living Planet Report (WWF 2020). In summary, we consider that our study contributes significantly to the extant literature as it provides evidence of nascent emancipatory extinction accounting in a developing economy, responding to calls from the literature for such research (Roberts et al. 2021). Further, we consider the contribution is significant in identifying extinction accounting that is characterised by emancipatory elements in a study that focuses specifically on the mining sector for the first time, providing some cause for optimism, when compared with earlier findings for mining which were more suggestive of biodiversity accounting (with reference to the schema in Figure 2). Specifically, Adler et al. (2017) found no emancipatory elements in biodiversity disclosures by Australian metal and mining companies as the reporting seemed driven by legitimacy concerns rather than by a desire to conserve species. In contrast, we feel the evidence provided in this paper is suggestive of genuine concern for ecological issues and for species preservation. Lastly we feel a contribution of this paper is to crystallise species accounting as a necessary and critical element of extinction accounting, as a focus on disclosing dynamic and transformational efforts to preserve, conserve and enhance populations of specific species affected by a company's operations is essential in efforts to transmute accounting for biodiversity into twenty-first century emancipatory extinction accounting.

Notes

1. This recent body of research exploring emancipatory extinction accounting builds on a substantial body of academic accounting research focusing for several decades on the concept of emancipatory accounting, an accounting that seeks transformation and emancipatory change in actions and behaviours (see: Gallhofer and Haslam 1996, 1997, 2003, 2011, 2019). We seek to bring this literature into analysing ways in which ecological and biodiversity accounting can be framed to enhance conservation, biodiversity protection and to prevent species extinctions.
2. This is consistent with a General Systems Theory (GST) approach as discussed in Von Bertalanffy (1971); Hopper and Powell (1985); Gray, Adams, and Owen (2014), inter alia.
3. The elements of this framework are explained in detail in Maroun and Atkins (2018).

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