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The emancipatory potential of extinction accounting: Exploring current practice in integrated reports

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1. Introduction

The planet is currently experiencing the sixth mass extinction event, with human and business activity being the root cause of species loss and habitat destruction (Ceballos et al., 2010; Ceballos et al., 2015; Kolbert, 2014). The latest scientific research finds that, from a sample of almost half vertebrate species, 32% are decreasing in population size and range as a result of habitat loss, overexploitation, invasion by alien species, pollution and global warming (Ceballos et al., 2017). The most significant finding is that extinction rates have been underestimated due to a focus on specific species rather than the reduction in total population sizes:

> "Population extinctions today are orders of magnitude more frequent than species extinctions. Population extinctions, however, are a prelude to species extinctions, so Earth's sixth mass extinction episode has proceeded further than most assume. The massive loss of populations is already damaging the services ecosystems provide to civilization …. All signs point to ever more powerful assaults on biodiversity in the next two decades, painting a dismal picture of the future of life, including human life" (Ceballos et al., 2017, p.6095).

Given this looming environmental disaster, the accounting and business community cannot simply assume that a scientific solution will be found to prevent extinction and the associated risks which it poses to humanity. Codes of corporate governance and responsible investment (see Institute of Directors in Southern Africa [IOD], 2012; 2016) call on all companies and institutional investors to take a stand on unsustainable business practice. Practitioner-focused books have emerged making a clear business case for reversing declining trends in animal and plant populations in the interest of long-term corporate sustainability (see Atkins and Atkins, 2016; King with Atkins, 2016). These include the outline of an emerging business and reporting framework incorporating initiatives, partnerships and stakeholder engagement designed to mitigate the risk of extinction where companies' activities affect specific species (King with Atkins, 2016; Atkins et al., forthcoming; Atkins et al., 2016). The concern for species preservation is evident in a special issue of *Accounting, Auditing and Accountability Journal (AAAJ)* entitled 'Extinction Accounting and Accountability' examines the theoretical dimensions of an emerging extinction accounting framework in terms of accounting's emancipatory potential designed both to report on and react to the loss of species among other issues (2018).[1]

This emerging area of extinction accounting research provides an excellent starting point for developing a more refined emancipatory tool: a pragmatic means of extinction prevention as well as a theoretical construct which is not entirely grounded in a critical (traditionally Marxist) discourse[2] (Galhofer and Haslam, 2017). The current study makes an important contribution by taking the next step in the development of extinction accounting by exploring how extinction prevention is currently being disclosed in integrated reports as well as demonstrating how an

[1] The papers included in the special issue are: Atkins and Maroun (2018), Adler et al. (2018); Cuckston (2018); Gray and Milne (2018) and Weir (2018).

[2] See the following body of work which develops this theoretical framework Gallhofer & Haslam (1996); Gallhofer & Haslam (1997); Gallhofer & Haslam (2003) Gallhofer & Haslam (2011); Gallhofer, Haslam & Yonekura (2013); Gallhofer, Haslam & Yonekura (2015); Gallhofer and Haslam (2017).

extinction accounting framework may be operationalised. An interpretive methodological approach is adopted and we use interpretive, and at times critical, textual analysis to reveal elements of extinction accounting from an extensive selection of South African listed companies' integrated reports. Further, the paper seeks to problematize the current approach to extinction accounting in practice by addressing several aspects of current accounting practice in a critical and reflective manner. Firstly, we discuss whether or not the terminology and approaches adopted to address extinction issues, especially within integrated reporting, are appropriate and sufficient to be emancipatory. Second, we consider specifically the concept of natural capital and discuss whether this term *per se* stifles an emancipatory approach to extinction accounting. Third, we develop earlier discussions in the literature around the term and concept of biodiversity and its application in accounting. Again, we querying if 'accounting for biodiversity' has emancipatory potential or is more likely to result in vague notions of nature and wildlife in integrated reports which do not result in transformational or emancipatory change. We also return to a concern in the prior literature about the GRI principles relating to extinction accounting that their use alone would produce merely a 'fossil record' of species. Further, we consider what the concept of 'value creation', so central to integrated reporting, actually means in relation to 'natural capital'.

We posit that unless extinction accounting is emancipatory, or at least progressive in nature, extinctions will not be prevented at either population or species level and all of the worst predictions about the future of the planet will be borne out. In other words, by prioritising an emancipatory extinction accounting, businesses will transform their ethos, activities and business strategy to slow and stop extinction trends. The prior research argues that current extinction prevention initiatives reported by companies are not emancipatory but rather embed hegemonic anthropocentric attitudes to nature and wildlife (see Tregidga, 2013; Romi and Longing, 2016; Atkins and Maroun, 2018). Transforming these leads to an emancipatory or, at a minimum, more progressive capitalism which ultimately increases species populations and reduces extinctions.

The remainder of this paper is structured as follows. Section two explores biodiversity and species under threat of extinction within a South African context. In section three we discuss the theoretical framework with a focus on emancipatory accounting. Section four presents the research method. In section five there is a discussion of South African integrated report content and the paper concludes in section six.

2. South African biodiversity and species endangered by extinction

The South African National Biodiversity Institute, a public entity created by the Department of Environmental Affairs, is tasked with, *inter alia*, leading and coordinating research on the state of biodiversity and reporting changes in biodiversity mass (Wynberg, 2002; South African National Biodiversity Institute, 2014). The IUCN's Red List Categories and Criteria have been developed over a period of almost 90 years (see Atkins et al., forthcoming) and are used to classify species (SANBI, 2017a) as depicted in Figure 1.

Insert Figure 1 about here

South Africa is regarded as one of the world's most biologically diverse regions. There are an estimated one million species living in 9 biomes, some of which are unique to South Africa

(Wynberg, 2002) forming part of 12 megadiverse regions which, collectively, account for two thirds of global biodiversity (Daly and Friedmann, 2016). Nevertheless, human behaviour has had a significant impact on local biodiversity with numerous species classified as threatened or of conservation concern (see Figure 1).

The rhinoceros is a high profile illustration of a species threatened with extinction. A combination of habitat loss, climate change and unprecedented levels of poaching to supply illegal trade in rhinoceros horn, has placed significant pressure on populations (South African Department of Environmental Affairs, 2013; 2015). The African Wild Dog may face a similar fate. The species requires a large home range putting it in direct competition with expanding human settlements. In addition, they are often misunderstood as posing a significant threat to livestock leading to conflict with farmers. As a result, it is estimated that only 250 individuals remain in the wild (EWT, 2016c). The African Vulture is another example of a species which is critically endangered due largely to harvesting for traditional medicine, killing by farmers, human encroachment on wilderness areas and the effects of climate change (Ogada et al., 2016). The giraffe is another species threatened with extinction as almost 40% of the population has been lost over the last 40 years (Carrington, 2016).

The risk of extinction is not limited to Africa's large mammals and birds. Several insects (such as the honey bee) and amphibians (for, example, the reed frog) are included on the IUCN's red list (Atkins et al., 2016; SANBI, 2017b). Numerous plant species are also at risk. Just under 12% of South Africa's flora is classified as a conservation concern and approximately 14% are listed as threatened (SANBI, 2017b). This is attributed mainly to the conversion of natural areas for urban, industrial and agricultural use; degradation of habitats due to inappropriate fire management, land clearing and over grazing; and unsustainable harvesting of plants for trade or use in medicines, building materials and traditional practices (SANBI, 2015; EWT, 2016a; SANBI, 2017b).

The 2016 Red List assessment driven by the EWT and SANBI provides an account of some of South Africa's most endangered species. A total of 331 species were assessed with 19% classified as threatened and 13% as near threatened representing a 66% increase (from 2004) in the number of species which are at greater risk of extinction (Daly and Friedmann, 2016; Cuckston, 2018). Individual species classified as critically endangered or endangered are summarised in Table 1.

Insert Table 1 about here

An anthropocentric case for protecting South Africa's biodiversity and preventing extinction of species is easy to make. It is estimated that ecosystem services contribute ZAR73[3] billion per annum to the South African economy or approximately 7% of GDP (Wynberg, 2002; Maroun, 2016). For example, several mammal species play an essential role in controlling pests, dispersing seeds, and recycling nutrients which are essential for the agricultural sector (EWT, 2016b). Perhaps most important are the insect species (including the honey bee) which provide invaluable pollination services necessary for commercial-scale production of several crops which are either grown for local consumption or sold on international markets (Melin et al., 2014; Atkins et al., 2016). Some plants and animals also hold direct financial value. They are reared, grown or

[3] Approximately USD6 Billion

harvested as a source of food, for use in medical products or auctioned for personal use (EWT, 2016b). South Africa's wildlife (in particular, the iconic Big 5[4]) are a core aspect of the ecotourism industry. An opportunity to see Africa's large birds and mammals in their natural habitat attracts millions of visitors each year to the country's game reserves, creating employment for rural communities and generating much-needed foreign exchange.

However, natural systems cannot be understood only in terms of the financial benefits they offer humanity. This is explained by Naess (1973), who argued for the need for a non-anthropocentric or deep ecological conceptualisation of nature 'which views the survival of natural systems and the capacity of the planet for self-renewal as crucial to all life, human as well as non-human' (Khisty, 2006, p299). Deep ecologists dispute the Judeo-Christian position of humanity occupying a central role on the planet (Sessions, 1995) and question the emphasis placed on improving standards of living to the detriment of the quality of all forms of life on Earth (Naess, 1972). Given the increased (and unsustainable) impact which people are having on the biosphere, dep ecologists argue that attitudes and polices need to change to ensure continuity of human and non-human life (Khisty, 2006, Christian, 2016). An anthropocentric approach to nature and biodiversity which uses the term 'natural capital' to describe 'life on earth' and 'ecosystem services' to describe the natural balance of nature assumes that all flora and fauna are simply in existence for our use and abuse. This approach is directly opposed to the views of deep green ecologists and nature lovers who see us all as part of one system (Lovelock, 1979; 2009; 2014; Naess, 1973). The preservation of biodiversity should be understood as a moral, ethical and cultural imperative which is mutually exclusive from the value people assign to different species (Devall and Sessions 1985; Khisty, 2006; Jones and Solomon, 2013).

Framed according to a deep ecological paradigm, the splendour of Africa's wilderness areas, coupled with the fact that these are some of the last places on earth where multiple species exist with limited human interference, means that humanity is obligated to respect and protect these ecosystems. Similarly, many plant and animal species, such as the rhinoceros, elephant and lion, have become an integral part of Africa's identify. Their loss would be a significant financial blow and a moral and cultural tragedy for a Continent which has become synonymous with natural beauty and large populations of wildlife. Finally, as contemporary society becomes more removed from the natural world, it becomes easy to forget that we are only a single part of an interconnected biosphere which we still do not fully understand. The loss of species which people do not currently think are important may have catastrophic consequences for all life on Earth (see Ceballos et al., 2017).

3. From accounting for biodiversity to extinction accounting

On the limitations of biodiversity reporting

Most of the prior research paints a negative perspective on the state of the planet and the role of different types of corporate reporting to reverse extinction trends (Atkins et al., 2016). For example, Tregidga et al. (2014) argues that much of the development in sustainability reporting reflects corporations' efforts to reframe pressing environmental issues as financial considerations

[4] In alphabetical order: buffalo, elephant, leopard, lion and rhinoceros

to mitigate calls for change. Despite growing scientific evidence of human behaviour driving global warming, habitat destruction and an unprecedented loss of species (Intergovernmental Panel on Climate Change, 2013), the corporate reporting model remains firmly focused on explaining value creation from a financial perspective (Gray, 2010). Urgent changes in consumer behaviour, business models and investment practices are presented as exceeding the limits of organisations' responsibility or something which can only reasonably be expected to be resolved in the long-term. Even when the need for immediate action is recognised, responsibility for taking the initiative is normally vested with governments and environmental agencies (Malsch, 2013; Cho et al., 2015; Burritt and Lehman, 1995; Lehman 2002). As a result, critical theorists have argued that the pace at which corporations are engaging with the risks posed by a deteriorating planet, rethinking their business-as-usual approach and explaining how they are contributing to a sustainable future is sorely lacking (Gray et al., 1995; Milne et al., 2009; Tregidga, 2013). Codes of best practice established to encourage an awareness of important social and environmental issues may not have had the desired effect. According to the GRI,

> 'Sustainability reporting, as promoted by the GRI Standards, is an organization's practice of reporting publicly on its economic, environmental, and/or social impacts, and hence its contributions – positive or negative – towards the goal of sustainable development' (GRI, 2016, p. 3).

Application of the GRI's guidelines has grown significantly (KPMG, 2012). It is estimated that 95% of the world's largest companies prepare sustainability reports (or equivalent) which include details on their CSR or ESG practices and that the number of these reports filed with the GRI has grown exponentially (Dumay et al., 2010; Hughen et al., 2014). In particular, the extent to which companies are reporting on biodiversity-related issues has also increased (Atkins et al., 2016), probably due to the GRI's position (see *GRI304*) on biodiversity,

> 'Protecting biological diversity is important for ensuring the survival of plant and animal species, genetic diversity, and natural ecosystems. In addition, natural ecosystems provide clean water and air, and contribute to food security and human health. Biodiversity also contributes directly to local livelihoods, making it essential for achieving poverty reduction, and thus sustainable development' (GRI, 2016, p. 185).

Where companies report on biodiversity under the GRI, there is an expectation that they, having developed the systems necessary to track details on species and habitats affected by their operations, have a greater appreciation of their impact on the environment and take steps to prevent or reverse biodiversity loss (Bebbington et al., 1999; Atkins et al., 2015). This is not necessarily the case. A significant criticism of the GRI is that it fails to define 'sustainability' and 'sustainable development' explicitly (Milne et al., 2009) and establish exactly *how* an organisation should incorporate biodiversity management as part of its risk assessment, strategy and operational practices (Mansoor and Maroun, 2016). Instead, principles are explained very broadly; are difficult for organisations to apply in the unique contexts of their business model and may be interpreted by companies as a disclosure checklist rather than a framework for reducing biodiversity risks or preventing extinction (see Farneti and Guthrie, 2009; Milne et al., 2009; Dumay et al., 2010; Jones and Solomon, 2013). Consequently, there is no guarantee that statements on compliance with the

GRI and increases in the extent of non-financial reporting translate into clear policies and actions on conserving biodiversity or reversing biodiversity loss. This remains the case even after the most recent development in the sustainability movement: integrated reporting. According to the IIRC, integrated reporting is:

> 'a process founded on integrated thinking that results in a periodic integrated report by an organization about value creation over time and related communications regarding aspects of value creation…" (IIRC, 2013, p. 33).

The value creation process should take cognisance of interconnection between different types of capital (including: financial, manufactured, intellectual, environmental, human and social and relationship capital) in the context of the entity's strategy, risks and operating model (Eccles and Krzus, 2010; Eccles and Saltzman, 2011). In theory, this integrated thinking framework should be well suited for framing how biodiversity should be understood and reported on by organisations. However, the equal treatment of the six capitals could be called into question when we consider that 'natural' capital represents life on earth and the ecosystem, without which the other five are rendered meaningless. In addition, companies could be expected to analyse risks associated with biodiversity loss, explain why these are considered material, the plans they have in place to address biodiversity risks and the different capitals required to effect these plans (Atkins et al., 2015). However, initial reviews of biodiversity reporting under the IIRC's integrated reporting framework have revealed a number of weaknesses. Consistent with prior research examining biodiversity reporting according to the GRI's guidelines (Jones and Solomon, 2013; Rimmel and Jonäll, 2013; van Liempd and Busch, 2013), companies do not define 'biodiversity' clearly. The link between business risks and biodiversity losses, internal management practices and forward-looking analysis of biodiversity is also limited (Mansoor and Maroun, 2016; Maroun, 2016). This can be attributed to the difficulty of identifying and understanding the business case for biodiversity management (Jones, 1996); the practical challenge of applying a new reporting framework which is principles–based and does not provide reporting prescriptions (De Villiers et al., 2014; Dumay et al, 2017) and underdeveloped accounting infrastructure and management control systems necessary for collecting and processing data on biodiversity (see Alrazi et al., 2015; Mc Nally et al, 2017). Indeed, the majority of biodiversity-related disclosures tend to be anthropocentric in nature, with a focus on risk (financial and reputational) management and with very little species-specific reporting, except for 'charismatic' species and 'attractive' mammals (Atkins et. al., 2014). Further it has been suggested that the very use of the term 'biodiversity' is inappropriate 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" (Jones and Solomon, 2013, p.683).

To address the limitations of existing reporting guidelines, this research proposes a form of corporate narrative reporting which relies on providing details on biodiversity affected by an organisation's business activity and explaining how its acts to mitigate its biodiversity-related risk. The normative nature of the reporting model is informed by a deep ecological stance which recognises the need for academics to promote change (Khisty, 2006). It also takes into consideration the view that recommendations need to be capable of practical implementation if steps are to be taken to address the already alarm rates of extinction (see Ceballos et al., 2017). As

such, a framework inspired by the deep-ecological movement does not have to require radical economic, social or political change which may not be feasible in the short-term; it may possible to use the features of existing accounting infrastructure to contribute to improved transparency and accountability and operationalise sustainable development (Gray, 1992; Jones and Solomon, 2013). This can take into consideration the intrinsic value of the natural world (as espoused by deep ecologists) while simultaneously recognising the anthropocentric case for preserving so-called 'natural capital' (Atkins and Maroun, 2018). Grounding recommended changes to accounting practice in a deep ecological paradigm also requires more than just impression or reputation risk management. Deep ecology necessitates a genuine commitment to protecting species and preventing extinction on ecological, moral and social grounds (see Gray, 1992). In other words, if accounting is going to be used to combat extinction, it must have an emancipatory potential which is more effective and transformative than previous type of biodiversity reporting forms (consider Gallhofer and Haslam, 2017).

An extinction accounting framework

Extinction accounting is intended as a means of reporting on biodiversity-related risks which creates an awareness of the importance of managing biodiversity loss (including the risk of extinction). It is hoped that detailed reporting on extinction and extinction prevention will, in turn, encourage companies to conceptualise and communicate how they may be able to mitigate the risk of different species becoming extinct. This takes into account the fact that, rather than constrain the sustainability movement (Tregidga et al., 2014), accounting can function as an agent of "social well-being or welfare" and, more broadly, as an "emancipatory project" designed to encourage changes in mind-sets (Gallhofer and Haslam, 2003, p.162) and "bring about social change" (Gallhofer and Haslam, 1996, p.25).

In the context of extinction accounting, bringing about social change translates as preventing species extinctions as:

> "A vision of accounting as an emancipatory force is consistent with seeing accounting as a communicative social practice that functions as a system of informing that renders transparent and enlightens with the effect of social betterment. It is a vision in which a progressive community comes to control accounting rather than be controlled by it, a reflection of a proper accountability" (Gallhofer and Haslam, 2003, p.7).

This paper contributes to a relatively new departure in the academic accounting literature which employs the emancipatory accounting concept in a more pragmatic and less radical way than earlier research. In other words, evolution of the emancipatory accounting project is beginning to create paths which allow an emancipatory development within the capitalist system rather than one which attempts to overthrow current practice, along similar lines as expressed here,

> "More generally, there is a move away … from the position that emancipatory accounting – if still a radically progressive notion – necessarily reduces to an accounting that is an instrument of revolutionary or grand radical transformation consistent with the position suggested in the Marx-inspired line of thought pursued by Tinker" (Gallhofer and Haslam, 2017, p. 6).

This is not to say that the limitations of existing reporting frameworks are ignored. For extinction accounting to contribute to change, it needs to take into consideration weaknesses in integrated and sustainability reports which fail to explain clearly the interconnection between reporting on the environment and acting on identified risks (see Tregidga et al., 2014; Cho et al., 2015). An extinction accounting framework needs to ensure that: (i) sufficient information on affected species is provided; (ii) the reasons for being concerned with extinction are established and (iii) the policies, plans and actions taken to respond to the possible extinction of species are consistently reviewed and reported on (Jones, 1996; Jones and Solomon, 2013; Tregidga, 2013). The outline of a simple extinction accounting framework is presented in Table 2.

Insert Table 2 about here

The first element contains descriptive information and is based mainly on the recommendations in *GRI304*. Examples include information on number of species affected by operations and geographical areas under review (see GRI, 2016). While the GRI has limitations (as discussed earlier), grounding Element 1 of the extinction accounting framework in well-established reporting discourse increases the probability of the proposed accounting being understood and applied by practitioners as it ensures the development of a reporting framework which is consistent with, and fits within, the current system (Atkins et al., 2016). The aim is to describe the risks posed by biodiversity loss (including extinction) and explain the motivations for preserving biodiversity (Atkins et al., 2016). Both anthropocentric *and* deep ecological factors should be considered. This is to ensure that biodiversity is not understood only in monetary terms while avoiding a situation where environmental concerns appear to be too far removed from current business practice by an investor community which may not understand deep ecology completely.

Deep ecologists will probably be disappointed by a strong anthropocentric view of nature. The proposed framework is not, however, intended to be a substitute for Capitalism. The framework is a necessary compromise in the short-term to ensure that companies and stakeholders understand the relevance of extinction and mobilise existing systems of corporate governance to assist with the mitigation of associated risks. For example, principles in codes on governance dealing with the need to manage both financial and 'non-financial'[5] capital and understand the impact of risks (including environmental-related risks) on the value creation process (see, for example, Eccles and Saltzman, 2011; IOD, 2016) can be applied to the threat of extinction of species once this biological issue is framed and understood in existing business discourse[6]. The information provided in Element 1 may be in the form of tables, graphs, pictures or qualitative information (referred to collectively as biodiversity narrative) according to its complexity and the detail required to ensure that users understand the relevant biodiversity issues under consideration.

[5] We consider the term 'non-financial' to be a misnomer in its misrepresentation of environmental risks which are in fact financial in nature (see for example, Solomon et al., 2011).

[6] South Africa's most recent code on corporate governance (King-IV) specifically requires a company's strategy and risk assessment to take the underlying triple context (economy, environment and society) and the 6 capitals referred to by the IIRC into account (see IOD, 2016). This in no way infers that environmental and social factors are not financial but that they must be integrated because they are financial and represent core component of any corporate strategy or business plan.

In the second and third Elements, the organisation supports the biodiversity narrative with an explanation of how it plans to prevent extinction and improve biodiversity mass (cf Cho et al., 2015). This includes detailed information on the actions taken to prevent harm. Due to the complexity of programmes aimed at preventing loss of species, anti-extinction programmes are likely to involve partnerships with governmental agencies, NGOs, scientific groups and other stakeholders (van Liempd and Busch, 2013) which the organisation needs to explain in its extinction accounting. Elements 2 and 3 are essential for establishing a clear link between operational practices and environmental policies and preventing extinction accounting being misinterpreted as an example of counter-coupled rhetoric and action (Malsch, 2013; Cho et al., 2015). This element of the reporting process also takes cognisance of the guidance given in existing codes of corporate governance which emphasise the importance of ensuring that an organisation's broad strategic objectives are supported by sufficiently detailed policies/plans, a clear understanding of steps taken to implement these plans and the availability of appropriate skill and expertise to achieve objectives (see IOD, 2016).

Elements 4 and 5 are a type of post-implementation review. The organisation assesses its performance in addressing biodiversity risks (Element 2 and 3) in terms of its polices and pre-established objectives. This can include a formal biodiversity audit to quantify environmental impact. Reflecting on the outcomes of the extinction model reinforces the connection between corporate reporting and action necessary for preventing extinction accounting from becoming superficial (see Malsch, 2013; Cho et al., 2015). Regular review of environmental performance and targets can also be used to drive financial and 'non-financial' efficiencies, maintain commitment to extinction prevention initiatives and encourage the development of new and creative approaches to addressing extinction risks (see Melnyk et al., 2003; Brown and Dillard, 2014; Alrazi et al., 2015).

In the final element of the extinction accounting framework, the organisation ensures that the entire species extinction prevention process is incorporated in its primary report to stakeholders. The business aims to explain the interconnection between the risk of species loss and strategy, how it reacted to these risks and its successes and failures in mitigating risks (see IIRC, 2013). Importantly, the extinction accounting framework is forward-looking. The company needs to explain the results of its assessment of biodiversity action plans (including the outcomes of environmental audits) and detail how it plans to react to the risks posed by biodiversity loss in the future.

The reporting approach is informed significantly by the guidance provided by South Africa's *King IV Report on Corporate Governance* (IOD, 2016). This stresses the importance of reporting in a manner which 'enables stakeholders to make informed assessments of the organisation's performance and its short-, medium- and long-term prospects' (IOD, 2016, Principle 5). To achieve this, an integrated approach to reporting is required (IOD, 2016, Principle 4) which, when it comes to extinction accounting, is able to explain how the risk of extinction impacts keys aspects of the value creation process, where we consider that value can no longer be based around purely traditional financial measures but also on creation of value in relation to 'natural capital' and societal welfare.

4. Method

In this paper we analyse interpretively, and to some extent critically, the extinction/species-related disclosures within a large sample of integrated reports to assess the extent to which they are consistent with the tentative extinction accounting framework proposed in the recent literature. We interpret details reported in companies' integrated and/or sustainability reports as more than merely forming part of a neutral accounting and reporting function (McNicholas and Barrett, 2005; Gallhofer et al., 2015). Rather, they provide insights into companies' understanding of their role in preserving 'natural capital', including the prevention of extinction of species. We also attempt to gauge the extent to which such accounting is indeed emancipatory in nature and whether integrated reporting is delivering an emancipatory extinction accounting.

Selection of companies

The intention is not to test for the widespread application of extinction accounting but to document in detail information currently being reported on species loss and extinction prevention efforts in order to demonstrate what a comprehensive extinction account might contain. For this reason, the research concentrates on the largest 40 companies on the Johannesburg Stock Exchange (JSE)[7]. This includes organisations with direct and indirect environmental impacts and subject to more significant stakeholder and regulatory scrutiny than smaller concerns (Deegan et al., 2002). Large listed companies are also more likely to have mature reporting systems, a developed accounting infrastructure and the expertise to prepare high quality sustainability or integrated reports (Alrazi et al., 2015; Romi and Longing, 2016). Overall, the choice of companies ensured that the findings were not specific to a particular type of business/industry or constrained by companies' being in a developmental stage of their reporting process.

The researchers chose to focus on South Africa due to the country's long-standing stakeholder-centric corporate governance system (Solomon, 2013) and its mature financial and non-financial reporting environment (Rossouw et al., 2002; Maroun et al., 2014). Integrated and sustainability reports are expected to contain material environmental disclosures, including biodiversity-specific content (Solomon and Maroun, 2012). This detail can be aggregated and used to develop a more complete outline of what a comprehensive extinction accounting framework would contain and how it would be presented to stakeholders. This includes the preparation of a reporting matrix which summarises the different elements of extinction accounting and, due to an established integrated and sustainability reporting culture, can be applied in the short-term by practitioners interested in participating in an extinction prevention movement.

Data collection and analysis

Data were collected using interpretive text analysis of the companies' integrated and sustainability reports from 2011 to 2016. This is the period following the formal adoption of the IIRC's framework by South Africa to date. A total of 120 reports were analysed complemented by content found on companies' webpages as at 1 December 2016[8]. The intention is not to report on changes

[7] This was by market capitalisation at the time of data collection in December 2016.

[8] The researchers were unable to gain access to website content for the full period under review.

in disclosure trends or practices over time but to consider the different types of biodiversity-related disclosures being reported cumulatively to date and which may be used to inform a comprehensive extinction account.

Each corporate report and company webpage was read several times to identify issues relating to biodiversity. Three specific types of disclosure served as the unit of analysis: narrative on particular endangered species, disclosures recommended by the GRI and references to extinction in general. This is in keeping with the aim of using existing disclosure themes or principles to illustrate the content of a comprehensive extinction account and the decision to avoid creating a frequency table of specific disclosure items. Software (such as ATLAS-TI) was not used to code the report as there is no generally accepted biodiversity or extinction reporting framework to use as a reference. To maximise the exploratory potential of the study, the researchers examined each report and webpage individually and reflected on whether or not specific content could be used in an illustrative extinction account. For this purpose, the elements in the extinction accounting framework (see Table 2) were used as code headings to organise content found in the integrated and sustainability reports or on companies' webpages (adapted from Llewelyn, 2003; Laine, 2009). To ensure validity and reliability, the coding was reviewed by a research assistant to ensure that all sections of the integrated reports, sustainability reports and webpages were reviewed and coded consistently. Draft results were presented at two conferences to ensure that the findings resonated with a broad audience.

Interpretive and critical research findings

No single company dealt with each of the disclosure themes or elements discussed in Section 3.2. This is, we feel, to be expected giving the still emergent nature of integrated reporting (De Villiers et al., 2014; Massa et al., 2015) and, more specifically, biodiversity reporting (Jones and Solomon, 2013; Mansoor and Maroun, 2016). However, there are some glimpses of what *emancipatory* extinction accounting could look like.

Illustration of Element 1 – Extinction accounting context

Reporting on ecosystems and species affected by an organisation's business activities provides stakeholders with an understanding of biodiversity impact (GRI, 2016). There were several examples of companies providing details on the nature of threatened ecosystems, their sizes, location and importance from a biological perspective. For instance:

> 'The Valdivian Coastal Reserve Conservation Project, managed by the Nature Conservancy, comprises almost 50,000 hectares located within the Los Rios region of Chile. It is bounded by the Pacific Ocean on the west and the Andes Mountains on the east. It is recognised by conservation non-government organisations as one of 34 world 'hotspots' based on the largest number of species facing significant conservation threats. It is an area of rich biodiversity, including ancient Alerce forests (Alerce trees can live for more than 3,600 years), one of the smallest species of deer and one of the world's largest woodpeckers' (BHP Billiton, Sustainability Report, 2013).

These types of descriptive disclosures are useful for drawing stakeholders' attention to important ecosystems and, more importantly, demonstrating that the company is at least aware of flora and fauna affected by its operations. Reporting this element alone is insufficient as a means of ensuring that companies prevent species extinction. Nevertheless, to contextualise the risk of species loss (including extinction), there is a sense that the environment is being understood (to some extent) in a deep ecological manner. The company is attempting to establish the biological significance of natural systems, the interconnectedness of species and the role of each in an ecosystem's continual functioning, suggesting that a duty of accountability for preventing the loss of the affected species. Consider the following extract from a sustainability report (see Figure 2).

Insert Figure 2 about here

The extract identifies the business unit and geographical area under review and explains the associated biodiversity risk. As discussed in more detail later in the analysis, it also explains the steps being taken by the company to minimise its biodiversity impact. Providing an indication of the specific species under threat by operations, the IUCN categorisation and population sizes, may have provided a better understanding of the magnitude of the extinction risk (Jones, 1996; GRI, 2016). The disclosure also stops short of explaining explicitly the anthropocentric or deep ecological case for preserving biodiversity (Jones and Solomon, 2013). Nevertheless, the sustainability report establishes a clear link between mining operations and specific environmental challenges in a way which is easy to understand and demonstrates an awareness of the need to mitigate biodiversity-related risks. It certainly provides a strong starting point for progressing extinction accounting towards a more transformational form and content.

Reporting on biodiversity risk by business unit and area of operation can be supported by a clear policy statement which explains a company's assessment of biodiversity issues and provides a framework for evaluating the types of actions which are taken to reverse extinction trends (see Jones and Solomon, 2013; Rimmel and Jonäll, 2013; Mansoor and Maroun, 2016). For example, the following statement is included as part of a company's sustainability policy:

> "[We] do not explore or extract resources within the boundaries of International Union for Conservation of Nature (IUCN) Protected Areas Categories I-IV, unless a Biodiversity Action Plan is implemented that delivers measurable benefits to biodiversity commensurate with the level of expected biodiversity impact and meets regulatory requirements" (BHP Billiton, Sustainability Report, 2015).

As mentioned earlier, 'biodiversity' is a catch all phrase which means very little without an appreciation of specific species and their value to the ecosystem as a whole. These notions were raised in previous literature criticising biodiversity reporting where the use of the term itself creates an unclear, generalised view of 'natural capital' which is difficult to understand and, given its generality and non-specific approach, may be in effect meaningless (see Jones and Solomon, 2013). Consider the following disclosure:

> 'We are committed to identifying technology opportunities to minimise our environmental impact. An important initiative in this area has been the development of a 'biodiversity overlap assessment tool', through which we will be overlaying

> biodiversity data available from the World Database on Protected Areas (WDPA) with our own site-based data. This will further help us to identify and prioritise the main biodiversity risks and opportunities for our operations and is a first step towards piecing together a global map of Anglo American operations in relation to protected areas'. (Anglo American, Sustainable Development Report, 2011)

It can be argued that the above disclosure stops short of giving a detailed explanation of extinction-specific risks, how this assessment tool is used and the results of any analysis (consider Milne et al., 2009; Cho et al., 2015). Extinction accounting would specify species under threat and how the 'tool' actually works to prevent loss of key species. From a critical perspective, the disclosure does not present real change in comparison to biodiversity reporting and could be interpreted critically as impression management rather than a genuine commitment to species protection (Atkins et al., 2014). More optimistically, the example provides evidence of the development in extinction reporting where companies are beginning to provide broad policy plans or objectives which could be refined and used to frame specific extinction prevention.

Another company provides detailed context on its commitment to preventing extinction. Richemont includes a case study on its participation in the formation of trans-frontier conservation areas (TFCAs) or 'peace parks' in Africa in its 2012 annual report:

> 'Pivotal in this great undertaking is Peace Parks Foundation, which this year marks 15 years of dedication to facilitating the establishment of Southern Africa's **vast and vital peace parks** and developing the human resources to support **sustainable local economic development**, the **conservation of biodiversity**, and **regional peace and stability**…it is with deep appreciation and **humble honour** that we consider the progress made in conserving **our natural heritage and wildlife resources**, in **sharing new science and best practices**, and in **pushing back the ravages of poverty and the indignity** of unemployment. For this is a dream of a **better reality for Africa and her people** that has much meaning to convey in a **world grappling with issues of sustainability**' (Richemont, Annual Report and Accounts, 2012, p35, emphasis added).

As is the case with the first example, a detailed list of species affected cross referenced to the magnitude of, and changes in, extinction risk is not provided. The vagary of the term 'biodiversity' fails to annunciate specific species risk, in our view. The company does, however, provide a good indication of its rationale for participating in peace park initiatives. This seems to be grounded in a deep ecological perspective which stresses the importance of the intrinsic value of wilderness areas, the relevance of 'natural heritage', and the role of conservation projects in promoting sustainability and combating poverty (see Khisty, 2006; Jones and Solomon, 2013). The report is supported by a detailed schedule of activities taken from 1997 to 2012 (the date of the report) which, in our opinion, iterates a sense of genuine concern for and commitment to preventing extinction. There is also substantial emotional content here, as the company expresses a deep appreciation and humble honour towards nature, reflecting the findings on rhinoceros reporting (Atkins et al., forthcoming). There is, however, a risk that social and environmental issues are being mentioned in a type of emotive value statement rather than as a signifier of action.

Elements 2 & 3 – Reporting on actions and partnerships

For extinction accounting to be emancipatory, it needs to explain how extinction prevention policy translates to specific actions to reverse extinction trends and the results of any conservation or environmental initiatives on rates of species loss (see Brown and Dillard, 2014; Cho et al., 2015; Gallhofer et al., 2015). There are some examples of an early form of this level of reporting:

> 'Wetlands around the Jansen Potash Project, in Saskatchewan, Canada, are home to a range of sensitive amphibian species including the Canadian toad. To mitigate potential effects the Jansen Project may have on these toads, the Canadian Toad Relocation and Monitoring Program was initiated in 2012. To date, 45 adult toads have been collected, 44 of which had their feet tagged with a fluorescent elastomer. These adults and **subsequently 204 metamorphs and 21 toad tadpoles were released into wetlands that will not be disturbed by Project activities and have habitat to which they are accustomed**' (BHP Billiton, Sustainability Report, 2015, emphasis added).

The disclosure explains the species which needs to be protected and the geographical area of operation under review (Element 1). This is followed by an explanation of the conservation initiative supported by quantified details on the number of individual animals assisted by the scheme. We feel that this is exactly the type of species-specific reporting which could form the tentative steps towards an *emancipatory* extinction accounting. There is still a long way to go but the disclosure has the correct approach. Similarly,

> 'While the animals inside our supply chain are our main concern, we also believe we have an **ethical obligation** to minimise human-wildlife conflict. For several years, Woolworths has been involved with sponsoring and training Anatolian guard dogs as well as the publication of a conservation manual for sheep and cattle farmers. **Woolworths has now committed R4.7 million over three years** to create a sustainable wildlife friendly lamb supply. The funding will go to key NGOs operating in Southern Africa: Conservation South Africa, the Cape Leopard Trust, the Landmark Foundation and the Endangered Wildlife Trust. **These NGOs are tasked with enlisting farmers in a programme** to trial various non-lethal predator control methods such as the use of Anatolian guard dogs, llamas, protective collars, alpacas and shepherds to protect livestock. **Woolworths will then source lamb from these farmers** (Woolworths, Sustainability Report, 2014, emphasis added).

The company provides context for its disclosure by articulating an environmental issue (conflict between predators and sheep farmers) as an ethical (rather than entirely financial) imperative. This is also referenced to its broader strategy of being an environmentally responsible retailer (Woolworths, Sustainability Report, 2014). Details on the intervention developed, the cost of the project and the time frame are provided to explain how the company fulfils its strategy and moral obligation (cf Tregidga et al., 2014; Cho et al., 2015). The narrative also provides details on the partnership between the retailer and different NGOs including the responsibility of each party.

Similarly, a second company explains its collaboration with different environmental groups to reduce the biodiversity impact of agricultural activity:

> 'Since 2001, we have worked with three NGOs in the British American Tobacco Biodiversity Partnership: Fauna & Flora International, the Tropical Biology Association and Earthwatch Institute. The Partnership seeks to address some of the challenging issues surrounding the conservation and management of biodiversity within agricultural landscapes and the ecosystems on which we depend' (British American Tobacco, Sustainability Report, 2013).

The disclosure does not give quantified performance measures, costs and timeframes but it does show that the company is aware of its biodiversity impact and is taking steps to mitigate associated risks by collaborating with organisations which have a well-established track record in environmental responsibility. However, the discussion is non-specific and does not attempt to identify any actual threatened species.

A more detailed illustration of action-focused reporting is provided by a financial services firm. First Rand explains an environment fund established to support conservation projects. It explains how the fund has played 'a critical role in conserving biodiversity, protecting endangered species and educating communities about reducing environmental degradation, deforestation, pollution and creating "green" jobs' (First Rand, Integrated Report, 2013). This is supported by quantitative disclosures on fund performance, see Figure 3.

Insert Figure 3 about here

Importantly, the disclosures are not focused only on financial performance. Figure 3 shows reporting on the Rand-value of investments (approximately USD540 000) as well as statistics on human capital (number of trainees and jobs created) and natural capital (species and hectares conserved) in line with a multi-capital approach to reporting suggested by the IIRC (see Atkins and Maroun, 2015; Massa et al., 2015). There is a need for the disclosures to list affected species and effects on their populations resulting from such initiatives if the company is to produce a truly emancipatory extinction account.

As a final illustration of Element 2 of the extinction accounting framework, consider the anti-rhino poaching disclosures included in Investec's corporate reports (2015). The narrative opens with a statement identifying the species, explaining the extinction risk (albeit indirectly) and expressing outrage:

> "South Africa loses rhinos on a daily basis. The rhino crisis has become the most significant conservation issue faced by the country. Poaching attacks represent lawlessness, a lack of political will, human greed and a disregard for the well-being of animals in spite of the most dramatic public response in our conservation history" (Investec, Sustainability Report, 2015).

The above disclosure contextualises the company's position on the need to preserve the species as driven by principle (Element 1) and this is supported by a short account of what the company is doing to prevent the loss of one of Africa's iconic Big 5,

> 'The Investec Rhino Lifeline initiative was launched in 2012 together with Dr Will Fowlds to raise awareness around the rhino crisis. An education programme was started in 2013 through our partnership with Coaching for Conservation. Approximately 1 200 children have been reached through the programme since inception. We also developed a partnership with Wilderness Foundation, a recognised and credible non-government organisation, to enable fundraising initiatives to further support our initiatives' (Investec, Sustainability Report, 2015).

Similar to the approach followed by Woolworths and First Rand, there are clear descriptions of the conservation initiative, scope of the project and time periods involved. The focus on a training project (which we interpret as a mobilisation of human capital at the local community level) is complemented by a broader plan to educate rhino horn consumers or those who may become involved in poaching,

> 'Realising the need for greater support on the prevention side, Investec partnered with Wilderness Foundation in their Vietnamese demand reduction campaign which started in April 2014 when they hosted two Vietnamese pop stars in South Africa on a rhino experience. Through their extensive influence in the media, they are educating and raising awareness about the properties of rhino horn as well as the impact on rhino populations in Vietnam, the biggest market for rhino horn' (Investec, Sustainability Report, 2015).

As with the examples provided above, the anti-extinction effort involves a close partnership with NGOs to develop a carefully planned response to rhino poaching. While the company stops short of giving details on the cost of the action plan, number of students trained and impact of its engagement with foreign consumers, the researchers feel that this type of reporting cannot be attributed only to impression management. A financial services company has engaged with different stakeholders to implement a project aimed at saving a species which has no direct impact on its business model. This points to a genuine sense of accountability for protecting South Africa's wildlife on deep ecological grounds (see Atkins et al., 2015; Gallhofer et al., 2015). Further, this represents – in our view – *emancipatory* extinction accounting as it provides evidence of an innovative means of strangling the demand for horns using Vietnamese social icons who may be able to reach a large part of the population and change minds and hearts. This, for us, represents an attempt at providing disclosures which seek to transform and change behaviours and an illustration of pragmatic emancipatory accounting (Gallhofer and Haslam, 2017).

Elements 4 & 5 – Analysis and reflection

An integrated approach to business management and reporting requires post-implementation review of management's strategy and how well the company performed in terms of its strategic objectives (IIRC, 2013; IOD 2016). This should be measured with reference to financial and non-financial metrics (IIRC, 2013) or, as explained by King-IV (IOD, 2016), the social, economic and

environmental context (see also Eccles and Krzus, 2010; Atkins and Maroun, 2015). Applying this approach to extinction accounting, the reporting entity should provide a review of its extinction risks, the actions taken to reverse extinction and its successes and failures (Atkins et al., 2016). Self-reflection, self-critique and reconsideration of strategy are critical if extinction accounting is to emerge. There was some evidence of companies starting to provide this type of information. For example, Richemont, as part of the disclosure dealing with the peace park initiative, highlights key milestones in the conservation project and provides some indication of what the company hopes will be achieved:

> "…The ultimate aim is to remove the electrified border fence to allow the elephants and other wildlife to re-establish their ancient migration patterns. Conservation areas along the Futi River will enable communities to become shareholders in conservation and eco-tourism businesses, creating a viable land use option in the region" (Richemont, Integrated Report, 2011).

This, again, has an *emancipatory* component as the company is reporting doing something for re-establishing habitats and providing safe corridors. A mining company has also taken some steps to providing an assessment of its biodiversity policies and actions:

> 'In FY2013, we introduced new biodiversity and conservation targets. The first target focuses on a core business requirement to develop Land and Biodiversity Management Plans that include controls to prevent, minimise, rehabilitate and offset impacts to biodiversity and ecosystems services, and this has been achieved by all of our operations. Where actual or potential impacts exceed what is acceptable, we then look to implement compensatory actions. The second target is at a wider Group level, and is a voluntary commitment to financing the conservation and ongoing management of areas of high biodiversity and ecosystem value that are of national or international conservation significance. We established an alliance with Conservation International in FY2012 to support the delivery of this target and improve our approach to biodiversity management more broadly. Since FY2013, we have contributed more than US$35 million to conservation, in addition to the environmental management activities at our operations. This has resulted in more than 60,000 hectares being conserved, protecting 16 globally threatened species and generating more than 900,000 megalitres of fresh water' (BHP, Company Webpage).

The disclosure includes a number of important elements of an extinction accounting framework. A brief discussion of two targets and associated plans of action are provided (Element 1 and 2). The company comments on progress to date stating that the first objective has been met. For the second (and ongoing) part of the project, it refers to its partnership with an NGO and provides quantified measures (litres of water, hectares of land and number of species) of the conservation initiative's outcomes (Element 3 and 4). There is also some indication of self-reflection with the acknowledgment that, where satisfactory outcomes are not achieved, corrective action will be taken (Element 4 and 5). The researchers do, however, acknowledge that the more analytical elements of the extinction accounting framework (Element 4 and 5) are not fully developed. More detail could, for example, be given on the exact nature of the biodiversity impact and what the company regards as minimum levels of acceptable performance. The actual biodiversity impacts

could have been quantified (as was done for the second part of the initiative) and contrast with the planned or desired outcomes. Where under-performance was recorded, details could have been provided to support the statement that: 'where actual or potential impacts exceed what is acceptable, we then look to implement compensatory actions' (BHP, Company Webpage).

Element 6 – Reporting

The types of disclosures provided by companies on different aspects of biodiversity show that it is possible to provide a detailed account of extinction risk and how this is being managed. The review of what companies report, has also revealed limitations. In particular, while organisations provide significant detail on different aspects of biodiversity, this is not presented as part of a coherent framework which contextualises the risk of and response to extinction. In this context, the researchers propose the use of the following matrix to assist companies with their extinction reporting (see Figure 4). Figure 4 is designed to be used as a flow chart to summarise key elements of the extinction accounting framework. It can be used to inform a combination of qualitative and quantitative disclosures included in an integrated report. It could be used as the basis for a diagram to provide an overview of the response to extinction risk.

Insert Figure 4 about here

To address Element 1 (and comparable GRI) disclosures, the entity lists affected species and ecosystems (B) per location (A)[9]. This is followed by a detailed risk analysis (C) designed to contextualise the relevant biodiversity issues. The entity provides a description of the affected species or ecosystems (C1) and the associated extinction risk assessment as per the IUCN Red List or analysis provided by an independent environmental expert (C2). For each species and/or ecosystem, the organisation explains its business impact and the reasons for wanting to mitigate the risk of extinction (C3). Related to this are any fines, disputes or provisions which can be allocated directly or on a reasonable basis to the business operations or locations and the applicable biodiversity (C4).

Reporting on species by relevant location (A & B) and associated risk analysis (C) provide a basis for stakeholders to understand the species and ecosystems which the organisation is focusing on, the level of extinction risk and the reasons for addressing extinction risk specific to those species or ecosystems. This is supported by detailed accounts on how the organisation addresses extinction risk (D) as required by Element 2 and 3 of the extinction accounting framework. The aim is to explain each specific environmental plan or action initiative which the entity undertakes (D1) cross-referenced to the applicable operation and affected species/ecosystems[10]. The guidance provided by the IIRC (2013) on disclosing the interconnection between different types of capital is useful for avoiding superficial reporting. For example, the entity can explain:

- the costs of the project and funds invested (financial capital – D2)

[9] These should be the geographical or operating locations used to summarise business and financial performance to ensure that the extinction accounting can be cross-referenced to other information provided in an integrated or sustainability report.

[10] It is possible for a single plan or action to address multiple species and/or locations. For this reason, the matrix does not link actions and species/ecosystems directly

- the systems, operations and processes involved in running the project (manufactured capital – D3)
- staffing requirements, community engagement and partnerships with NGOs (human and relationship capital – D4)
- specific technologies, skills and expertise required to ensure successful implementation (intellectual capital – D5).

To achieve the emancipatory potential of extinction accounting, the organisation should review its progress periodically and report on its performance (Atkins et al., 2015; Gallhofer et al., 2015). This needs to be detailed and framed according to the key performance indicators (KPIs) or outcomes the entity hoped to achieve (E1). For coherent and complete disclosures, the KPIs and associated evaluation should address the applicable capitals. For example, the entity can comment on the actual versus budgeted costs of a conservation project (E2), outline additional training or partnership requirements required (E3) or identify further research or development necessary for improving or securing positive outcomes (E4).

One approach to developing KPIs could be to link them directly to the motives driving extinction accounting and consequently to the different stakeholders and intended or likely readership of extinction accounts (see Table 4).

Insert Table 4 about here

The development of KPIs provides a first step in enabling companies to disclose information on their extinction prevention activities which is in a format which measures their performance and also assesses performance year on year. This approach is consistent with and would fit neatly within the integrated reporting framework as it represents a relatively simple and easily usable reporting mechanism. We feel these KPIs could also enhance the emancipatory elements of extinction accounting and assist in preventing extinction of species, furthering the emancipatory potential of integrated reporting.

Overall, the above disclosures are not only useful for providing stakeholders with a review of the successes and failures of existing projects; they can be used to highlight the need for revisions to risk assessments (C) and future action plans (D) in order to drive positive outcomes. This is depicted by feedback loop from Analysis Reporting (E) to Risk Analysis (C) and Action Reporting (D). The interconnection between the articulation of extinction risk, detailed reporting on plans and actions, communication of positive and negative experiences and the refinement of anti-extinction measures ensures an integrated approach to reporting as described by Element 6 in the extinction accounting framework (Section 3.2).

6. Concluding discussion

To deal with the threat posed by climate change, mass extinction and society's inexorable demand for natural resources, a dynamic form of corporate reporting is required which draws on accountancy's emancipatory potential (Gallhofer et al., 2015). This paper explores the

operationalisation of an extinction accounting framework as an example, and advances an emancipatory pragmatic approach.

Extinction accounting represents a far more developed form of reporting than current accounting for biodiversity. Extinction accounting draws on principles from the GRI, integrated reporting and prior literature on emancipatory accounting to provide a framework for disclosing the risks posed by extinction of specific species as well as demonstrating evolving practice and extinction prevention performance. An initial outline of this type of accounting describes a 5-element process involving: a description of the extinction risk; reporting on actions taken (including partnerships) formed to combat extinction; detailed analysis of successes and failures; and comprehensive reporting on each aspect of the accounting framework (derived from Atkins and Maroun, 2018).

This research makes an important contribution by showing how this largely theoretical framework can be applied in practice. By using details from the prior literature and the GRI, the entity compiles a narrative explaining species affected by business activities along geographical or operating lines. This is supported by a clear assessment of extinction risk cross-referenced to the actions taken by an organisation to prevent extinction and a review of the effectiveness of any anti-extinction initiatives. To ensure comprehensive reporting, the researchers propose that the outline of any policies, plans or actions (and associated successes and failures) should address the different types of capital referred to by the IIRC (2013). This amounts to an evaluation of extinction prevention measures in terms of financial and operational considerations (financial and manufactured capital); demands for human resources, community engagement and partnerships with environmental experts (social and relationship capital); and the need for additional research, development or specialised technologies (intellectual capital). We have also proposed some KPIs on extinction prevention which organisations could disclose in their integrated reports. Further, in the researchers' opinion, the extinction accounting matrix outlined in this paper provides a practical approach for companies committed to providing high quality integrated reports and participating in the anti-extinction movement. If implemented sincerely, the proposed method of reporting can contribute to enhanced awareness of the impact organisations have on biodiversity and aid with articulating and developing appropriate responses to mitigate extinction. In particular, while the findings are normative, they are grounded in existing corporate reporting discourse increasing ease of application.

The paper has also approached current extinction accounting efforts from a critical and reflective perspective and sought to demonstrate that terms such as natural capital fail to represent adequately the immensity and significance of the natural world and the reliance of the other five capitals on the survival and continued existence of species constituting the ecosystem. Further, our discussion leads us to consider what exactly is meant and understood by value creation in relation to natural capital. Creation of value is a core integrated reporting concept and for natural capital could value creation be interpreted simply as increase in species populations? If so, then the need to use extinction accounting to demonstrate value creation in relation to species preservation and growth has to be incorporated into every integrated report, in order to reflect appropriately increases in natural capital. This is also another way of enhancing the emancipatory nature of extinction accounting.

As with any study of this nature, additional research is required. This paper has explained the detail which could be included in an extinction account based on the assumption that the necessary infrastructure is in place. Future researchers need to provide insights into how management control systems can incorporate species-specific indicators, the type of extinction prevention which the accounting system needs to capture and track and how the information being reported and acted on by management can be assured in order to increase its reliability. More research is also needed to explain the application of an extinction accounting framework by environmental agencies and government departments where a broader (and more detailed) account of species-related risks is probably required. Finally, researchers will need to carry out more exploratory research to confirm the normative recommendations advanced in this paper. This could include, for example, detailed interviews with preparers, the GRI and IIRC to evaluate the usefulness of an extinction accounting framework and explore ways of increasing its application.

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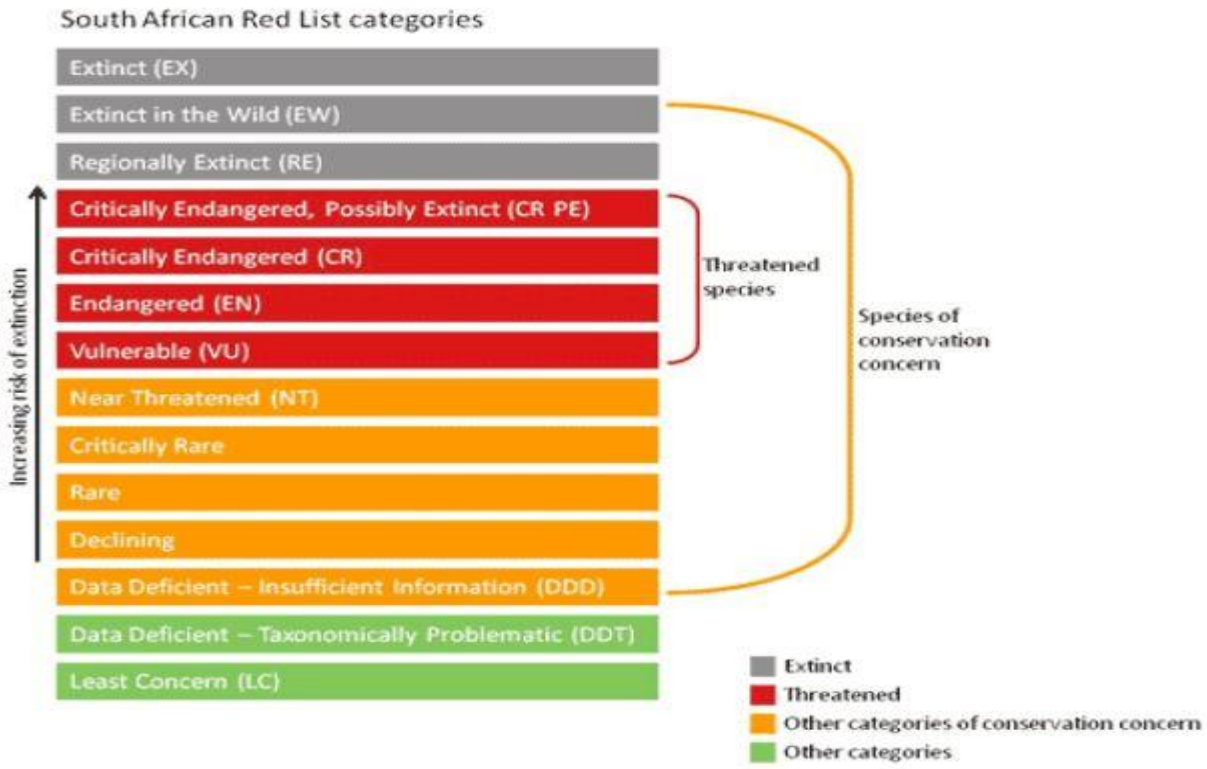
Figure 1: South African red list categories



(SANBI, 2017a)

Table 1:	
Species	**Status**
African Wild Dog	Endangered
Antarctic ‘True’ Blue Whale	Endangered
Cape Mole-rat	Endangered
Damara Woolly Bat	Endangered
Four-toed Elephant-shrew	Endangered
Gunning's Golden Mole	Endangered
Hartmann's Mountain Zebra	Endangered
Indian Ocean Bottlenose Dolphin	Endangered
Marley's Golden Mole	Endangered
Oribi	Endangered
Robust Golden Mole	Endangered
Samango Monkey ssp.Labiatus	Endangered
Sclater's Forest Shrew	Endangered
Southern Elephant Seal	Endangered
Swinny's Horseshoe Bat	Endangered
Tonga Red Bush Squirrel Ssp	Endangered
Tsessebe	Endangered
White-tailed Rat	Endangered
Black Rhinoceros	Critically endangered
De Winton’s Golden Mole	Critically endangered
Visagie’s Golden Mole	Critically endangered
Juliana’s Golden Mole	Critically endangered
Rendall’s Serotine Bat	Critically endangered
Riverine Rabbit	Critically endangered
Rough-haired Golden Mole	Critically endangered
Short-eared Trident Bat	Critically endangered
Van Zyl’s Golden Mole	Critically endangered
Ongoye Red Squirrel	Critically endangered

Table 2 GRI biodiversity indicators	
Indicator	**Explanation**
GRI304-1	Location and size of land owned, leased, managed in, or adjacent to, protected areas and areas of high biodiversity value outside protected areas.
GRI304-2	Description of significant impacts of activities, products and services on biodiversity in protected areas and areas of high biodiversity value outside protected areas.
GRI304-3	Habitats protected or restored.
GRI304-4	IUCN Red List species and national conservation list species with habitats in areas affected by operations

(GRI, 2016, pp. 188-191)

Table 2: Elements in an extinction accounting framework			
#	Element	Purpose	Elements
1	Extinction accounting context	Describe the extinction risk in the context of the organisation's business 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 company's activities Report where, geographically, the 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 company's operations (equivalent to the existing GRI principles to this point) Incorporate images (photos or drawings, for example) of threatened species which are affected by the company's operations and which the company needs to protect Report full details (narrative as well as financial figures) relating to any fines or ongoing claims relating to endangered species legislation 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 company takes and plans to take to reduce extinction risk	Report actions/initiatives taken by the company to avoid harm to, and to prevent extinction of, endangered plant and animal species
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 company which aim to address corporate impacts on endangered species and report the outcome/impact of engagement/partnerships on endangered species
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 corporate operations
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 corporate initiatives/actions are assisting in prevention of species extinction 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 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)

Table adapted from Atkins et al., 2017

Figure 2: Illustration of biodiversity impact by geographical region and area of operation

Operations situated in environmentally sensitive areas

Operation	Description	Response
Copebrás Cubatão, Niobium and Phosphates, Brazil	Copebrás Cubatão is situated in a very dense and biodiverse rainforest area in São Paulo province. The ecosystem had already been impacted significantly by industrial activity prior to the commissioning of the operation.	Cubatão works with the municipality on reforestation programmes and operates a nursery for indigenous plants. The nursery is also used as a base for environmental education programmes for disadvantaged youths and has recently launched a programme to stimulate a sustainable products market.

(Anglo American, Sustainable Development Report, 2014, p. 58)

Figure 3: Reporting on fund performance

Environment investments	2013
Investment value (R thousand)	7 036
People trained in environmental conservation	45 487
Environment-related jobs created	35
Endangered species protected/conserved	171
Hectares under protection	536 967

(First Rand, Integrated Report, 2013, p. 117)

Figure 4: Extinction accounting matrix

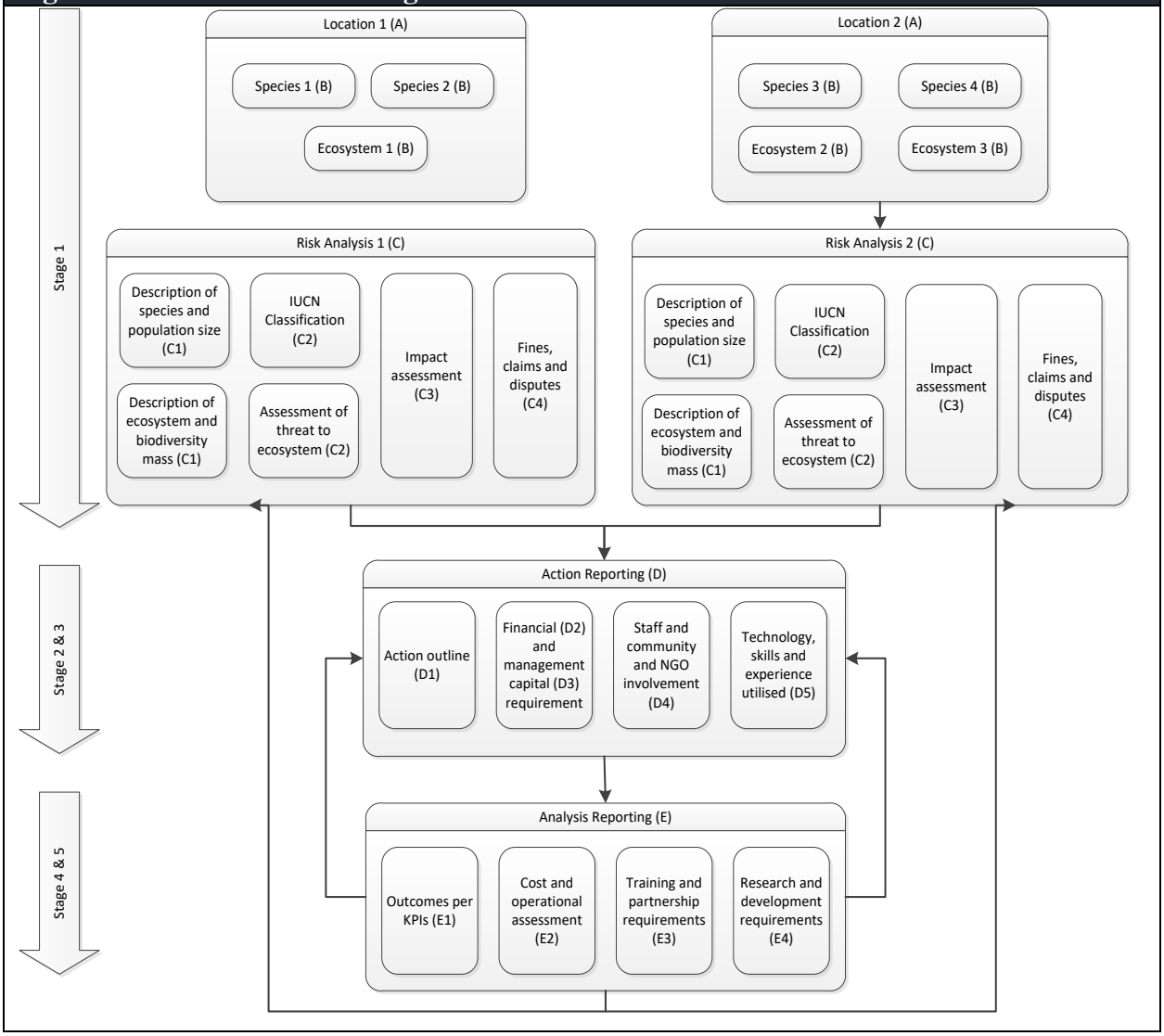


Table 4

Motives driving extinction accounting	**Stakeholder/readership**	**Possible KPIs**
Business case/financial	Financial stakeholders/shareholders	Percentage reduction in financial risk/opportunity cost associated with specific species loss in populations affected directly by company's operations, e.g. reduction in financial risk attached to pollinator decline. Percentage change in corporate funding of environmental rehabilitation Increase in scope of environmental rehabilitation Percentage reduction in fines and legal liabilities arising from corporate activities causing damage to specific species populations Percentage increase in investor engagements on species specific issues Potential estimated decrease in cost of capital arising from reduced risk associated with species loss
Ethical, moral and deep green	NGOs environmental activists	Percentage increase in specific endangered species populations Percentage increase in the quality of the habitat Percentage increase in engagement with NGOs and wildlife organisations (with an emphasis on specific policies, plans, actions and outcomes)
Emotional, cultural, heritage		Percentage increase in spending on educational and awareness raising initiatives Percentage increase in outreach to social groups with a measure of outcomes, e.g. changes in attitude in awareness (measured by questionnaire or other survey)