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BIODIVERSITY AND BUSINESS: WHAT DO WE KNOW ABOUT BIODIVERSITY ACCOUNTABILITY?

Paola Vola[1], **Lorenzo Gelmini**[1]

[1] University of Eastern Piedmont, Italy

ABSTRACT: The aim of this paper is to investigate the complex relationship between global business and biodiversity. Since business organizations impact biodiversity degradation and at the same time have to face the consequences of the loss of biodiversity, it seems necessary to further investigate the role played by business organizations in alleviating biodiversity loss (Reade, Goka, Thorp, Mitsuhata and Wasbauer, 2014).

In order to study how business organizations comprise the topic of biodiversity in reality, this research primarily proposes a literature review on biodiversity in the field of accounting, management and organization.

This assessment is significant being, as far as we know, one of the first systematic reviews of the literature on biodiversity and natural capital.

KEYWORDS: *biodiversity, accounting, management, organization, accountability*

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INTRODUCTION

During the past few decades, firms have been under increasing pressure from stakeholders to reduce their impact on the environment. The environmental issue has become key strategic variables for business organizations, in terms of disclosures (Cho and Patten, 2007), now mandatory in many countries. The business community has been asked through the launch of the 'Business and Biodiversity' initiative, to contribute actively to the objectives of the Convention on Biological Diversity (CBD); the European Commission supports these initiatives through the adoption of best practices to reduce the impacts of businesses on biodiversity and promote its conservation. Biodiversity is usually depicted as a new, additional form of external environmental constraint on business activity; businesses make use of cost-benefit analyses in order to evaluate the marginal economic value of biodiversity (inclusive of ecosystem services) for trade-offs purposes: this allows them and their stakeholders to account for biodiversity and ecosystem services loss or gain from an economic perspective.

The real awareness of the links between business and biodiversity is still of concern mainly to large corporations and multinationals, the firms most visible to the general public and those directly involved with living systems such as agribusiness (Houdet, 2008). These are the corporations most likely to be subject to pressure from stakeholders, including non- governmental organizations, local communities and Corporate Social Responsibility (CSR) rating agencies.

The aim of this paper is to investigate the complex relationship between global business and biodiversity.

Since business organizations impact on biodiversity degradation but, at the same time, have to face the consequences of the loss of biodiversity, it seems necessary to further investigate the role played by business organizations in alleviating biodiversity loss (Reade, Goka, Thorp, Mitsuhata and Wasbauer, 2014).

Many scholars (Boons and Lüdeke-Freund, 2013; Hansen, Große-Dunker and Reichwald, 2009; Schaltegger, Lüdeke-Freund, and Hansen, 2012; Stubbs and Cocklin, 2008) underline that business organizations can help develop integrative and competitive solutions by either

radically reducing negative and/or creating positive external effects for the natural environment and society.

In order to study how business organizations really comprise the topic of biodiversity, we propose, first of all, a literature review on biodiversity in the field of accounting, management and organization.

This assessment is significant being, as far as we know, one of the first systematic reviews of the literature on biodiversity and natural capital.

Literature analysis is critical because it represents the premise for discussing business organizations' commitment to biodiversity; at the same time, we look for original theorizations in the field of biodiversity, able to move further from the more traditional ones.

BIODIVERSITY: THE MAIN CHALLENGE FOR BUSINESS ORGANIZATIONS

The UN Convention on Biological Diversity (CBD) from 1992 defines biodiversity as "[...] the variability among living organisms from all sources including [among other things] terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are a part ... [including] diversity within species, between species and of ecosystems".

According to Spicer (2006), there may be more than 80 definitions of biodiversity

apart from the one agreed by the Convention on Biological Diversity in 1992.

An approach to biodiversity incorporating the concept of ecosystem services tends to adopt an entirely anthropocentric perspective. (Jones and Solomon, 2013).

In fact, "the value of biodiversity to many companies does not usually relate to the existence of individual species per se. Rather, it is the economic value of natural or "ecosystem" services that are sustained through the complex simultaneous interaction between many species that has long been integral to economic success, and is now at risk from growing biodiversity loss" (F&C, 2004, p. 1).

Biodiversity represents a bundle of resources essential for the well-being of the planet, in particular for mankind that lives on it, and, from another point of view, plays an important role in the economic development, through its provision of ecosystem services. It has been estimated that the global biodiversity resources have been declining continuously over the last several decades (FAO 2010, Dempsey, 2015; IPBES, 2019).

The CBD target for 2010 has failed in all its given assignment: the main reasons of such a failure can be referred to the lack of mainstream activity of ecosystem and biodiversity in the economic planning and economic sector (CBD 2012).

TEEB 2010 (The Economics of Ecosystems and Biodiversity) has emphasized the importance of business sectors involved in the whole process of conservation and protection of ecology, biodiversity, and environment. Since business organizations impact on biodiversity degradation but, at the same time, have to face the consequences of the loss of biodiversity, it seems necessary to further investigate the role played by business organizations in alleviating biodiversity loss (Reade, Goka, Thorp, Mitsuhata, and Wasbauer, 2014).

Many scholars (Boons and Lüdeke-Freund, 2013; Hansen, Grosse-Dunker and Reichwald, 2009; Schaltegger, Lüdeke-Freund and Hansen, 2012; Stubbs and Cocklin, 2008) underline that business organizations can help develop integrative and competitive solutions by either radically reducing negative and/or creating positive external effects for the natural environment and society.

According to this perspective we can affirm that all business organizations are accountable for their actions and for their contribution to biodiversity. Buhr (2007) and Livesey (2002) underline that the 'act' of corporate reporting on sustainability has the potential to influence and transform corporate behaviour. In the field of biodiversity Jones and Solomon (2013) argue that accounting can be used as emancipatory device which can, by reporting organizations' impacts on biodiversity and their efforts to enhance and protect biodiversity, raise stakeholders' awareness of companies' impact and the extent to which organizations are attempting to mitigate this impact.

Accounting for biodiversity can represent an accountability mechanism since organizations reporting their biodiversity commitment will be encouraged to conserve and protect biodiversity.

As far as concern the level of biodiversity reporting, the main studies referred to developed countries demonstrate a low level of disclosure on biodiversity; it is worth observing that the findings of Van Liempd and Busch (2013), Danish companies (period 2009 – 2011), are consistent with those arising by Jones, Solomon, Rimmel and Jonäll (2013), Swedish companies (period 2006 – 2010), and with those of Grabsch et al. (2011) regarding UK and Germany.

In the recent years sustainability reporting has become a more common practise (Higgings et al., 2014), mainly due to the adoption of some reporting framework, such as the Integrated Report, proposed by IIRC, and GRI standards, notably the GRI 304 on biodiversity.

Despite the rise in the quantity of sustainability reports (KPMG, 2013), it is important to stress the attention to the quality of the reporting (Cho et al., 2012; Milne et al., 2006, 2009; Bowen and Aragon-Correa, 2014; Merkl-Davies and Koller, 2012).

As Boiral (2016) underlines, accounting for biodiversity requires not only explanations of a company's commitment and qualitative information, but also the possibility of estimating the performance in this area. Without a reference to both tangible impacts on environment and business activities carried out by the organization, biodiversity risks to appear just a convenient tool for impression management, enhancing corporate image through the release of general information.

So that business organizations need to face the great challenge of biodiversity translating biodiversity issue into their business activities: this implementation throughout the organization is necessary in order to effectively manage sustainability risk and opportunities (Haugh and Talward, 2010).

PHILOSOPHY, ECOSOPHY AND THE MAIN THEORETICAL STREAMS OF RESEARCH

The notion of "natural capital", which embodies *latu sensu* the notion of biodiversity as well, is not new in the field of social sciences studies.

For instance, according to Stuart Mill, "nature" means, at the very same time, "all powers existing in either the outer or inner world and everything which takes place by means of those powers" and, "not everything which happens, but only what takes place without the agency, or without the voluntary and intentional agency, of man" (Mill, 2006).

With the clear words of DesRoches, Stuart Mill's first concept of nature denotes everything actual and everything possible, including human agents and their intentional activities, whilst the second concept of nature, that Stuart Mill prefers, drives a wedge between intentional human agency and that realm of phenomena that has not yet been affected by human agency (DesRoches, 2018).

In line with Stuart Mill, G.F. Hegel and Karl Marx also recognized these same two concepts of nature but placed them under the same general heading of "Nature"; in this sense, "First Nature"is the biophysical world as it existed before the evolution of Homo sapiens and "Second Nature" is what most would refer to as the artificial - the material and cultural environment that our species has imposed upon First Nature (DesRoches, 2018).

Stuart Mill's second concept of nature – which denotes processes that take place independent of human agency – has roots in the writings of the ancient Greeks, particularly those of Aristotle.

In his Physics, in fact Aristotle affirms that nature denotes an inner principle of change that is characteristic of self-moving things.

Unlike artificial objects, "natural ones are involved in a process of growth, change and flux. Nature, in this sense, is deeply intertwined with how things behave when left to themselves, free from intentional human agency" (DesRoches, 2018).

The second concept of "nature" in Stuart Mill, as his direct source in Aristotle, fits

well the concept of "natural capital" since ecological economists "claim that specific instances of natural capital, unlike manufactured capital, are production processes that generate welfare-enhancing benefits (DesRoches, 2018).

More recently, French philosopher Guattari and, later, Norwegian academic Naess develop the notion of "ecosophy" which, again, takes a significant step inside the work of Stuart Milll.

In fact, ecology, in the Guattarian sense, is a study of complex phenomena, including human subjectivity, the environment, and social relations, all of which are intimately interconnected; Guattari prefers to emphasize heterogeneity and difference, synthesizing assemblages and multiplicities in order to trace rhizomatic structures rather than creating unified and holistic structures (Guattari, 1992).

In line with the above, Naess defined ecosophy as "a philosophy of ecological harmony or equilibrium. A philosophy as a kind of sofia (or) wisdom, is openly normative, it contains both norms, rules, postulates, value priority announcements and hypotheses concerning the state of affairs in our universe" (Drengson and Devall, 2008).

Finally, some philosophers tackle the relationship between nature, natural capital and ecology; for instance, Morton (2009) has engaged in a project of ecological critique, through which he problematizes environmental theory from the standpoint of ecological entanglement.

In his "Ecology Without Nature", the Author proposes that an ecological criticism must be divested of the bifurcation of nature and civilization, or the idea that nature exists as something that sustains civilization, but exists outside of society's wall. The short annotations above, concerning major philosophical trends in the field of nature, seem to us to be of considerable usefulness in order to better understand the whole context of the accounting, managerial and organizational studies, with reference both to natural capital and biodiversity.

In fact, a joint reading of Stuart Mill, Guattari, Naess and Morton makes it possible to hypothesize two very distinct approaches in the description of the relationship between living beings and nature: in the first case, human beings is a key element around which to build and to mitigate the relationship within the environment; in the second case, instead, the environment is perceived as an element of reality that possesses a meaning even beyond the wall of the human being.

These two streams of philosophical background are strongly rooted within two different (managerial, organizational and accounting) theories which are notably appropriated to assess and disentangle natural capital and biodiversity: impression management and extinction accounting.

In particular, impression management implies *in re ipsa* the role of human beings while extinction accounting draws an emancipatory approach which is in line with deep ecological thoughts of Naess.

Impression management within natural capital and biodiversity has been recently addressed by academics (Boiral, 2016; Boiral and Heras-Sizarbitoria, 2017), who state that, "as stressed by theories of neo-institutionalism, external pressures and the search for corporate legitimacy are two of the main reasons for implementing new practices, especially in the area of environmental management, natural capital and biodiversity".

Most interestingly, Boiral (2016), basing on the content analysis of some sustainability reports from mining organizations, sheds light on the use of rhetoric in reports

on non-measurable and potentially unaccountable issues as biodiversity.

Specifically, the study shows that mining organizations use four main techniques of neutralization when they explain their impact on biodiversity (1. they claim of a net positive or neutral impact on biodiversity; 2. they deny that they have a significant impact; 3. they distance themselves from the impact of their actions; 4. they play down their responsibilities).

Put in these terms, impression management represents a tactics for addressing, within the human being reality, the issue of sustainability, natural capital and biodiversity; and it is perfectly coherent with the first meaning of nature for Stuart Mill.

Extinction accounting moves, on the contrary, within the awareness that "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" (Maroun and Atkins, 2018).

It is in line with the study of Maas et al. (2018), who confirm that investors are only interested in biodiversity and natural capital when it is clearly and directly linked to (reduced) financial risks.

In this sense, according to Maroun and Atkins, extinction accounting is intended as a means of reporting on biodiversity-related risks which creates an awareness of the importance of managing biodiversity loss (Maroun and Atkins, 2018).

More broadly, the Authors intend their project as "emancipatory" designed to encourage changes in mind-sets and "bring about social change" (Maroun and Atkins, 2018).

With its tendency to change the status quo and with its profound relationship with the movement of the deep ecology, extinction accounting represents a dynamic, holistic and attractive modality to outline the phenomenon and to operationalize it, in which narrative and reports allow to "change things" and have an impact.

Furthermore, in addition to constituting an important theoretical model, extinction accounting also offers a valuable operational tool for the content analysis of reports (*latu sensu*) which deal with natural capital.

The Authors propose, in fact, an assessment of the reports using six capital elements (Extinction accounting context; Action-focused reporting; Partnership reporting; Analysis and reflection; Assessment; Reporting).

The revolutionary and emancipatory power, implicit in the extinction theory, consonants also in a recent work which explores the myth as a founding element of integrating reporting (Gibassier, Rodrigue and Ariales, 2018).

The Authors conceptualization integrated reporting as a rational myth and the exploration of its ramifications; this approach enables them to introduce Hatchuel's rational myth as a relevant lens for studying non-financial reporting, suggesting that myths can play a productive role in transforming business and reporting practices.

Next and amongst the main theoretical approaches outlined above (impression management; extinction accounting) it lies the role of business models in tackling sustainability issues, since our special attention is conveyed to the business models of integrated reporting: in this sense, some authors have in recent years paved the way for depicting and assessing business models for sustainability (Schaltegger, Hansen and Lüdeke-Freund, 2016).

THE ACADEMIC BACKGROUND ON BIODIVERSITY: ACCOUNTING, MANAGERIAL AND ORGANIZATIONAL LITERATURE REVIEW

Literature review methodology

To identify the relevant literature eligible for our review, we combined four leading databases within the field of accounting, managerial and organizational studies: Elsevier, Emerald, Wiley and Springer.

We focused our search on articles published in academic journals up to January 2020, with the lower boundary for the timeframe of 2014, which has been chosen as the first year since launch in 2013 of the International Integrated Reporting Council Pilot Programme.

We used the following search algorithm of keywords in the text: biodiversity and "integrated report*"; we have chosen the word "biodiversity" and not also the "natural capital" in order to be more in focus with the call for papers and we have added the "integrated report*" phrase to center the papers inside the realm of Integrated Reporting, which constitutes the field of the second part of the paper

We limited the literature review to in· uential articles published in established peer-reviewed journals, as articles in academic journals can be regarded as validated knowledge and likely to have a major impact on the · eld (Campopiano et al ., 2017).

Established journals are acknowledged to shape research in a · eld by setting new horizons for investigation within their frame of reference (Campopiano et al., 2017).

We therefore considered that this approach provided an accurate and representative picture of relevant scholarly research; we excluded articles that were not written in English, teaching cases, those not addressing business and management issues (Campopiano et al., 2017).

This procedure led to a · nal population of 144 articles, listed in Table 1, with the time frame in Table 2.

Table 1

Academic journals with more than one paper on biodiversity and "integrated report"*

Journal	Number of articles
Accounting, Auditing & Accountability Journal	23
Journal of Cleaner Production	20
Meditari Accountancy Research	15
Sustainability Accounting, Management and Policy Journal	14
Critical Perspectives On Accounting	4
Managerial Auditing Journal	4
Business Strategy and the Environment	3
International Journal of Corporate Social Responsibility	3
Resources Policy	3
Miscellanea*	55
Total	144

It comprises n. 55 papers, of which 20 have been published in 10 journals (twice each) and 35 in 35 journals, 1 paper each.

Table 2

Time frame of the articles regarding biodiversity and "integrated report"*

Year	Number	Cumulated
2014	9	9
2015	11	20
2016	19	39
2017	24	63
2018	29	92
2019	47	139
2020	5	144
Total	144	

RESULTS

As shownin Table 1, the topic discussed in this paper has been strongly concentrated in a limited number of journals (namely: Accounting, Auditing & Accountability Journal; Journal of Cleaner Production; Meditari Accountacy Research; Sustainability Accounting, Management and Policy Journal), which cover 50% of the whole population of articles; the remaining 50% is dispersed, *vice versa*, in 50 different journals.

With reference to the time frame, the topic of biodiversity in the managerial studies has grown in its importance over the years; in 2019, in fact, the number of articles has been the same as in the previous two years together, representing overall 33% of the total.

At the very same time, we decided, for a better understanding of the state of the art of literature, to try to give a numerical judgement, albeit synthetically, of the relevance of the various articles to the specific theme of the call for papers and of our article: we thus set a score from 0 to 5 (Likert scale), with 0 as "not relevant" and 5 as "decisive". The results are in the Table 3 below. Even though the score we have calculated is not expressive of the overall richness of the articles but only of its proximity and affinity to the topic of call for papers, it is undeniable that the ample majority of the articles examined deal with the issue of biodiversity within the integrated reporting only minimally, with a few important exceptions, almost all of which in the year 2018 and 2019. Within the population we also, first, group articles according to their nature, if theoretical or empirical.

Table 3

Relevance of the articles for the call for papers

Score	Number
0	6
1	47
2	33
3	32
4	13
5	13
	144

Table 4
Nature of the articles

Theoretical only	Empirical only	Both	Not relevant
39	61	38	6

For reasons of clarity, theoretical articles are defined as articles that either describe and conceptualize frameworks, or develop original theories or offer a literature review.

Empirical articles, on the contrary, could be either with case studies and content analysis or with statistical techniques.

The results are demonstrated in Table 4.

In detail, out of the 77 articles with a theoretical (exclusively or not) context, 52 of them explicitly identify, within the most established frameworks, the operational applications of them to the issues of natural capital and biodiversity; in this sense, legitimacy theory plays the lead role as in Table 5.

Table 5
Principal theory adopted

Legitimacy theory	6
Institutional theory	4
Stakeholder theory	3
Impression management	3
Action research approach	2
Resource based view	2
Organizational change	2
Luhmann theory	2
Institutional logics	2
Emancipatory accounting	2
Corporate citizenship	2
Actor-network theory	2
Miscellanea*	20
Not mentioned	25
Total	77

** It comprises 20 different theories, mentioned once.*

With reference to the empirical studies, on the contrary, they are mostly based within case studies; the articles with statistical techniques – outnumbered in respect of the articles with a case study approach – in general deal with listed companies and with specific industries (for instance, the mining sector.

DISCUSSION AND CONCLUSIONS

The analysis of articles shows that biodiversity issues have grown in importance in the last year, considering that the 33% of the studies selected has been published in 2019.

If we consider the 77 articles with a theoretical (exclusively or not) contest, only 52 of them explicitly identify the theory they are based on.

Legitimacy theory, institutional theory, and stakeholder theory and impression management seem to be the more adopted frameworks: it could be interesting to extend the range of adopted theories in order to provide more implications on biodiversity.

As far as concern the most relevant articles, we have identified the following (Table 6).

Our literature review confirms that accounting and reporting for biodiversity are research field still understudied (Boiral, 2016; Jones and Solomon, 2013; Jones, 1996, 2003).

As Boiral (2016) underlines, accounting for biodiversity requires not only explanations of the company's commitment and qualitative information, but also the possibility of estimating performance in this area.

Therefore business organizations need to face the great challenge of biodiversity translating biodiversity issue into their business activities: this implementation throughout the organization is necessary in order to effectively manage sustainability risk and opportunities (Haugh and Talward, 2010).

Further research is thus required to assess actions carried out by business organizations with reference to biodiversity, otherwise commitment to biodiversity and sustainability will remain rather general than tangible; it is important to trace the effective impact of firms actions, through disclosure reports, on biodiversity in order to detect and promote virtuous behaviour by business organizations.

Table 6
Review of the most relevant articles

N.	Year	Authors	Title	Journal
1	2015	Cho, C.H., Laine, M., Roberts, R.W. & Rodrigue M.	Organized hypocrisy, organizational façades, and sustainability reporting	Accounting, Organizations and Society
2	2016	Lähtinen,K., Guan, Y., Li, N. & Toppinen A.	Biodiversity and ecosystem services in supply chain management the global forest industry	Ecosystem Services
3	2017	Adler, R., Mansi, M., Pandey, R., Stringer, C.	United Nations Decade on Biodiversity - A study of the reporting practices of the Australian mining industry	Accounting, Auditing & Accountability Journal
4	2017	Del Baldo M. & Baldarelli M.G.	Renewing and improving the business model toward sustainability in theory and practice	International Journal of Corporate Social Responsibility

N.	Year	Authors	Title	Journal
5	2018	Maroun, W & Atkins J.	The emancipatory potential of extinction accounting: Exploring current practice in integrated reports	Accounting Forum
6	2018	Stewart, R. & Niero M.	Circular economy in corporate sustainability strategies: A review of corporate sustainability reports in the fast‐moving consumer goods sector	Business Strategy and the Environment
7	2018	Long, T.B., Looijen A. & Blok V.	Critical success factors for the transition to business models for sustainability in the food and beverage industry in the Netherlands	Journal of Cleaner Production
8	2018	Bini, L., Bellucci, M. & Giunta F.	Integrating sustainability in business model disclosure: Evidence from the UK mining industry	Journal of Cleaner Production
9	2019	Cubilla‐Montilla, M.I., Galindo‐Villardón, P., Nieto‐Librero, A.B., Vicente Galindo, M.P. & García‐Sánchez I.M.	What companies do not disclose about their environmental policy and what institutional pressures may do to respect	Corporate social responsibility and environmental management
10	2019	Ruokoken, E. & Temmes A.	The approaches of strategic environmental management used by mining companies in Finland	Journal of Cleaner Production
11	2019	Albertini E.	Integrated reporting: an exploratory study of French companies	Journal of Management and Governance
12	2019	Skouloudisa,A, Malesios, C. & Dimitrakopoulosa P.G.	Corporate biodiversity accounting and reporting in mega-diverse countries: An examination of indicators disclosed in sustainability reports	Ecological Indicators
13	2020	Weir K.	The logics of biodiversity accounting in the UK public sector	Accounting Forum

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