



Accounting for the environment: Towards a theoretical perspective for environmental accounting and reporting

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ABSTRACT

This article develops a multilayered theoretical model to underpin environmental accounting and reporting (severe environmental dangers; corporate responsibility; new relationship between industry and environment; measure industry's impact, and disclose and report impact). This theoretical model has eight premises. It begins with the fundamental premise that environmental change puts the planet at risk. Given that industry has a great impact on the environment and that society legitimates industry it is argued that industry has a duty to act. As the present situation appears to put the planet in jeopardy, there is a need for a new relationship between industry and the environment. It is argued that, although there should be a long-term radical reorientation, in the immediate short-term sustainable development should be the target. There is a need for a measurement system to assess industry's impact, but current accounting is inadequate for a variety of reasons (e.g., monetary dependence, capitalist orientation, business focus, reliance on neo-classical economics, numerical quantification, and technical accounting practices). There is thus a need for a new holistic accounting which captures corporate environmental impacts. Finally, it is argued that companies because of their stewardship function should report their environmental accounting to their stakeholders. There are several implications from the acceptance of this theoretical model for organisations and accountants. First, at the general level, given the severity of the environmental problems which face us, it would seem prudent for managers and accountants to take immediate action to address these threats. Second, the traditional accounting paradigm with its narrow focus on accounting numbers does not capture the environmental consequences of organisational activity. Third, as part of innovation and experimentation there is a continued need to explore potential alternative monetary and non-monetary valuation systems. Finally, the theoretical framework implies that as part of their discharge of their stewardship function organisations should disclose their environmental performance to stakeholders.

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“Never send to know for whom the bell tolls, it tolls for thee”.
John Donne, Devotions upon Emergent Occasions. Meditation XVII

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1. Introduction

The relationship between human beings and the natural environment has always been complex. Humans are at once both part of, and apart from, the natural world.¹ The general scientific view is that we have evolved through natural selection from within the animal kingdom,² but through manipulative technology we increasingly shape and craft the natural environment. In this sense, we are both inside and outside the traditional natural environment: both participants and observers. We thus both form and shape the environment, but are also capable of observing and recording both the environment and our impact upon it.³

An increasing recognition of the impact of humans on the environment has led to a radical questioning of traditional economic, ethical, and accounting assumptions. In the 1970s, for example, there was a new concern with questioning the limitations of the traditional management paradigm. Chastain (1973), Gambling (1974), Ullman (1976) and Dierkes and Preston (1977), *inter alia*, explored the linkages between accounting, organisations and society. In the 1990s, the concern turned more specifically to environmental issues.⁴ More recently, there have been efforts to operationalise environmental issues.⁵ This paper seeks to develop a theoretical framework in which this debate can be located by developing eight premises.⁶

What is undoubtedly true is that concerns with the environment have moved centre stage over the last two decades since Kyoto. There have been a series of global meetings to discuss, *inter alia*, climate change. Following the Stern Report (2006) there is a new global interest in environmental issues (Gray, 2009), in general, and in carbon reduction techniques in particular. Accounting is implicated in these, for example, through carbon emissions trading and its involvement is likely to increase (Hopwood, 2009). Moreover, there is active debate about whether to save the planet we need to move towards a deep green ecological position (Mauders & Burritt, 1991).

This article is located within a broad body of literature concerned with environmental accounting and critical of the current role of accounting. The main purposes of this article are two-fold. First, to synthesise, unify and critically appraise the somewhat scattered prior literatures which provide a theoretical underpinning for environmental accounting and reporting. This prior literature is used to construct a multilayered model with eight premises. Thus, the objective is to provide a theoretical justification for environmental accounting and reporting.⁷ Put simply, this article aims to show why it is crucially important that organisations should develop a comprehensive system of environmental accounting and why they should report it to their stakeholders. This paper assumes that companies should behave in a socially responsible way (Solomon & Solomon, 2004; Quinn and Jarvis, 1995). Indeed, demands for businesses to act in ways consistent with social and environmental accounting and sustainable development are growing (Milne, Tregida, and Walton (2009)). The promotion of this particular model does deny other possible theoretical models. However, this model will hopefully provoke debate and prove useful in gauging corporate attitudes to genuine environmental progress on environmental issues.

It is based on a personal conviction that companies need to engage with environmental issues. Compared to the wealth of studies on environmental disclosure research (Berthelot, Cormier, & Magnan, 2003, for example review 57 studies) relatively few studies have sought to theorise on why we need environmental accounting (see as notable exceptions Gray (1992), Gray, Kouhy, and Lavers (1995), Gray, Owen, and Adams (1996)).⁸ Indeed, Hackston and Milne's (1996, p. 78) contention still holds that: "To date, however, there still exists no universally accepted theoretical framework of corporate social accounting" [i.e., by its very nature this includes environmental accounting and reporting]. Such issues generally "rarely merit explicit consideration" (Gray, 2003, p. 357). The second purpose is to examine the implications of the theoretical framework for organisations and accountants. In particular, the main approaches to operationalising environmental accounting are reviewed (such as full cost accounting, Herborn, 2005; Bebbington, 2007; sustainable indicators Jones & Matthews, 2000).

¹ This concept is a relatively new theoretical perspective and is encapsulated in the thinking of writers such as Naess (1985), Rolston (1985).

² Note, however, the creationists, particularly in the US, who argue against such Darwinianism.

³ In a sense, animals (such as elephants cropping the Savannah) and natural events (such as volcanoes) also form and shape the environment. Human action is, however, more pervasive and deliberate.

⁴ Interested readers are referred to for example, Gray (1992), Owen (1992), Gray and Bebbington (1993), Gray, Bebbington, and Walters (1993).

⁵ As evidenced in the work of Jones and Matthews (2000), Jones (2003), Bebbington et al. (2001), Chambers and Lewis (2001), Baxter et al. (2003), Bebbington et al. (2007), and Howes (2003). In a sense, these initiatives pick up the earlier work by authors such as Beams and Fertig (1971), Dierkes and Preston (1977) and Ullman (1976).

⁶ There is not necessarily only one theoretical perspective. In a sense, therefore, this particular perspective is premised upon the author's personalistic ethics and value judgements. However, hopefully it will also resonate with many individual readers' views and values, even if it does not capture them all. By environmental accounting the author means the development and operationalisation of an accounting system to measure the environment. By environmental reporting, the author means the reporting of environment accounting to external stakeholders.

⁷ The concern of this present paper is with environmental accounting and reporting, particularly external environmental reporting, rather than more generally with social and environmental accounting. Although environmental accounting and reporting can be purely qualitative this article focuses on its numerical and quantitative aspects.

⁸ Gray (1992) introduces the principles of the deep green position and investigates its implications for accounting. Environmental degradation is shown to be one part of the environmentalist agenda and the influence of systems theory is discussed. Gray (1992) also explores the potential of sustainability. Gray et al. (1995, 1996) theorise about the corporate social responsibility literature. These authors partially locate their literature in social and political theory studies (premised on political economy and legitimacy theories).

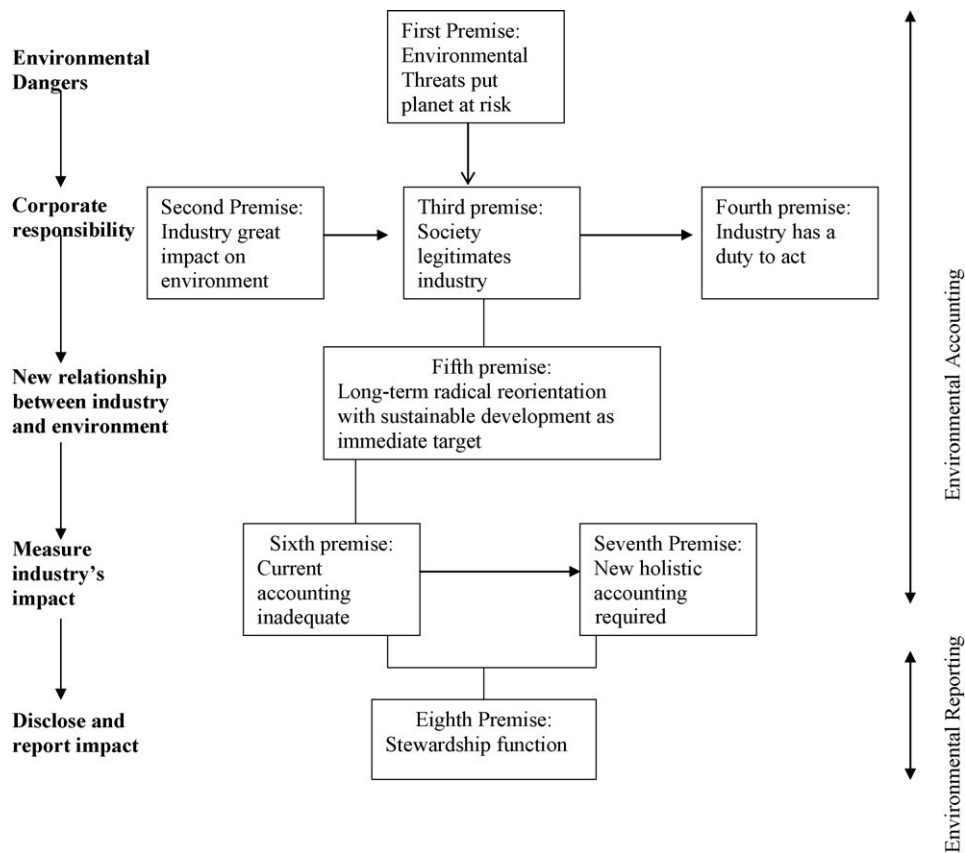


Fig. 1. A possible theoretical model for environmental accounting and reporting.

This article attempts to synthesise and make *visible* the *implicit*, but often unstated (Cooper and Sherer, 1984) *value judgements* which often underpin environmental accounting and reporting.⁹ Eight basic premises are discussed in a multi-layered approach.¹⁰ These have been derived from the environmental ethics, environmental economics and environmental accounting literatures.¹¹ Where appropriate countervailing opinions are recognised and discussed. Together they provide a theoretical model, set out in Fig. 1, upon which more practical or empirical studies can be based. This theoretical model is integrative and summative, building on the separate strands of the prior theoretical literature.

2. Environmental accounting and reporting model

In this section, I build on the prior accounting (e.g., Gray, 1992), economics (e.g., Daly, 1991) and environmental literatures (e.g., Schneider, 1990) to construct a model which underpins environmental accounting and reporting. This model consists of five major parts: environmental dangers; corporate responsibility; a new relationship between industry and environment; a need to measure this impact; and a need to report this impact. Within the model, there is a discussion of 8 underlying premises.

2.1. Environmental danger

The first premise is that the environment is under threat. The nature and severity of this threat is debatable but, in essence, most reputable scientific sources agree that a cocktail of environmental problems face us as we enter the third millennium. Kovel (2007, pp. 1–2) catalogues a long list of environmental indicators showing a depressing list of ecological

⁹ In this paper, there is an attempt to make value judgements more explicit. However, judgements are rarely, if ever, value free or socially neutral. Tinker, Merino, & Neimark (1982) show, for example, that 'positivism', often seen as an objective and non-partisan research technique, has normative origins.

¹⁰ This article is generally written from the perspective of the Western developed world. It is easier, for example, to consider the environment when one is rich rather than starving. However, it may have relevance to the developing world. In addition, although this article draws upon Christian values, environmental awareness is not exclusively Christian and other faiths also may share some of the values expressed here.

¹¹ These literatures are not homogeneous, but very diverse in orientation.

degradation from 1970 to 2000. There is no reason, unfortunately, to suggest any subsequent future slowing down of these environmental trends. Environmental threats have been theorised as environmental risks by Beck (1992, 1999). Mankind is exposed and threatened by these risks, so that we live in a risk society. A crucial difference from earlier societies is that the threat is global.

“Ecological disaster and atomic fallout ignore the borders of nations. Even the rich and powerful are not safe from them. These are hazards not only to health, but also to legitimacy, property and profit.” (Beck, 1992, p. 23)

Unbridled ecological devaluation threatens life on earth, but also property and commercial interests. Dirty chemical towns, such as Villa Parisi, and industrial apocalypses like Bhopal merely exemplify the problems (Beck, 1992, p. 44). Beder (1997) persuasively argues that these dissenting voices are mainly fostered and encouraged by corporations to cast doubt on environmental problems in order to promote a corporate agenda which involves avoidance of regulation and the supremacy of private property rights.

Perhaps the principal currently debated risk is climate change commonly thought to be exacerbated by global warming (Schneider, 1990; The Stern Report, 2006; Intergovernmental Panel on Climate Change (IPCC), 2007). Pollution builds up and stops heat leaving the earth. Inter alia, this causes sea-levels to rise as icecaps melt. Generally, there is a broad consensus that such human-caused climate change is occurring (e.g., IPCC, 2007). However, significant voices still doubt the significance of climate change and the impact of human beings (e.g., Bradley, 2003; Carter, 2007; Lewis, 2007; Morris, 1997); and at the 2008 International Conference on Climate Change (although even here the keynote speaker did accept some warming and that humans were, at least partly, to blame (BBC, 2008)).

There are numerous other environmental problems. The ozone layer has been eroded (Farman, 1990; Stern, 2006). Air quality suffers through the build up of ground-level ozone, while acid rain causes environmental damage and degradation (Wilkinson & Woodin, 1990). As well as the air, our seas, fresh water and land are threatened by pollutants. In the U.K., the North Sea has long been a dumping ground for toxic materials. Many rivers are badly polluted and the extensive use of pesticides and chemicals has led to a decline of biodiversity (Pretty, 1990). There is a broad consensus that the planet is “facing a growing global water crisis” (Balali, Keulortz, & Korthals, 2009).

Indeed, biodiversity is under threat both in the developed and the developing world (Teer & Berwick, 1987; Vida, 1989). The scale of the problems is immense: a quarter of the world’s land is at risk from desertification, 40% of our rainforests were lost from 1960 to 1990, and the endangered species list has risen from 230 to over 35,000 (Adams, 1990) (see also Porritt, 1989; and Bhattacharya, 1990). Kovel (2007) states that from 1970 to 2000: species were vanishing at a rate not seen for 65 million years, 40% of agricultural soils have been degraded, half of the world’s forests have disappeared and half of the world’s wetlands drained or filled. Habitat loss and species loss are particularly severe (Myers, 1985) both on land and at sea through pollution, pesticide use and over-fishing (Harmon, 1990; Prance, 1990). In most developed countries proportionately little self-sustaining natural capital remains (Harman, 1990; Leitch, 1992). There is, therefore, an imperative for action if biodiversity is to be preserved at all.

2.2. Corporate responsibility

Under the broad heading of corporate responsibility three interlocking premises are discussed: (i) that industry has a great impact on the environment; (ii) that industry relies upon social legitimation; and (iii) that individuals and companies have a duty to act.

2.2.1. Industry has a great impact on environment

The second premise is that human beings, particularly industry, are having a great impact upon the environment. In this sense, humans have long had such an impact. The European landscape has, to a large extent, been fashioned by farming activity. The Americas were drastically affected by rapacious European settlers. Following the industrial revolution the relationship between human beings and nature has changed radically. Traditionally, human activity shaped the environment incrementally and intermittently, but now, human impact, particularly industrial activity, is now significant across a broad spectrum of activities. Industry is directly responsible for major environmental incidents such as the Exxon Valdez oil spill in Alaska (1989) or habitat loss such as the deforestation of the Amazon and other tropical rainforests by logging companies. Moreover, industry is very wasteful of materials, recycling little (Ayres, 2004). Indirectly, the increasing usage of agricultural pesticides and herbicides causes biodiversity loss, while industrial activity causes air, land and water pollution. The nature and extent of these environmental impacts has not gone unquestioned. Carson’s “The Silent Spring” (1965) was an early response to the loss of songbirds, although some (e.g., Lewis, 2007, p. 6) have, in hindsight, challenged her dire predictions. Stern (2006) summarises scientific opinion: “there is now clear scientific evidence that emissions from economic activity, particularly the burning of fossil fuels for energy, are causing changes to the Earth’s climate”.

Cumulatively, these industrial impacts cause worldwide problems with increasingly recognised global consequences. As far back as the 1960s, there was a profound, radical questioning of the political, economic and ethical bases of modern society. Goldsmith (1972) signalled a call to arms for environmental action. In June 1992 there was a global summit in Rio de Janeiro to discuss, *inter alia*, a global biodiversity treaty. In 1997, the Kyoto Protocol was established with 172 countries agreeing on mandatory targets for the reduction of greenhouse gases in 2005. The Stern Report (2006, pp. 66–67) models increasingly drastic climatic consequences, relating to water, food, health, land, the environment and, more generally, with

temperature rises of 1 °C to more than 5 °C. Meanwhile, environmental ethicists, such as Callicott (1984) and Rolston (1985, 1988, 1992), have redrawn the traditional ethical paradigms by, for example, valuing wildlands.

2.2.2. Social legitimisation

The third premise, commonly put forward by environmental accounting researchers, is that the authority of organisations may be seen as legitimated by society through minimally accepted moral standards (legally enshrined) and through collective societal moral responsibility (Gray, Owen, and Maunders, 1987, 1988; Wicks, 1992). “[O]rganisations can only continue to exist if the society in which they are based perceives the organisation to be operating to a value system which is commensurate with the society’s own value system” (Gray et al., 1996, p. 46). Reciprocity exists in that in return for societal legitimisation organisations provide societal services and respect societal standards. However, some, termed pristine capitalists by Gray et al. (1996), such as Friedman (1970), Hetherington (1973) believe business’s sole aim is to make a profit, and, therefore, dispute such societal legitimisation. This latter paradigm is not generally dominant today. There is generally at least a grudging acknowledgement that it is expedient for companies to accept a certain level of social responsibility.

2.2.3. Individuals and organisations have a duty to act

The fourth premise is that no government, organisation or individual (and that includes managers and accountants) can afford to be complacent when faced with such potential threats. At best, such threats devalue our quality of life; at worst, they harbour calamitous change. Using the mind set of accounting, Barton (1999, p. 211) comments, “. . . natural capital assets are important parts of our natural environment which must be protected to ensure continuity of life on earth.” Even though there are counter arguments from those who feel it is somebody else’s problem not theirs,¹² it would seem prudent to take the precautionary view and act now, when we can, rather than repent later when effective action is too late.

From both the anthropocentric and non-anthropocentric viewpoints the earth’s resources must be protected.¹³ This article takes the view, much supported in the Environmental Ethics literature that given a sophisticated anthropocentrism then the two views will converge and both recommend the same environmentally responsible behaviours and policies (Norton, 1986, 2008).¹⁴ From the anthropocentric viewpoint currently dominant in the Western world this is because, although nature has no intrinsic value, it does have a wide variety of utilitarian values. Humans are intricately bound up with nature. We need clean air to breathe, clean water to drink and healthy food to eat. Natural products are essential for trade: for example, petrol powers cars. Nature provides a genetic reservoir for new crops or drugs. All businesses in one way or another use natural resources. In the mid-1990s Costanza et al. (1997) estimated the current economic value of 17 ecosystem services for the entire biosphere as U.S.\$ 33 trillion per year. This outstripped the estimated global gross national product of US\$ 18 trillion per year. They included only renewable ecosystem services, excluding non-renewable fuels, minerals and the atmosphere. However, there is a tension within anthropocentrism. In the long term, business, in totality, must protect nature because of its utilitarian values. However, it may pay certain businesses to exploit the environment in the short-term for individualistic gain. A common good can be plundered for personal benefit. Indeed, this generation might maximise its own self-wealth and happiness and leave future generations to take care of themselves. Without corporate self control or government regulation short-term corporate self-interest may prejudice society and perhaps even long-term corporate gain. Whether or not an accurate, realistic value can be put on these resources is debatable. O’Neill, Holland, and Light (2008) argue that this utilitarian approach to the environment is currently the predominant paradigm, but that it is severely wanting.

From the non-anthropocentric viewpoint earth’s resources should be protected because nature has an intrinsic value (McShane, 2007a). We ought to care for the “biosphere because it has a value in itself” (Rolston, 2006, p. 307). Many observers therefore, argue that human beings are morally obliged to fulfil a stewardship role: “of preserving species, maintaining the integrity of natural communities, and ensuring the healthy functioning of the biosphere, the garden as the whole” (Callicott, 1984, p. 302; Nelson & Callicott, 2008). Deep ecologists, such as Naess (1984) believe that non-human life has an intrinsic value of itself; that biodiversity contributes to this value and is valuable in itself; that humans have no right to interfere destructively with non-human life, except to satisfy vital needs; and that present interference is excessive and detrimental. Humans are only one of many species in an ecosystem and the value they place on ecosystems may differ from other species or not reflect the need for ecosystem maintenance (Farber, Costanza, & Wilson, 2002). Anthropocentrism and non-anthropocentrism, therefore, both urge environmental protection, natural resource conservation and maintenance of biodiversity, particularly critical natural capital (Ekins, Folke, & De Groot, 2003; Ekins, Simon, Deutsch, Folke, 2003).

2.3. New relationship between industry and the environment

If the prior four premises are accepted, it follows that we need a radical reorientation of the human relationship with the environment. In the long term we need to redress environmental damage, reverse global warming, and remediate habitats

¹² Anecdotally, for example, accounting standard setters have been traditionally reluctant to get involved in environmental accounting issues. Accounting for carbon emissions has, however, now been the subject of IASB scrutiny.

¹³ Both of these viewpoints are, of course, human constructs. The non-anthropocentric view underpins many religions such as Buddhism, Christianity and Islam.

¹⁴ This view is, however, not universally accepted see, for example, McShane (2007b, 2008) who points to possible differences in the two views.

and thus biodiversity. This will probably mean reducing (or at the very least stabilising Brown, 2009) global population and limiting, if not stopping growth, until we are back in balance with the environment.

In the short term, however unpalatable to deep green environmentalists, such radical reorientations, such as zero growth or population control, although ecologically desirable, would be socially, economically and politically impossible to achieve. A more realistic goal which would provide a possible first step towards any radical reorientation of the human relationship with the environment (see, for example, Pearce, Markandya, & Barbier, 1989) is sustainable development. Sustainable development is a concept to which many businesses and governments have already subscribed, albeit often rhetorically. Sustainable development is thus a pragmatic and practical initial response, upon which more radical future reorientations such as long-term zero growth (Daly, 1985) and deep ecology (Naess, 1985) could be built. Sustainable development itself is a subset of a sustainable society, for example, Van de Kerk and Manuel (2008) in a wide ranging article develop a comprehensive index for a sustainable society. This has 22 indicators across a range of social, environmental and ecological issues.

Sustainable development is best seen as a relative rather than an absolute theoretical concept. It is rooted in the current economic, social and political conditions as well as building on current financial reporting paradigms. It provides a broad theoretical umbrella under which practical environmental indicators, such as sustainable performance indicators, full cost accounting and natural inventories can be operationalised. The following definition of sustainable development is preferred in this article:

“the maintenance of essential ecological processes and life-support systems, the preservation of genetic diversity, and the sustainable utilization of species and ecosystems, with the overall aim of achieving ‘sustainable development’ through the conservation of living resources” (IUCN, 1980 as quoted in Barbier, 1987, p. 101).

The essence of sustainability is at least maintaining a given stock of resources such as natural habitats, wildlife, water or air. Consequently, non-sustaining capital must be managed and only a sustainable yield harvested. “The major task of environmental economics is to design an economic institution analogous to the plimsoll mark [safe carrying capacity] – to keep the weight, the absolute scale of the economy from sinking our biospheric ark” (Daly, 1991, p. 257).

Individual systems must achieve relative sustainability, ideally within the context of overall global sustainability (Simon, 1989; Turner, 1987). Sustainable development implies sustainable income. In environmental terms, this is an adaptation of Hicksian income, the maximum amount of income consumable, without environmental depletion or degradation so that an organisation (and thus society) is as well off in terms of stocks and resources at the end of a period as it was at the beginning. Daly (1991) graphically illustrates the threat to overall worldwide sustainability, pointing out that 40% of terrestrial Net Primary Production (basic world food resource for all non-photosynthesis life) is appropriated by human beings. With increasing population growth, particularly in the developing world, the pressure on wildlife and vulnerable ecosystems such as the rainforests, is consequently immense. In the very short-term, therefore, the minimisation of human impact upon the environment is more likely than the achievement of sustainable development. Sustainable development is likely to alleviate rather than eradicate environmental problems. However, it is a step in the right direction.

The concept of sustainable development extends to future generations. Sustainability implies maintaining a constant stock of natural assets which is then bequeathed by the present to the future (Bossel, 1987; Department of the Environment, 1990; Gower, 1992; Howarth, 1992; Wright, 1988). As the Brundtland Report states sustainable development “meets the needs of the present without compromising the ability of future generations to meet their own needs” (UNWCED, 1987). In essence, there is a trade-off between intra-generational equity (i.e., no net environmental impact in this generation) and inter-generational equity (no net environmental impact between this and future generations). Bebbington (2001b, p. 141) concludes: “Without intra-generational equity, inter-generational equity is unlikely to be achieved”. With the growing pressure on planetary resources, achieving inter-generational equity will be challenging, at best, and unobtainable at worst. This challenge is intensified as Wood and Waterman (2008) argue that some of the world’s most important environmental issues, such as biodiversity loss and global climate change, fall outside the legitimate scope of governmental decision-making as they would entail unwarranted constraint on the present generation.

Sustainable development, in the current world environment, is a challenging concept as it confronts the basic “economic model of the world that runs through conventional accounting and finance” (Gray, 2003, p. 372). It seeks to marry economic betterment with environmental protection. Economic development is not, therefore, sacrificed on the altar of environmental enhancement.

Sustainable development thus represents an uneasy pragmatic compromise between the needs of the natural environment and the imperative of economic growth. This compromise is full of latent contradictions (Gray, 2009; Redclift, 1993). It is a fluid concept which has been moulded so as to meet various mutually exclusive outcomes (Bebbington, 2001b). Potentially, the concept of sustainability is very elastic, for example, Thompson (2007) provides an impressive conceptual map of sustainability accounting. Sustainable development is at odds with the prevailing capitalist ethos and with current economic and demographic trends which deplete and pressurise current environmental resources. Sustainable development implies development without depleting resources. Capitalism implies generating profits for the capitalist class. Even if this is done by eco-efficiency, which is a common approach (see, for example, the specific issue in Ecological Economics, April 2009 and the editorial by Huppés, 2009), the net effect may be that an individual organisation’s impact will just be less than otherwise (Gray & Collison, 2002, p. 806). However, increases in population may collectively eradicate any savings through eco-efficiency. This is a pessimistic scenario. However, the stark reality remains that under the present capitalist system

sustainable development through eco-efficiency gains does provide a politically acceptable, short-term compromise. In the longer term, a more radical reorientation of the human relationship with the environment is needed.

2.4. Measure industry's impact

It is assumed here that it is important to measure industry's impact in some way. Measurement per se makes visible what has previously been invisible and enables us to capture the otherwise hidden attributes of an object. As humans, measurement is one of the ways we make sense of the world around through a variety of measurement systems such as minutes, hours and seconds for time; kilometres, metres and centimetres for distance. In business, one of the major measurement systems is quantification through accounting numbers. Such quantification helps us to understand and appraise corporate activities and achievements whether they be financial or environmental.¹⁵ If the necessity of measuring business impact is accepted, then there are two interrelated premises: First, conventional accounting is not suitable for environmental accounting and reporting and, second, we need to develop a new system of environmental accounting.

2.4.1. Current accounting inadequate

The sixth premise is that conventional accounting is not suitable for environmental accounting. Conventional accounting is not designed to and, consequently, does not capture human beings' impact upon the natural environment. There is a strong body of academics and practitioners who do think there is a need for some sort of environmental accounting and reporting. Thus, there is a wealth of academic papers and studies as well as environmental disclosures in annual reports and stand alone environmental reports. This is admittedly not universal, for example, environmental accounting has not traditionally been included in the remit of accounting standard setters; although, accounting for CO₂ emissions, is now on the agenda of the IASB (Cook, 2009). Below six impediments that inhibit the appropriateness of conventional accounting for environmental accounting are discussed and located in a historical setting: capitalist orientation; business focus; reliance on neoclassical economics; numerical quantification; monetary dependence and technical accounting practices.

2.4.1.1. Capitalist orientation. The conventional accounting discussed here, and which dominates in the West, is predicated upon capitalism. Modern capitalistic accounting has a limited world view. This is perhaps unsurprising given that the essentials of double-entry book keeping which underpin modern accounting are still as Pacioli first expounded them in 1494. Pacioli's system enabled Italian merchants to keep a systematic and orderly set of books and to establish whether or not they were making trading surpluses. Gradually, however, double-entry bookkeeping developed into modern accounting which, with its focus on profit, became entangled with capitalism. In historical terms, capitalism is a relatively new way of organising the terms of production. Capitalism is an exploitative, antagonistic system rather than a collaborative system. Corporations aim to squeeze a surplus (profit) from their ongoing exchange activities. As Beder (2006) puts it, transnational companies are eclipsing governments and millions die through contaminated air and water. The environment (Maunders & Burritt, 1991) can be sacrificed on the altar of capitalism. There is not necessarily goal congruence between the interests of capitalists and the environment and, indeed, the planet. Indeed, claims that the environment is safe in the hands of business are, at best, contestable and at worst, incomprehensible (Gray, 2003, p. 371; Gray & Bebbington, 2000). This is particularly evident in companies, particularly global companies. International financial capitalism has been severely implicated in ecological destruction (Gray, 2009; Kovel, 2007). Both Beder (1997) and Monbiot (2000), inter alia, document how companies can subvert the democratic process and the environmental movement. Certainly, current accounting with its focus on profit measurement as a precursor to dividend payments primarily serves the interests of the big companies and their shareholders. Other stakeholder groups and interests, including environmental interests, remain unsatisfied. By explicitly placing "profits" on a "dias" conventional accounting elevates the measurement, calculation, valuation and disclosure of financial assets and profit. Other activities which remain unmeasured are disregarded.

Some have gone so far as to see in double-entry bookkeeping a symbol of capitalism. Sombart (1979), the most extreme advocate of double-entry bookkeeping, saw an intimate connection between capitalism and double-entry bookkeeping; questioning which came first capitalism or double-entry bookkeeping. Yamey (1949, 1964) contests Sombart's views, but the constitutive role of accounting and its relationship to capitalism have caused much debate (e.g., Miller & Napier, 1993). Weber identified rational (i.e., double-entry) bookkeeping "as a prerequisite for capitalism" (Weber, 1976, p. 92). Finally, Bryer (2000) argues that the introduction of double-entry bookkeeping played a part in the introduction of capitalist accounting to the English East India Company in the 1640s.

A new twist on the role of accounting, capitalism and the environment has been taken by the emergence of a market for carbon emissions. As MacKenzie (2009) points out this poses questions for environmentalists who conceive themselves as opponents of capitalism. It also caused many problems for accounting standards setters where a previously costless activity became costed (Cook, 2009). Furthermore companies were forced to adopt a new mind set and grapple with new international externalities (Engels, 2009).

¹⁵ Accounting, in this sense, is used broadly as an overriding measurement system rather than as capturing the purely monetary aspects of a business.

The problematic nature of such a new market is demonstrated by Braun (2009) with Hopwood (2009) illustrating the possibilities for creative accounting and Lohman (2009, p. 499) examining the “concrete conflicts, contradictions and resistances engendered by environmental accounting”.

2.4.1.2. Business focus. Conventional accounting also takes a very narrow business-orientated view. It sets out to capture and measure business transactions. It does not, in any way, seek to embrace the interactions between society and nature. Indeed, the natural world is redefined in accounting terms. Forests, therefore, are viewed as repositories of the asset ‘timber’ not as havens of wildlife. Seas become deposits of the asset ‘fish’ rather than as unique ecological havens. Water and air are generally treated as free goods. Simply put, our relations with the environment are at best ignored and at worst seen as opportunities for commercial exploitation or generating profits. The environment only becomes visible in accounting terms when it is captured and quantified.

2.4.1.3. Reliance on neoclassical economics. Accounting relies on neoclassical economics for its intellectual source more than on any other single source (Chwastiak, 1996). As such, income theory; information economics; market studies; principal-agent models and agency theory are all predicated upon this neoclassical paradigm. Neoclassical economics is closely associated with capitalism as the dominant political ideology. Financial economics research has been captured by such thinking to the exclusion of other intellectual sources (Whiteley, 1986). Neoclassical economics privileges market mechanisms to solve environmental problems, favours economic instruments, such as tradeable pollution rights, as a solution to current economic problems as well as extending property rights to provide incentives for environmental protection (Beder, 1997). The power of neo-classical economics is intellectually and historically derived from its exclusivity, which is embedded in property rights and ownership concepts. Under neoclassical accounting the social, organisational and political aspects of accounting are largely ignored.

2.4.1.4. Numerical quantification. Accounting is also usually based on numerical quantification. As such numbers provide a common yardstick by which figures can be added, subtracted and generally manipulated. That the summation and multiplicative process often creates a meaningless aggregation of figures which has no common source or other commonality is often ignored. In carbon accounting, for example, accountants are struggling to make emission rights equivalent (MacKenzie, 2009). In business, quantification sometimes appears an end in itself. In the real natural world, however, quantification is, often, at best, of limited value and at worst, a fruitless activity. Birkin (1996, p. 237) sums up “Numbers are useful abstractions but they do not have the ability to contain the complex and interdependent series of events attendant upon any action within even the isolation of the business world; the problems of quantifying the unquantifiable”. Or as Hines (1991, p. 28) succinctly puts it: “Accounting quantifies. But can it meaningfully put a money equivalent on the rubber tree, my friend?” The sheer success of double-entry bookkeeping as a calculative technology has curtailed experimentation in accounting. Numerous other accountings are possible either using monetary or non-monetary calculative measurement techniques.

2.4.1.5. Monetary dependence. Numerical quantification is then, in turn, usually predicated upon monetary values (in, for example, dollars, euros, pounds, yen, etc.). Often many different subsidiary accounts in varied countries, prepared using different currencies, will be converted into one standard currency. Alternative quantification measures are possible, such as reserves of petrol (in litres), natural gas (in cubic metres) or carbon dioxide (tonnes). Potentially, however, these alternatives are usually converted into a standard monetary currency. Monetary values play a constitutive role in economic calculation (Weber, 1976). Only those items which have a monetary value are recorded. This means that a wealth of externalities remains unrecorded. In environmental matters, non-monetary transactions are axiomatic for “the vast majority of the biosphere is . . . not covered by price (air, water, common land, habitat, species, ozone layer, etc.)” (Gray, 1991, p. 23). “Nature is excluded from accounting calculations” (Hines, 1991, p. 27). In most cases, these externalities are currently not valued not because of a lack of value, but because current measurement systems find it difficult to quantify their value. The quality of life would, for example, be severely affected if air and water quality were seriously degraded. Environmental economics and ecological economics have been developed which attempt to account for externalities traditionally excluded from classical market-based economics (see Daly, 1980, 1985).

2.4.1.6. Technical accounting practices. And, finally, Maunders and Burritt (1991) show that certain technical aspects of accounting (such as the entity concept and periodicity) actually mitigate against the environment. For example, the entity concept draws up artificially societally constructed entities which are accounting “units”. The individuals and assets which constitute particular business organisations are not intuitively self-evident to outsiders. Businesses, such as corporations, are, in effect, legal, intangible entities with fluid, ever-changing and unclear boundaries. Externalities outside these units are ignored. Moreover, the interactions between these entities and the environment may also go unrecognised and unrecorded (Saravanamuthu, 2004, p. 298). Periodicity, divides time up into artificial and discrete periods. In financial reporting, this is conventionally a year. Accounting, as practiced in the modern corporation, is notoriously short-term in orientation, while environmental problems, such as global warming, have very long time spans. This mismatch in periodicity does not make an easy marriage between accounting and the environment. “The matching concept is blind to the cost of . . . short-term management strategies [which cause] the loss of bio-diversity through pollution of air, water and land” (Saravanamuthu, 2004, p. 299).

2.4.2. New holistic accounting

The seventh premise is based on a more holistic view of accounting, organisations and the environment, seeing them as mutually independent, interconnected and interrelated systems all being mutually dependent. In essence, accounting favours some parts of the overall 'system' (i.e., specific financial events and transaction) at the expense of others (i.e., the environment). This concept has often underpinned theorisation about environmental accounting (see Laughlin and Gray, 1988; Gray, 1990, 1992 and Daly, 1991). The organisation is viewed as a complex web of interactions drawing from, and contributing to, the economic and social environment in many ways. "Just as the micro unit of the economy (firm or household) operates as part of a larger system (the aggregate or macro-economy), so the aggregate economy is likewise a part of a larger system, the natural ecosystem" (Daly, 1991, p. 256). A network of exchanges connects systems and sub-systems. These interactions embrace both measurable (e.g., monetary) and non-measurable (e.g., non-monetary) transactions. They also involve human and non-human systems. Gray (2002) views systems thinking as a helpful heuristic for considering the boundaries of accounting and finance. At its most extreme, this systems view sees the planet, Gaia, as a living system (Lovelock, 1982, 1988).

The traditional macro-economic paradigm focuses primarily on satisfying the wants and desires of materialist human beings, consequently ignoring the world's deteriorating biological resource-base. Since the environment has no cost, consequently it has no value. This failure to ascribe value to non-market factors has far reaching consequences (Repetto, 1992a, 1992b). A country can cut down its forests, erode its soils, pollute its aquifers and hunt its wildlife and fisheries to extinction, but its measured income is not affected as these assets disappear (Repetto, 1992b, p. 64). Moreover, "this impoverishment is taken for progress" (Repetto, 1992b, p. 64). Indeed, this neglect of ecosystems may compromise the sustainability of humans in the biosphere (Costanza et al., 1997). Traditional economics sees land as passive, with natural land unproductive, ready and willing to be exploited by labour and capital (Daly & Cobb, 1989, p. 190). Land is valued only for its use in the capitalist process. Land as an ecological repository of biological diversity is outside the traditional economic paradigm.

This marginalisation of the environment at the macro level is equally true at the micro level. Traditional accounting makes no attempt to encompass environmental matters. Typically, only land is recorded in the balance sheet, generally at cost, but sometimes revalued, under the umbrella heading, property plant and equipment. There is no analysis of the habitat type or of the presence or absence of wildlife. The commoditisation of land, using the market price model, views nature as a human possession to be bought and sold. The governing paradigms of economics and accounting, therefore, do not encourage a responsible attitude towards either the environment or nature.

2.5. Disclose and report impact

The eighth and last element of the theoretical model is the belief that organisations should be accountable for the environment both because they are stewards of the environment and because of enlightened self-interest. All organisations comprise human beings who, although nominally adhering to specific organisational objectives such as profit making are also simultaneously citizens, parents and members of a wider community (Ostapski & Isaacs, 1992). If this broad, community and stewardship-based accountability is to be fulfilled the disclosure and reporting of corporate environmental impact is required.

At its narrowest, organisations can be seen as being accountable to their shareholders for their stewardship of natural assets. More widely, they can be seen as accountable for natural assets which they own (e.g., habitats) and for any actions which impinge upon the environment (e.g., such as the use of natural resources or pollution (Willis & Goodfellow, 1991)). Stewardship implies that the moral right to destroy land is not concomitant with the right of land ownership. Such logic has already been recognised in legal terms; for example, in *Just vs. Marinette Country*, the supreme court of Wisconsin argued that a zoning ordinance prevented owners of a coastal marsh from "destroying the natural character of a swamp or wetland so as to make that location available for human habitation".¹⁶ The notion of a wider public interest has taken precedence over narrow private self-interest. In other words "ownership does not convey the right to destroy use value in order to create market value" (Sagoff, 1989, p. 189). Ownership does not imply complete immunity from societal responsibility and brings obligations as well as rights. This wider notion of stewardship may be seen as stemming from the need for organisations to be legitimated by society.

Environmental assets, such as wildlife, are not conventional business assets: they are community assets. Environmental assets for example, have no readily determinable economic life, their economic valuations are inadequate descriptions of their underlying characteristics and they may be more "valuable" to the public than to the accounting entity itself (Barton, 1999; Pallot, 1992; Wright, 1990). Barton (1999, p. 208) comments, "They are 'public goods' which involve 'externalities' and which are non-revenue generating, and cannot readily be sold . . . although some natural resources, such as fossil fuels, minerals, agricultural and forested land, display some of the characteristics of private property others such as watercourses and migratory wildlife do not".

If these arguments are accepted, organisations must manage their resources responsibly. Rubinstein (1989, 1991, 1992), who regards corporations as stewards accountable for the natural resources they use, develops the idea of natural asset trust accounting which extends double-entry book-keeping accounting to embrace the environmental degradation of land. "The

¹⁶ *Just v Marinette Co.*, 46, Wis. 2d 7, 201 N.W. 2d 761, 768 (1972), quoted in Sagoff (1989) Book Review of E.F. Paul, *Property Rights and Eminent Domain*, New Brunswick, New Jersey, Transaction Books, 1987.

concept of 'stakeholders' is thus extended to include future generations" (Willis & Goodfellow, 1991, p. 46). This concept of stewardship embraces both public and private property. Over and above this obligation to manage their resources responsibly is a need for companies to be accountable by disclosing their actions to society and other third parties.

Nowadays, most companies discharge their responsibility to account for their financial (and increasingly non-financial activities) to shareholders and other corporate stakeholders such as employees, the government and the public at large through stand alone environmental sustainability reports or in their annual reports (Harte & Owen, 1991; Hibbitt and Kamp-Roelands (2000). Given the environmental threats that face the planet, the impact of industry on the environment and the legitimization of business by society, then the stakeholder groups which companies need to report to will naturally be varied and diverse. Accountants play a key role in the preparation, communication and dissemination of this information. In essence, this represents enlightened self-interest (Adams, 1992; Macve & Carey, 1992). Successful organisations seek a wide legitimacy by being environmentally responsible as well as by communicating their environmental responsibility to a range of business stakeholders. Enlightened self-interest can lead to differentiation and competitive market advantage for businesses (Hartman, Rubin, & Dhanda, 2007, p. 374). More cynically, environmental reporting represents an excellent public relations opportunity for companies to trumpet their environmental achievements. Beder (1997) cites Greenpeace campaigners who claim that Chevron, a US multinational oil company, spends five times as much promoting its environmental actions as on those actions themselves. Poor environmental performance may impact a company's share price, bring unwanted publicity and even governmental interference.

The conceptual theories which seek to provide a framework for conventional accounting are notionally premised upon the existence of multiple user groups (AAA, 1966; AICPA, 1974; ASSC, 1975). Stewardship is recognised as an important objective of accounting both in the private sector (ASB, 1991, para. 14; IASC, 1989, para. 14) and in the public sector (Drebin, Chan, & Ferguson, 1981). This stewardship has traditionally embraced only a narrow defined set of financial assets, however, logically there is no reason why it should not be extended to the stewardship of environmental assets. This wider view of stewardship dictates that companies should not only care for the environment, but also that they should account for their environmental activities. This accounting should be formally reported. Conventionally this has been done either through environmental disclosures in the annual report or by stand alone environmental reports.

In summary, the theoretical model is multilayered with eight premises. It begins with the fundamental premise that environmental threats put the planet at risk. Given that industry has a great impact on the environment and that society legitimates industry it is argued that industry has a duty to act. As the present situation appears to put the planet in jeopardy, there is a need for a new relationship between industry and the environment. It is argued that although there should be a long-term radical reorientation, in the immediate short-term sustainable development should be the target. There is a need for a measurement system to measure industry's impact, but current accounting is inadequate for a variety of reasons (e.g., monetary dependence, capitalist orientation, business focus, reliance on neoclassical economics, numerical quantification, and technical accounting practices). There is thus a need for a new holistic accounting which captures corporate environmental impacts. Finally, it is argued that companies because of their stewardship function should report their environmental accounting to their stakeholders.

3. Discussion and conclusions

There are several implications from the acceptance of this theoretical model for organisations and accountants. First, at the general level, given the severity of the environmental problems which face us, it would seem prudent for managers and accountants to take immediate action to address these threats. Simply put: it is not somebody else's problem. As was said at the start of the article "never send to know for whom the bell tolls, it tolls for thee". There is a need for individuals, the government, companies and professional organisations to wake up to the environmental challenges. In a sense, this has already begun, if disjointedly and intermittently. For example, in the UK, key individuals, both in companies (such as British Petroleum and Carillion), and in academia (such as Bebbington, Gray and Owen) have already sought to operationalise advances in environmental accounting (ACCA, 2001) while in UK professional accountancy institutes, such as the ICAEW, and particularly the ACCA have provided leadership and funding. Specifically, companies should explicitly recognise that the environment is under threat, that the company has a responsibility to act, that the company is, in effect, a steward of the environment and that the company needs to acknowledge and work within a wider network of social, economic and environmental systems.

Second, the traditional accounting paradigm with its narrow focus on accounting numbers does not capture the environmental consequences of organisational activity. A new environmental accounting system would need to measure, capture and disclose the full range of environmental corporate impacts. This would include, inter alia, accounting for air and water pollution, and the depletion of natural resources. There are three conceptual approaches: a damage cost basis, an avoidance basis and a restorative basis. In the first, the damage caused by the impacts are considered; in the second, the costs of taking preventive action to prevent environmental degradation are considered; and in the third, the cost of restoring the environment to its pre-corporate impact state are taken into account. There is, thus, a need to experiment with new models of corporate environmental accountability. The most popular way forward has been to operationalise the umbrella concept of sustainable development. However, as Gray (2009, p. 6) comments on sustainability: "Innovation and experimentation are still not especially common in academic work". New environmental systems and approaches are needed to capture and measure the environmental impacts.

Much interest has been shown in full cost accounting (for example, Antheaume, 2004, 2007; Baxter, Bebbington, & Cutteridge, 2002; Baxter et al., 2003; Bebbington, 2007; Bebbington, Brown, & Frame, 2007; Bebbington, Gray, Hibbitt, & Kirk, 2001; Boone & Rubinstein, 1997; Frame & Cavanagh, 2009; Griffiths, 2001; Herborn, 2005; Howes, 2001, 2003; Rubinstein, 1994; Taplin et al., 2006; and Xing, Horner, El-Haram, & Bebbington, 2009). Full cost accounting seeks to monetise externalities (Davies, 2009a; Frame & Cavanagh, 2009, p. 195). Rubinstein (1994) develops a fictional model for a forestry company and then reports on an experimental study carried out in Canada on a pulp mill. Bebbington et al. (2001) apply full cost accounting and attempt, using avoidance or restoration costs, to identify and measure the external impact of the activities of a research centre in New Zealand. By including such negative externalities as pollution and the decline of biodiversity, the full cost of environmental activities can be monetised. In effect, the environmental impacts are valued, wherever possible, on an avoidance or restorative basis.¹⁷

Bebbington (2001a), Baxter, Bebbington, and Cutteridge (2003), and Bebbington (2007) apply a sustainability assessment model ('SAM', a type of full cost accounting) for economic, resource, environmental and social flows to British Petroleum. The SAM measures economic, resource, environmental and social flows using damage costs. This analysis shows that for a 'typical' oil and gas development there are very large negative environmental impacts which generate large economic and socially positive benefits. This analysis provides a baseline so that a project can be reengineered to gain more positive benefits. The SAM has since been applied to a large number of other projects (Frame & Cavanagh, 2009) and developed into Construction and Urban Development forms (see Bebbington & MacGregor, 2005, and Xing et al., 2009, respectively). Further, Davies (2009a, 2009b) describes how the SAM forms the basis of a 'full cost accounting for higher education' model that has been developed in a dialogic manner under action research principles to assess a new campus building.

Figge and Hahn (2004) adopt a different approach within the sustainability umbrella. They use the notion of sustainable value added. It measures whether a company creates extra value (i.e., do the sustainable benefits outweigh the sustainable costs). Another approach to improving sustainability is to improve the Environmental Life Cycle Assessment Social Criteria. Gauthier (2005) devises The Extended Life Cycle Assessment and applies it to the *souris verte* (Green mouse) a manual charger for mobile phone batteries. Antheaume (2004) uses three external cost valuation methods (avoidance cost, cost of damages and collective consent to pay) to attempt to fully cost an industrial process. Finally, Herborn (2005) investigated full cost environmental accounting (FCEA) against the background that FCEA had been constrained by a lack of appropriate measurement techniques. She investigated FCEA in the context of the Australian public forest sector seeing FCEA as a negotiated solution and questioning the role of environmental accounting valuation techniques.

The use of sustainable indicators at the macro and micro levels appears promising. The concept of sustainable development has been operationalised at a global level by an international body, the Global Reporting Institute™ (2000) and on systems of national income accounts. There is, for example, a System of Environmental and Economic Accounting (SEEA) developed by the United Nations' Statistical Commission (Lange, 2007) and systems have been developed in individual countries, such as in the UK (DETR, 1999, 2000). In such initiatives, a range of sustainable performance indicators are developed to evaluate economic, environmental and social performance. This has extended to the stock markets with the launch of sustainable indices on the Dow Jones in the US and the FTSE in the UK (Fowler & Hope, 2007). Sustainable performance indicators build on the earlier work by Dierkes and Preston (1977) who develop a set of reference statistics and measurement techniques. Walter and Stützel (2009) point to numerous indicators and indicator sets for sustainable agriculture and sustainable land management. Lambertson (2000) uses an accounting method which combined environmental performance indicators and life cycle analysis to measure performance against ecologically efficient and sustainable targets. He used both quantitative and qualitative data on a city farm. He found mixed results with both sustainable and unsustainable aspects. Chambers and Lewis (2001) use ecological footprint analysis in an attempt to arrive at a sustainable indicator for business. Jones and Matthews (2000) apply a natural inventory to the Elan Valley Nature Reserve. Unlike the other initiatives, this model focuses on flora, fauna and natural habitats. Finally, Jones (2003) suggests that sustainability indicators can be used to gauge the health of natural assets.

Third, as part of the innovation and experimentation, there is a continued need to explore potential alternative monetary and non-monetary valuation systems.¹⁸ There are a variety of possible monetary systems such as market use (i.e., timber sales) or non-market use (i.e., conservation value or bequest value). These are premised upon the commensurability (common essence) of environmental values and their commodification (the need to set up a uniform system of exchange values) (Douai, 2009). Many of these are based on willingness-to-pay. A recent study of this kind (Czajkowski, Buszko-Briggs, & Hanley, 2009),

¹⁷ Davies (2009a), for example, identifies 16 experimental studies which adopted a range of approaches such as avoidance/restoration costs, damage costs and balance sheet/other focus.

¹⁸ Many different valuation systems, such as willingness-to-pay, have been explored (e.g., Samples, Dixon, & Gowen, 1986; Stevens, Echeverria, Glass, Hager, & More, 1991), while Jones (1996), Jones and Matthews (2000), and Jones (2003) use amenity valuation combined with ecological gradings for non-critical habitats. Nijkamp, Vindigni, and Nunes (2008) show that a variety of different economic valuation methods are possible for biodiversity, each having their pros and cons and producing different valuations: travel costs, random utility, hedonic pricing, avertive expenditure, contingent valuation of choice modelling. However, as Milne (1991) in the accounting literature, and Parker (1990), Peterson and Peterson (1993), Pearce and Moran (1994), Douai (2009) show in the environmental economics literature, there is little consensus. Indeed, there has been an active debate on the pros (see, for example, Pearce, 1992, 1993) and cons (see, for example, Hamilton, 1994) of valuing the environment at all. Sagoff (2008, p. 252) revisiting the debate in relation to ecosystem services comments: "The attempt by economists to 'value' by pricing ecosystem services only creates confusion because price does not correlate with value, benefit or utility." However, Asink, Hein, and Hasund (2008) do prefer monetary valuation arguing that valuations should be based on functions or services. Finally, Zendejdel et al. (2008) argue people cannot realistically estimate the amount they can pay because of limited ability and these researchers prefer a qualitative social intensity of wildlife diversity scale.

for example, investigated the Bialowieza forest in Poland. These methods could be used in cost benefit analysis or in Full Cost Accounting, for example, to measure the value of a product or service compared to the environmental damage its production or delivery causes. Non-monetary systems could, for example, use ecological grading systems that document the ecological importance of environmental assets and environmental impacts. For instance, Jones and Matthews (2000) use an ecological grading system to assess flora and fauna, and wildlife habitats.

Finally, the theoretical framework implies that as part of their discharge of their stewardship function organisations should disclose their environmental performance to stakeholders. This confirms the current practice whereby companies provide environmental information in annual reports or stand-alone environmental reports. Simnett, Vanstraelen, and Chua (2009), for example, show that 2113 companies from 31 countries produced sustainability reports from 2002 to 2004. Owen (2003) shows that traditionally within Europe, German and Scandinavian companies have led the way.¹⁹ In Europe, for example, there is a well-established set of European Environmental Reporting awards; while in the U.K. the government is monitoring corporate environmental reporting (DETR, 2000). If companies are going to discharge their stewardship duties, it would seem that the following tentative suggestions would enhance this reporting process. These could either be set as voluntary guidelines or prescribed by standards. On a pragmatic note it should, of course, be appreciated that companies may well be reluctant willingly to embrace environmental disclosure regulations. For example, Cho, Chen, and Roberts (2008, p. 451) argue that their research “provides empirical evidence that affected firms were already striving to reduce or mitigate environmental disclosure regulations, using political avenues, despite global environmental rises”. Therefore, mandatory regulation is likely to be more effective than voluntary regulation. Companies could provide the following statements in the annual report or stand-alone environmental reports.

1. A statement of their corporate philosophy towards the environment. In particular, identifying any threats they recognise and, in particular, whether their business activities potentially contribute to those threats.
2. Whether the company recognises a duty to act and what in broad terms it intends to do.
3. A statement of its attitude to sustainable development, what it believes the phrase means, and how it operationalises sustainable development. In particular, whether its pursuance of sustainable development will lead to any economic sacrifice for shareholders and other stakeholders.
4. A statement on whether the company sees any need for a radical reorientation of the human relationship with the environment.
5. A clear specification of its social, economic and environmental targets, how many have been met, how many partially met and to what degree.
6. Compliance with a clear comprehensive set of time-series performance indicators either internally devised or externally such as the GRI. These should embrace, inter alia, targets on water, waste, recycling, energy, pollution, biodiversity and, in particular, given the current concerns with climate change comprehensive details of air emissions, particularly tonnes of carbon dioxide.
7. A verification statement that clearly specifies whether the opinion is a “fair and balanced representation” of the company’s social and environmental activities.

Overall, therefore, this article had two major objectives. First, this article aimed to synthesise the prior literature into a model to provide a theoretical justification for environmental accounting and reporting. The article developed a multilayered theoretical framework to underpin environmental management (severe environmental dangers; corporate responsibility; new relationship between industry and environment; measure industry’s impact and disclose and report impact) comprising eight premises. The model was developed from a personal conviction that companies should engage with environmental issues. The model also strived to be realistic recognising the political and social realities of the current world situation. This particular model is not meant to be exclusive or deny other theoretical models. However, it is one model by which environmental progress can be measured.

The article’s second objective was to investigate the implications of the theoretical model for organisations and accountants. Four implications arose from the theoretical model. First, that there is an urgent need for managers and accountants to take action. Second, we need to experiment at once with new environmental accounting systems to measure, capture and disclose corporate environmental impacts. Third, potential alternative monetary and non-monetary valuation systems should be explored. And, finally, organisations should formally report their activities to their stakeholders probably under a mandatory framework.

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¹⁹ The research into the production of environmental reports has been prolific especially by the international accounting firms (e.g., see Deloitte Touche Tohmatsu International, 1993; Canadian Institute of Chartered Accountants, 1994; United Nations Environmental Programme, 1994, 1996a, 1996b; AccountAbility, 1999; KPMG/WIMM, 1999, cited in Hibbitt and Kamp-Roelands, 2001; KPMG, 2005, 2008).

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