

**EMERGENCE OF BIODIVERSITY DISCLOSURES TO  
THE REGIME OF CORPORATE REPORTING  
- REVIEW OF CURRENT APPROACHES**

**Jyväskylä University  
School of Business and Economics**

**Master's Thesis**

**2022**

**Author: Lilli Kulta  
Subject: Corporate Environmental Management  
Supervisor: Marileena Mäkelä**



**JYVÄSKYLÄN YLIOPISTO  
UNIVERSITY OF JYVÄSKYLÄ**

## ABSTRACT

Author Lilli Kulta	
Topic Emergence of Biodiversity Disclosures to the Regime of Corporate Reporting – Review of Current Approaches	
Subject Corporate Environmental Management	Type of work Master’s Thesis
Date 13.4.2022	Number of pages 61
Abstract Biodiversity loss has been identified as one of the biggest environmental challenges of our time. As companies have been a major driver of biodiversity loss, it is important to increase corporate accountability on biodiversity via accounting for biodiversity. The prior research on corporate biodiversity reporting has pointed out that for the large extent the reporting is limited and there is a research gap on the detailed content of the biodiversity disclosures. The aim of this thesis is to shed light on the content of corporate biodiversity disclosures in sustainability reporting by analysing the pioneer companies in sustainability. The common theories used in analysing biodiversity reporting, including stakeholder, legitimacy and institutional theories, are criticised for their isolated nature. Hence, usefulness of multi-level perspective as an alternative theoretical framework for analysing emerging corporate sustainability disclosures was discussed in the context of biodiversity disclosures as it provides a more holistic approach. This thesis is based on data obtained from corporate sustainability reports of the top 50 companies in the Global 100 Most Sustainable Corporations rating by the Corporate Knights, using content analysis as the research method. The finding of this thesis is that biodiversity reporting is still in early stages as the variety of biodiversity disclosures is high among the companies. Three different main categories of biodiversity disclosures, their sub-categories and the detailed content of each category as well as the relationship between categories were discovered. The main three categories are biodiversity impact assessment, biodiversity impact management, and biodiversity protection as a product or service. Hence, the companies in addition to measuring and minimising their own impacts have also started to increase their biodiversity handprint. This thesis fills the research gap and broadens the understanding regarding the detailed content of the different biodiversity disclosures used by the most sustainable companies in the world.	
Key words Biodiversity, Disclosure, Sustainability reporting, Content analysis	
Place of storage Jyväskylä University Library	

## TIIVISTELMÄ

Tekijä Lilli Kultra	
Työn nimi Luonnon monimuotoisuutta koskevien tietojen julkistaminen yritysraportoinnissa – Nykyisten lähestymistapojen tarkastelu	
Oppiaine Yritysten ympäristöjohtaminen (CEM)	Työn laji Pro gradu -tutkielma
Päivämäärä 13.4.2022	Sivumäärä 61
<p><b>Tiivistelmä</b></p> <p>Biodiversiteetin väheneminen on yksi aikamme suurimmista ympäristöhaasteista. Yritykset ovat edesauttaneet luonnon monimuotoisuuden vähenemistä toimillaan. Täten on tärkeää lisätä yritysten vastuullisuutta ottamalla biodiversiteetti paremmin huomioon raporttoimalla siitä. Tämän tutkielman tavoitteena on valaista yritysten biodiversiteettiraportoinnin sisältöä vastuullisuusraportoinnissa analysoimalla edelläkävijäyrityksiä. Aikaisempi tutkimus yritysten biodiversiteettiraportoinnista osoittaa, että raportointi on ollut rajallista ja biodiversiteettiraportoinnin yksityiskohtaisessa sisällössä on tutkimuspuutteita. Biodiversiteettiraportoinnin analysoinnissa on yleisesti käytetty sidosryhmä-, legitimizeetti- ja instituutioteorioita, joita on kritisoitu liiallisesta suppeudesta. Tästä syystä tutkielmassa tarkasteltiin monitasoisen näkökulman (Multi-level perspective) hyödyllisyyttä vaihtoehtoisena teoreettisena viitekehyksenä uusien vastuullisuusraportoinnin aiheiden analysointiin, sillä se tarjoaa kokonaisvaltaisemman lähestymistavan. Tämä tutkielma perustuu Corporate Knightsin Global 100 Most Sustainable Corporations -luokituksen 50 parhaan yrityksen yritysraportteista kerättyihin tietoihin käyttäen sisältöanalyysiä. Tässä tutkielmassa havaittiin, että biodiversiteettiraportointi on vielä alkuvaiheessa, sillä biodiversiteettiin liittyvien tietojen vaihtelevuus oli suurta. Tutkielmassa tunnistettiin kolme erilaista biodiversiteettiä koskevien raportoitujen tietojen pääluokkaa, niiden alakategoriat ja kunkin kategorian yksityiskohtainen sisältö sekä luokkien välinen suhde. Kolme pääluokkaa ovat vaikutusten arviointi biodiversiteettiin, vaikutusten hallinta ja biodiversiteetin suojelu tuotteena tai palveluna. Näin ollen yritykset ovat omien vaikutustensa mittaamisen ja minimoimisen lisäksi alkaneet kasvattaa biodiversiteettikädenjälkeään. Tämä tutkielma täyttää tutkimusaukon ja laajentaa ymmärrystä maailman vastuullisimpien yritysten käyttämien erilaisten biodiversiteettiä koskevien tietojen yksityiskohtaisesta sisällöstä vastuullisuusraportoinnissa.</p>	
Asiasanat Biodiversiteetti, vastuullisuusraportointi, sisältöanalyysi	
Säilytyspaikka Jyväskylän yliopiston kirjasto	

# CONTENTS

1	INTRODUCTION .....	7
1.1	Background of the Thesis .....	7
1.2	Aim of the Thesis .....	8
1.3	Structure of the Thesis.....	9
2	THEORETICAL FRAMEWORK .....	10
2.1	Company Reporting .....	10
2.1.1	Sustainability Reporting .....	10
2.1.2	Biodiversity Reporting.....	12
2.2	Commonly Used Theories in Biodiversity Reporting Literature.....	15
2.3	Alternative Approach for Analysing Nascent Disclosures: Multi-Level Perspective.....	17
3	DATA AND METHODOLOGY .....	23
3.1	Research Design .....	23
3.2	Data Collection.....	24
3.3	Data Analysis.....	26
4	RESULTS .....	27
4.1	General Findings.....	27
4.2	Biodiversity Impact Assessment.....	28
4.2.1	Corporate Dependencies on Biodiversity .....	28
4.2.2	Methods for Assessing the Biodiversity Impact .....	29
4.2.3	Impact of Business Activities on Biodiversity .....	32
4.3	Biodiversity Impact Management .....	36
4.3.1	Management Approach.....	36
4.3.2	Impact Management Activities.....	42
4.3.2.1.	Managing Impacts Connected to Business Operations .....	42
4.3.2.2.	Biodiversity Projects Separate from Business Activities.....	44
4.3.2.3.	Support for Research.....	46
4.4	Biodiversity Protection as a Product or Service .....	46
5	DISCUSSION .....	48
5.1	Implications of the Wide Variety and Extent of Disclosures.....	48
5.2	Discovered Novelties .....	49
5.3	Commonalities with Prior Research .....	50
6	CONCLUSION .....	52
	REFERENCES.....	54

## LIST OF TABLES

TABLE 1 Company profiles in order of the sustainability ranking .....	25
TABLE 2 Methods for assessing biodiversity impact.....	30
TABLE 3 Reporting of business impacts on biodiversity .....	32
TABLE 4 Biodiversity goals, targets and KPIs .....	40

## LIST OF FIGURES

FIGURE 1 Multi-level perspective .....	18
FIGURE 2 Multi-level perspective on biodiversity reporting .....	21
FIGURE 3 Biodiversity disclosures in corporate reporting and the number of companies reporting on each category .....	28
FIGURE 4 Management approach to biodiversity .....	37

# 1 INTRODUCTION

## 1.1 Background of the Thesis

Biological diversity, also called biodiversity, is defined as the variety among life forms including genetic, species, ecosystem, and biological community diversity (IPBES, 2019). Species diversity can be divided into two parts (Campbell et al., 2017). First, there is species richness that refers to number of different species in a biological community. Biological community is a group of different species populations that interact with each other as those are living in close enough proximity (Campbell et al., 2017). Secondly, there is relative abundance of different species which is the proportion of individuals of each species in the biological community.

There are multiple reasons why biodiversity is important (Campbell et al., 2017). Firstly, biological communities where biodiversity is high are more stable in productivity constantly from one year to the next one. These biological communities produce more biomass than less diverse communities in similar circumstances. Secondly, ecosystems with high biodiversity are more resilient. Biodiversity helps to recover as well as to cope with environmental stressors, such as floods, droughts, or toxins. Lastly, invasive species which are organisms located outside their native area face difficulties in invading areas with high biodiversity. Those biological communities are more resistant as those are more effective in taking most of the resources available in the system that leaves less resources for the invasive species.

Despite multiple benefits of biodiversity, it is globally decreasing. Biodiversity loss has been identified as one of the greatest threats to our planet (Roberts et al., 2021). The current extinction rate of species is estimated to be from 1,000 to 10,000 times higher than the natural extinction rate within the history of Earth and thus, this period in time has been referred to as the 6<sup>th</sup> mass extinction (World Wildlife Fund, 2020). The main drivers behind the current biodiversity decline are habitat loss including expansion of agriculture, land use practices such as rainforest depletion, urban sprawl, climate change, pollution, mono-agriculture, use of pesticides, and invasion of alien species (Atkins & Maroun, 2018; Dietz & Adger, 2003). Hence, human activity is a common nominator for the 6<sup>th</sup> mass extinction. The current biodiversity loss is over the planetary boundary, the safe operating space for humanity, which can impact the Earth system in non-linear and irreversible ways (Steffen et al., 2015). Biodiversity is essential part of natural capital and interaction between its parts provide various ecosystem services such as raw materials and other production factors, as well as flood regulation and other types of risk mitigation (Houdet, Joël et al., 2020). Hence, these ecosystem services are under risk with increasing biodiversity loss.

For instance, increased risk for zoonotic diseases, such as COVID-19, is closely linked to biodiversity loss and degrading ecosystem services (Everard et al., 2020).

All businesses are highly dependent on biodiversity and ecosystem services either directly or indirectly (Skouloudis et al., 2019). There is a two-way relationship between biodiversity loss and business, both are impacting each other. Major part of the biodiversity loss is caused by business and economic growth, for instance, via habitat transformations for roads and marketplaces as well as polluting outputs of companies (Dietz & Adger, 2003; Houdet et al., 2012; Khan, 2014; Williams et al., 2005). On the other hand, biodiversity loss brings risks to business as well in a form of, for example, changes in resource availability and ecological infrastructure degradation (Houdet et al., 2020). Lately biodiversity loss has been recognised as one of the most severe global risks (World Economic Forum, 2021). The development of perceived risk related to biodiversity loss has increased from 2017 till 2020 (Sjöland et al., 2021). It has been argued that businesses have a high potential as well as they need to play their part in reducing the biodiversity loss (Atkins & Maroun, 2018; Beck-O'Brien & Bringezu, 2021). Roberts et al. (2018) state that corporate accountability can be increased by accounting for biodiversity. Hence, it is important to study corporate biodiversity reporting as it is possible to increase the visibility of biodiversity impacts that were formerly invisible by accounting for biodiversity and this can increase the companies' actions to safeguard biodiversity (Jones & Solomon, 2013; Roberts et al., 2021).

There is a research gap in corporate biodiversity reporting research. Biodiversity is still an emerging area in corporate sustainability reporting with several shortcomings (Raar et al., 2020). In previous literature biodiversity has been researched with quantitative methods that have included exceptionally wide variety of different biodiversity disclosures (Adler et al., 2017; Atkins & Maroun, 2018; Hassan et al., 2020). This multiplicity implies that generally accepted, common biodiversity disclosures and indicators are still evolving. Due to quantitative focus in research, where disclosures are listed, it has resulted in outlining the different disclosures in a superficial level. This does not give an overview of the actual content of the disclosures. For instance, if a biodiversity goal is listed in disclosure index it does not give in-depth understanding on what type of goals the companies are setting for themselves. As stated by Adler et al. (2018) future research could focus on elaborating biodiversity disclosures where it is needed.

## **1.2 Aim of the Thesis**

This thesis aims to bridge the research gap of nascent and insufficient corporate disclosures on biodiversity. This is done by studying in more in-depth level the current state of biodiversity disclosures of the sustainability pioneer companies. The topic of this research is the current state of biodiversity disclosures in



corporations. The research question is specified as what disclosures on biodiversity are provided by sustainability pioneer companies in their reporting.

In order to answer the research question, the data used includes the top 50 of the most sustainable companies in the world and their sustainability or annual reports depending on where the companies have disclosed their latest sustainability information. It is assumed that these companies would also be pioneers in the field of biodiversity reporting. An inductive content analysis is the methodology used to analyse the disclosures.

### **1.3 Structure of the Thesis**

This Master's Thesis is structured into five main sections. First, theoretical background to the topic is reviewed including corporate reporting focusing on sustainability and biodiversity reporting as well as the commonly used theories in this field of research. Additionally, the usefulness of multi-level perspective as an alternative framework in studying emerging sustainability disclosures is discussed. Second, the data and methodology are presented. Third, an overview to the results is given to the biodiversity disclosures including biodiversity impact assessment, impact management, and biodiversity protection as product or a service. Fourth, analysis on the results is presented. Lastly, conclusion summarises this thesis and provides the implications, limitations as well as the suggestions for future research.

## **2 THEORETICAL FRAMEWORK**

This theoretical review first gives an overview to the sustainability reporting literature focusing especially on biodiversity reporting of companies. Then the current theoretical foundation of the previous research on biodiversity reporting and the shortcomings are presented. Lastly, the applicability of Multi-Level Perspective framework as an alternative theoretical approach for studying nascent sustainability disclosures is discussed in the context of biodiversity disclosures.

### **2.1 Company Reporting**

In the first part of this section sustainability reporting is discussed. Then biodiversity reporting as a sub-section of it is reviewed.

#### **2.1.1 Sustainability Reporting**

This paragraph presents the theoretical background for the sustainability reporting of companies. The contemporary development of corporate reporting on sustainability is based on the idea of triple bottom line developed by John Elkington in the late 1990s (Hahn & Kühnen, 2013). The triple bottom line as an accounting framework has three performance dimension that are social, environmental, and financial (Slaper & Hall, 2011). Hence, compared to traditional financial reporting, ecological and social measures are also included. Nevertheless, company accounting for sustainability emerged as a concept already in the early 1990s (Lamberton, 2005).

The need for the companies to report on their sustainability is grounded in the evolution of corporate social responsibility (CSR). Understanding CSR is important as sustainability reporting can be defined as a way for companies to communicate CSR practices to their stakeholders (Stocker et al., 2020). CSR slowly gained significant momentum starting from the 1950s (Latapi Agudelo et al., 2019). Nevertheless, signs of some forms of CSR can be traced back to the industrial revolution in the mid-to-late 1800s when businesses started to be concerned with employees, especially on ways to increase the productivity of the workers (Carroll, 2008).

Latapi Agudelo et al. (2019) illustrate how in the 1950s the social responsibility of companies was identified as responsibility to act in accordance with the values of the society. In the same period there were social movements, especially in the US, related to labour rights as well as the environment and companies had some philanthropy activities. In the late 1960s and 1970s CSR gained increasing interest, especially due to environmental issues created by the

companies such as oil spills (Latapi Agudelo et al., 2019). It was generally seen that the businesses exist by public consent.

In the 1980s the importance of stakeholders emerged into CSR related literature and the concept of sustainable development was introduced by the Brundtland Commission in 1987 (Latapi Agudelo et al., 2019). Sustainable development was defined as “development which meets the needs of the present without compromising the ability of future generations to meet their own needs” (World Commission on Environment and Development, 1987). Sustainable development is closely linked to sustainability reporting as it has also been defined as reporting publicly company’s contributions towards sustainable development (GRI Standards, 2016a).

In the 1990s the momentum increased as CSR gained appeal and the concept of good corporate citizenship was introduced as well as strategic dimension to CSR started to emerge due identifiable value creation (Latapi Agudelo et al., 2019). Business organisations have multiple benefits and goals for reporting on sustainability (Herzig & Schaltegger, 2006). These include but are not limited to better reputation, competitive advantage, legitimation of company’s activities that create social or environmental impact, higher level of transparency, motivating employees, and better brand value. Latapi Agudelo (2019) show that in the 2000s the strategic sustainability dimension increased as well as the understanding of the need for companies to be responsive for the social expectations beyond the legal requirements.

In the 2010s the idea of the companies to create shared value gained momentum that was also driven by international events such as Paris Agreement and the adoption of Sustainable Development Goals (SDGs) (Latapi Agudelo, 2019). SDGs give businesses more important role for achieving the goals compared to their predecessor, the Millennium Development Goals.

Sustainability reporting has had largely a voluntary nature (Hahn & Kühnen, 2013). The voluntary nature of sustainability reporting has led to voluntary guidelines to follow. Currently there are guidelines for reporting voluntary non-financial disclosures, such as Global Reporting Initiative (GRI) which aims for universally harmonised and accepted sustainability reporting framework (Vormedal & Ruud, 2009). The GRI reporting is a guideline that applies the idea of triple bottom line in the reporting (Lamberton, 2005). Accordingly, the GRI standards are divided into guidelines for reporting the economic, environmental, and social impacts of companies (GRI, 2021b).

Disclosing non-financial information of companies is, however, becoming increasingly mandatory. Before the 2010s the reporting of the CSR activities has been by large extent voluntary until European Union required large companies to start reporting non-financial information in 2018 (Latapi Agudelo, 2019). In the European Union (EU) large companies, including listed companies, banks, and insurance companies, must publish non-financial information related to environmental and social matters, treatment of employees, bribery, respect of human rights, and diversity on the boards of the companies (European Commission, 2021a). However, the current legislation will most likely be

amended to be more mandatory and with more precise instructions as on the April 2021 European Commission adopted a proposal for a Corporate Sustainability Directive. The proposal includes but is not limited to extending the scope to all large companies, mandatory assurance for the reporting, and more detailed reporting requirements. Companies most likely will need to comply with the new directive in 2024 in the reports covering the financial year 2023 (European Commission, 2021c). Next biodiversity reporting, a sub-section of sustainability reporting in the environmental area, and the related literature is reviewed.

### **2.1.2 Biodiversity Reporting**

Biodiversity reporting is seen as a way to address the biodiversity loss. Jones and Solomon (2013) find that increasing business organisations' accountability on biodiversity can be done via disclosing, measuring, and reporting for biodiversity. Addison et al. (2019) emphasise the role of analysis on corporate biodiversity accountability, that is communicated through sustainability reports, in tracking the progress towards biodiversity mainstreaming. Additionally, corporate disclosures have been identified as vital information sources on the ability of business organisations to address biodiversity (Amin et al., 2021). As companies have started to acknowledge the threat of biodiversity loss to global economies, business organisations are beginning to report their commitments and influence on biodiversity in their sustainability reports (Addison et al., 2019).

This paragraph represents some of the findings of the research related to reporting on biodiversity. Biodiversity reporting research literature is still embryonic (Roberts et al., 2021). However, it is gaining momentum as research contributions peaked in 2018 due to increasing environmental challenges globally. The research this far has revealed several factors that positively influence biodiversity reporting of companies. The use of GRI guidelines in sustainability reporting has at least a moderate positive impact (Bhattacharyya & Yang, 2019; Haque & Jones, 2020). The higher proportion of female directors in company boards (Haque & Jones, 2020) as well as smaller company board size increase the extent of biodiversity disclosures (Bhattacharyya & Yang, 2019). Additionally, gender diversity and financial expertise of corporate audit committees have a significant positive impact on disclosing biodiversity (Amin et al., 2021). Also, companies that have biodiversity partners are more likely to report more on biodiversity (Adler et al., 2018; Hassan et al., 2020a). Bhattacharyya and Yang (2019) examined that greater media exposure also has a positive correlation with biodiversity reporting. Additionally, Hassan et al. (2020) suggest that there is a positive significant relationship between reporting biodiversity and getting an environmental award, the number of biodiversity words published in the reports of a company as well as assurance provided by accounting firms. It is also noteworthy that profitability nor the size of the company do not have a significant effect on disclosing about biodiversity (Bhattacharyya & Yang, 2019; Skouloudis et al., 2019).

The perceived risks of the companies to contribute biodiversity loss, has an impact on the biodiversity reporting. Companies in high biodiversity risk, polluting and extractive industries, such as mining and energy, demonstrate better disclosing on biodiversity than other industries (Adler et al., 2018; Bhattacharyya & Yang, 2019; Haque & Jones, 2020; Hassan et al., 2020; Skouloudis et al., 2019). In the other end of the spectrum are industries that disclose the least including information technology and health care (Skouloudis et al., 2019). These are not using land as directly as the industries reporting more on biodiversity.

The literature this far has focused on studying large corporations. Previous research on companies' biodiversity disclosures on the global level has focused on the Fortune Global 500 companies (Addison et al., 2019; Adler et al., 2018; Bhattacharyya & Managi, 2013; Hassan et al., 2020b). Fortune, an American multinational business magazine, ranks the largest 500 companies worldwide measured in terms of revenue (Fortune, 2021). However, the results of the previous research have revealed room for improvement. The disclosures provided by the top Fortune Global companies are quite limited (Adler et al., 2018; Hassan et al., 2020) as well as lacking time bound, measurable, and specific biodiversity commitments (Addison et al., 2019). Although previous research has focused on the largest companies, interestingly company size seems to have no significant effect on extent of companies' disclosures regarding biodiversity (Bhattacharyya & Yang, 2019; Skouloudis et al., 2019). Additionally, Bhattacharyya and Managi (2013) pointed out that companies' revenues are not significantly relative to the companies' biodiversity loss responses.

Despite increasing interest in biodiversity reporting several issues have been identified both in private and public sector (Raar et al., 2020). Raar et al. (2020) revealed based on review of 17 biodiversity reporting articles that the information which companies disclose on biodiversity is mostly lacking quantitative aspects, biodiversity reporting has not been undertaken by most of the entities that have been studied, reporting is generally lacking, including appropriate data, and reporting approaches are lacking consistency including the use of frameworks in a way that even GRI indicators are cherry-picked.

The more recent literature also supports the findings of Raar et al. (2020) on the issues related to disclosing biodiversity. Biodiversity reporting of corporations is generally found to be quite limited with only small portion of companies providing substantial reporting (Adler et al., 2018; Hassan et al., 2020; Skouloudis et al., 2019). Lack of consistency was again identified in the reporting (Hassan et al., 2020). Furthermore, Beck-O'Brien and Bringezu (2021) emphasise the weak criteria and gaps in standards, certifications, reporting systems, and analysis. Regarding biodiversity disclosures, those have not been improved due to limited quantitative information (Bhattacharyya & Yang, 2019; Skouloudis et al., 2019), poor overall disclosure on impact assessments and initiatives (Haque & Jones, 2020), and lastly descriptions of biodiversity management are limited and sporadic, performance indicators have vague and generic statements and are underreported (Skouloudis et al., 2019). Houdet et al. (2020) have further criticised that even when there are quantified estimates of company's positive

impacts on biodiversity, those are never compared with quantitative negative activities.

The commonly used GRI guidelines have been identified insufficient in several papers to address biodiversity loss. Roberts et al. (2021) noted that GRI, which is a widely adopted sustainability reporting standard, is not sufficient in addressing companies' negative impacts on nature. Currently GRI includes four disclosures on biodiversity including operational sites in protected areas, impacts, habitats protected or restored, and conservation list species in areas where company operates (GRI Standards, 2016b). Addison et al. (2019) observed that due to voluntary nature of the GRI framework approximately a quarter of the companies in their study, reporting according to the GRI standards, reported on biodiversity at least with one disclosure. One reason for the cherry-picking of GRI disclosures, discovered by Raar et al. (2020), can be in the materiality assessments of the companies as the assessment defines the content of the sustainability report including the disclosures used (Puroila & Mäkelä, 2019). As observed by Raar et al. (2020) there is still biodiversity degradation and lost despite wide adoption of GRI and sustainability reporting. Thus, it can be said that GRI guidelines are not sufficiently halting the biodiversity degradation. Nevertheless, GRI is currently updating its biodiversity standard by the end of 2022 (GRI, 2021a).

Monetising biodiversity has been proposed as a one option to overcome the shortcomings of biodiversity reporting. Thus, due to several shortcomings it comes as no surprise that this quite new venture has been challenged for difficulties in reducing complex biodiversity issues into indicators, and adequacy in promoting ecological accountability for species and habitats as there seems to be rather narrow motivations for its use (Weir, 2019). As biodiversity is a complex issue to account for, there has been discussion on giving monetary value for it (Atkins & Maroun, 2018; Raar et al., 2020; Rimmel, 2021). Rimmel (2021) speculate that despite of being better able to show the cost of biodiversity loss and value of biodiversity for organisation and stakeholders, it could attract unwanted negative attention from, for instance, poachers who wish to harm biodiversity. Unit-based pricing of environmental goods as a valuation method has been stressed to be counter-productive to the purpose as it cannot fully capture the economic worth of priceless and complex living systems, including biodiversity (Farrell, 2007).

There have been other proposals as well to improve biodiversity reporting. As it has been discussed above, biodiversity reporting is still in a nascent phase and improvements regarding the biodiversity disclosures are needed for companies to address biodiversity loss in a sufficient level. Skouloudis et al. (2019) are suggesting that the current practices for disclosing biodiversity information, being still in early stages, need rethinking as disclosures lack clarity and are ambiguous. They propose that the business biodiversity accountability should be enhanced which can be achieved via generally accepted indicators.

## 2.2 Commonly Used Theories in Biodiversity Reporting Literature

Multiple theories are used in connection to corporate reporting of non-financial disclosures. Hahn and Kühnen (2013) gave an overview of the theoretical focus in sustainability reporting literature which includes legitimacy, stakeholder, institutional, and signaling theory. However, they also underlined that in many instances the literature is not referring to any theory. Similar review by Roberts et al. (2021) was conducted focusing on reporting regarding biodiversity and extinction accounting which identified that the most common theories used are legitimacy, stakeholder, institutional, deep ecology, and impression management. As these two reviews find three common theories, those are in the focus of this section. Next legitimacy, stakeholder, and institutional theories are examined more closely.

Legitimation can be identified as “the process whereby a corporation justifies its right to continue to operate to its conferring public” (Ching & Gerab, 2017). Accordingly, legitimacy theory is used to understand corporation image management when there are social expectations and the target audience is not separately identified (Chen & Roberts, 2010). Furthermore, Chen and Roberts (2010) point out that the rationale of actions, as in this case sustainability reporting, according to the theory is to gain social acceptance and meet social expectations. Also, Hahn and Lülfs (2014) point out that the intention of sustainability reporting is maintaining corporate legitimacy and thus, positive information dominates these reports. They also note that this whitewashing is the reason why negative information in the reports is found to be more trustworthy than the positive information. In accordance with legitimacy theory, Hummel and Schlick (2016) confirmed that in order to disguise the true performance of companies performing poorly in sustainability and to protect their legitimacy, those companies prefer low-quality disclosures regarding sustainability. In the literature on biodiversity reporting Addison et al. (2019) emphasised that companies can disclose a wide variety of actions, such as management and prevention of impacts on biodiversity, to maintain social legitimacy. This might not promote tackling the actual environmental impacts (Jones & Solomon, 2013). This can be especially in the case of beforementioned low-quality disclosures. In accordance with legitimacy theory, disclosures on biodiversity have been questioned to be merely impression management due to low-quality of the disclosures including vagueness and lack of specification (Adler et al., 2017; Adler et al., 2018; Talbot & Boiral, 2021). There are also contradicting findings with legitimacy theory. Skouloudis et al. (2019) argue that in their research disclosures on biodiversity were not disclosed to maintain legitimacy of the organisations as there was no correlation with identification of related risks nor challenges. The future of legitimacy theory, despite its wide acceptance, could be seen increasingly uncertain as the theory could become

redundant. I challenge the future usefulness of the theory due to following reason. Sustainability and biodiversity reporting this far have had for a large extent a voluntary nature (Addison et al., 2019; Hahn & Kühnen, 2013). In this context reporting has been conducted to maintain social acceptance of the society for company actions (Chen & Roberts, 2010). However, sustainability reporting is losing its voluntary nature. EU is increasing the scope of the companies that need to report on non-financial matters as well as increasing the level of detail of the information in these reports (European Commission, 2021a). Hence, the companies in the future will be driven by law in their sustainability reporting instead of image management as declared by the legitimacy theory.

Stakeholder theory is extensively used in research on environmental disclosures (Guenther et al., 2016). Stakeholder theory focuses on the business organisations' balancing of contradictory interests and demands of different external and internal stakeholder groups in order to gain their approval for company's actions (Chen & Roberts, 2010). In sustainability reporting these conflicting interests of stakeholders are presented with the help of materiality matrix as having unified view of what is important for each firms' sustainability (Puroila & Mäkelä, 2019). Hence, fulfilling one stakeholder group's expectations could have the opposite effect on another stakeholder group. This already raises the questions on which groups' interests the companies should focus on. Hahn and Kühnen (2013) assume that significant number of powerful stakeholders expands corporations need for explaining in a positive light their business practices. Furthermore, sustainability reporting is supposed to be providing important information to stakeholder to fulfil their call for sustainable business practices. However, the empirical evidence regarding the part of stakeholders in companies' disclosures is still limited (Guenther et al., 2016). There has been also research that is opposing the assumptions of stakeholder theory, for instance, companies' motivation for nature conservation was reported to be based on the managers' intrinsic motivations instead of stakeholder pressure (Krause & Matzdorf, 2019). Regarding biodiversity, it has been indicated that species are not considered as stakeholders of the wider community (Gaia & Jones, 2020). Hence, this undermines the usefulness of the stakeholder theory in research on biodiversity disclosures. Additionally, it has been pointed out that perspective of the actors, such as stakeholders, is not sufficient for understanding change processes towards new trajectories (Geels & Kemp, 2007).

Institutional theory focuses on studying companies' adoption of commonly used practices by similar social institutions (Chen & Roberts, 2010). Hence, the rationale of organisations' actions is to comply with institutionalised social structures and norms by conforming to established patterns. The institutional isomorphism happens as a coercive, mimetic, or normative process (DiMaggio & Powell, 1983). The coercive process means institutional pressure such as laws or society's expectations, mimetic imitating the best practices of the similar companies, and normative the values of, for instance, trade associations shaping practices. In accordance with institutional theory, it has been argued that political pressure is influencing the companies' reporting on sustainability



(Dragu & Tudor-Tiron, 2014). Cormier et al. (2005) posit that environmental disclosures of business organisations evolve depending on practices of other companies, the past routine of the organisation, and existing customs and laws. Nevertheless, Hahn and Kühnen (2013) identified mixed findings in past literature whether sustainability reporting would align due to institutional isomorphism. For instance, isomorphism cannot explain the heterogeneity and variety within the field of sustainability reporting (Herold, 2018).

In addition to some of the shortcomings of the presented theories, there is a common challenge in all three theories. Hahn and Kühnen (2013) pointed out that these theories are characterised by isolated nature instead of holistic approach. There is doubt regarding whether a single conceptual framework can be sufficient in determining company's strategy for environmental disclosures due to clashing imperatives (Cormier et al., 2005). Hence, multi-level perspective (MLP) as a possible alternative approach for analysing biodiversity reporting is explored in the next section. The aim with providing MLP as a new point of view is in embracing holistically sustainability reporting regarding nascent disclosures. Furthermore, Roberts et al. (2021) suggest that using the less common theoretical approaches could bring new insights to this embryonic field of research by extending knowledge as well as helping in developing new solutions.

### **2.3 Alternative Approach for Analysing Nascent Disclosures: Multi-Level Perspective**

The aim of this section is to present multi-level perspective (MLP) that is a framework for analysing sustainability transitions (Geels, 2011), and to explore its applicability in sustainability reporting regarding nascent disclosures. This will be investigated by focusing on biodiversity disclosures as a case example. The appeal of MLP is in its ability to encapsulate the bigger picture as in sustainability transitions MLP provides framework for broad interdisciplinary analysis (Smith et al., 2010). As mentioned earlier the challenge with the commonly used theories in sustainability and biodiversity reporting is in their isolated nature (Hahn & Kühnen, 2013). Additionally, there are multiple overlaps between these theories and, thus, it seems counterproductive to treat legitimacy, stakeholder, and institutional theory separately in enhancing understanding on reporting of biodiversity disclosures (Chen & Roberts, 2010; Ching & Gerab, 2017; Gaia & Jones, 2020; Roberts et al., 2021). Hence, MLP could potentially complement with its wider perspective these theories as well as to include the essence of these theories within the framework. Interestingly, insights from institutional theory were used in the development phase of the MLP (Geels, 2004). Furthermore, with the support of MLP this section also aims to explain some of the beforementioned shortcomings of the legitimacy, stakeholder, and institutional theory.

This paragraph gives a short overview to the framework that is illustrated in Figure 1. MLP is a middle-range theory that is used for analysing socio-technical transitions in innovation studies (Geels, 2011). Emphasis in middle-range theory is on connections between empirical research and theory which is also in the focus of this thesis. There are three levels in MLP where transitions take place which are niches, socio-technical regime, and socio-technical landscape (Geels, 2002). Niches represent radical innovations, regimes retention and stability of existing systems, and landscape deep structural trends such as major environmental problems. The regime level is in the focus in transitions as that is where new innovations, such as biodiversity disclosures, are finally adopted as a shift from one regime to another (Geels, 2011). Next the three levels of MLP are discussed in detail.

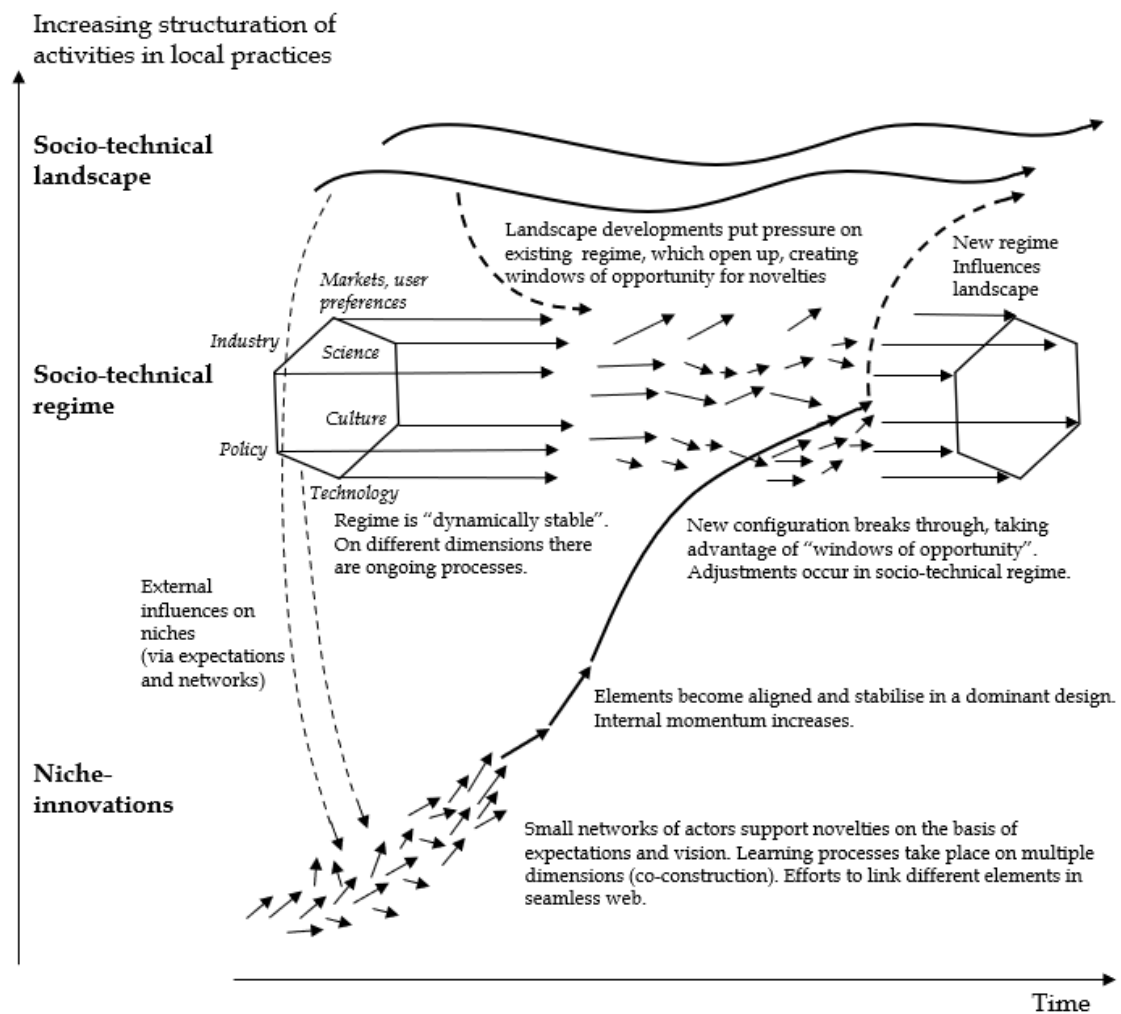


FIGURE 1 *Multi-level perspective*

Note. From *The multi-level perspective on sustainability transitions: Responses to seven criticisms* by F.W. Geels, 2011, *Environmental Innovation and Societal Transitions*, 1(1), p.28. Copyright Elsevier B.V.

The socio-technical regimes represent the dominant and stable system of conducting a certain function in the society, such as sustainability reporting (Smith et al., 2010). The socio-technical regime consists of sub-regimes that have interlinked semi-coherent set of rules, practices, and technologies which give the existing system its stability (Geels, 2004; Geels, 2011). Regime rules can include, for instance, favourable institutional arrangements, regulations, user practices, routines, and shared beliefs. Within the socio-technical regime there are multiple sub-regimes such as technological and product regimes, which include accounting rules, science regimes, policy regimes including formal regulations and procedures, socio-cultural regimes, and markets and user regimes (Geels, 2004). Key features of the regimes are path dependency, lock-ins, merely incremental innovations, and small adjustments (Geels, 2011; Smith et al., 2010). Regimes are increasingly facing pressure from new sustainability criteria, due to growing environmental awareness, that were not taken into consideration during the installation of the regimes (Smith et al., 2010).

Opposite to the incremental innovations occurring in regimes, niches generate radical innovations (Geels, 2002). Hence, transformative capabilities and ideas occur in niches (Smith et al., 2010). However, Smith et al. (2010) note that many of the niches are not viable in expanding to the regime or able to survive long period of time. Niches will obtain momentum if multiple innovations on a matter will configure a dominant design, expectations are broadly accepted and increasingly precise, and powerful actors with different expectations of the future performance of the niche-innovation compared to other regime actors undertake these niche experiments giving those legitimacy as well as resources (Geels, 2011; Smith et al., 2010).

The socio-technical landscape is characterised by slow changes as it forms the external context which the niche and regime level actors are unable to change in a short period of time (Geels, 2011). Hence, the landscape level is even harder and slower to change than the regime level (Geels, 2002). Landscape level includes, for example, shifts in political ideologies, macro-economic patterns, values of the society, social movements, resource scarcities, and environmental problems such as biodiversity loss (Geels, 2002; Geels & Kemp, 2007; Geels, 2011; Smith et al., 2010). Nevertheless, changes in landscape level depend also on the type of the landscape. Political landscape is rather dynamic, as there might be revolutions and new ideas, compared with material landscape where change is significantly slower (Geels & Kemp, 2007). Changes in the landscape level are creating pressure for changes in the regime level (Smith et al., 2010). This landscape level pressure creates windows of opportunity for changes in the regime level which make it possible for niches to break through to the regime level creating adjustments in the regime (Geels, 2011).

The different ways for innovations and change in regime to appear are presented in this paragraph. The main point in MLP is that change happens in a non-linear way in different phases in different levels via interplay between different processes that link together and reinforce transition with emphasis on the circular causality as there is no single driver for change (Geels & Kemp, 2007;

Geels, 2011). However, how innovations and change come through can be simplified into three phases, although in addition to niche dynamics the key for wider breakthrough is also in developments in the landscape and regime level (Geels & Kemp, 2007). First, radical innovations emerge in niches often outside the regime without dominant design. In this phase the actors are improvising to find the best design. Second, the dominant design begins to emerge from multiple niches. This phase can take a significant time if the existing regime and landscape are in mismatch with the dominant design. Third, possibly a wider breakthrough happens of the new practice to the established regime with competition which is followed by stabilisation. Geels (2011) points out that the unfolding of socio-technical transition is a result of processes interacting in different levels. These are the niches building up the momentum as described above, landscape level creating pressure on the regime, and lastly windows of opportunity opening up for niche-innovations in the regime level due to its destabilisation. Also Geels (2004) has identified that there are three routes for system innovation to occur with different types of interactions between the three levels. There can be gradual transformation that involves multiple innovations. This is characterised by increasing issues in the regime, which is followed by search for a new dominant option that is found after prolonged time of uncertainty and experimentation without immediate winner. Another route is gradual reconfiguration where the innovation is first an add-on in the old system gradually taking over as the dominant design. Third route is rapid breakthrough due to landscape level change such as war that create significant changes in the regime environment. Next biodiversity disclosures will be examined with multi-level perspective.

This part presents the argumentation for the use of MLP in the context of analysing company reporting. Biodiversity loss is considered to be contemporary environmental issue that is a societal challenge where systemic transitions are needed (Geels, 2011). Furthermore, as MLP is a fruitful framework for studying sustainability transitions, the aim here is to apply it in the context of corporate reporting despite of common use regarding more technological changes. In the context of biodiversity disclosures and in order to apply the MLP framework, the socio-technical regime is considered to be the sustainability reporting system and the biodiversity disclosures the niche-innovations. The following paragraphs discuss the three different levels of MLP in the context of biodiversity reporting. These show the complexity of the influencing factors on the emergence of biodiversity reporting of companies as also shown in Figure 2.

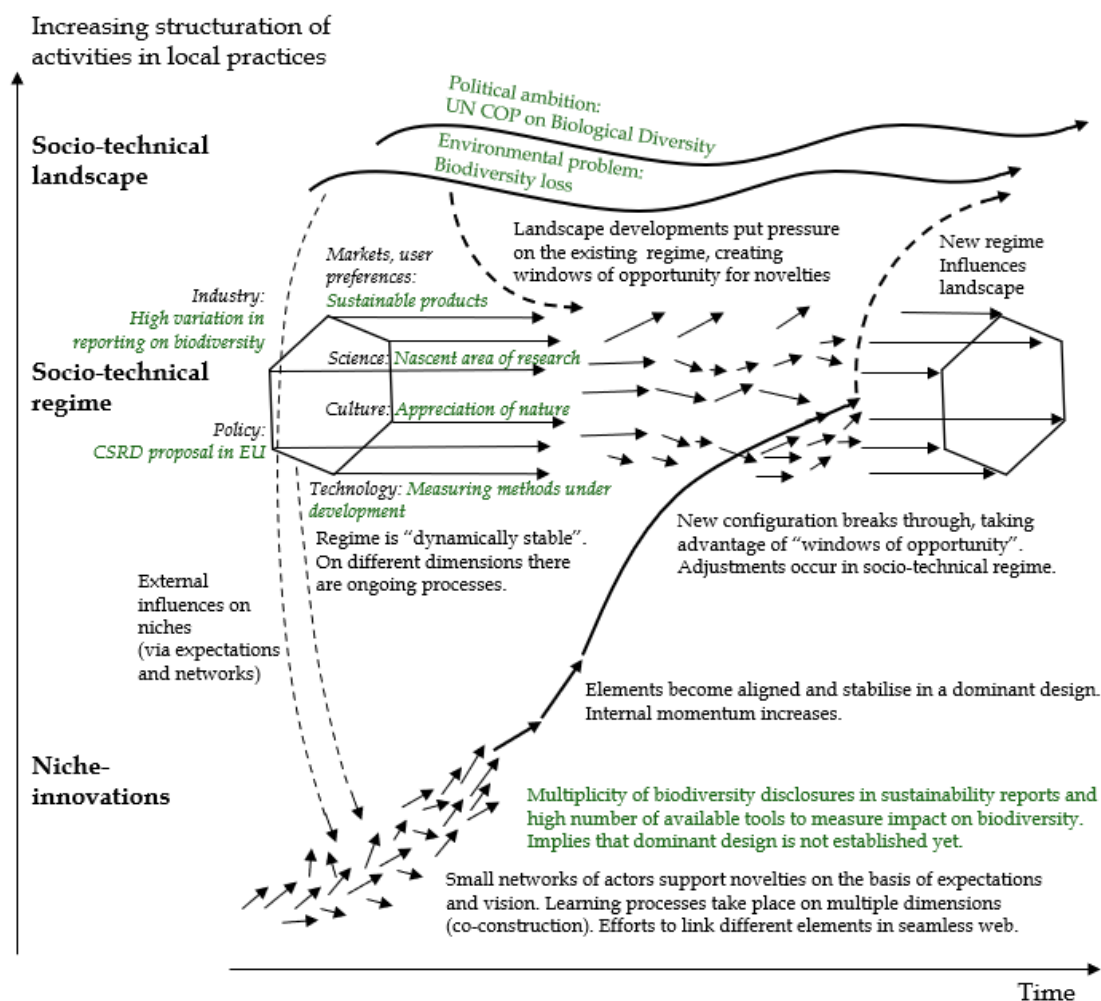


FIGURE 2 Multi-level perspective on biodiversity reporting

Note. Adapted from *The multi-level perspective on sustainability transitions: Responses to seven criticisms* by F.W. Geels, 2011, *Environmental Innovation and Societal Transitions*, 1(1), p.28. Copyright Elsevier B.V.

This paragraph discussed the niche level of MLP in the context of biodiversity. It seems clear that regarding niche-innovations, dominant design is yet to stabilise on biodiversity disclosures. The academic research on the biodiversity disclosures used in corporate setting has revealed a significant variety with more than 50 different types of disclosures identified (Adler et al., 2017; Atkins & Maroun, 2018; Hassan et al., 2020). Also, the number of available tools available, which measure different issues, for companies to evaluate their impact on biodiversity is high (WWF, 2019). Hence, this research aims to reveal the current state of the disclosures reported by the pioneer companies in order to discover if among those companies a dominant design for biodiversity disclosures is already emerging, and what would it include. As pointed out by Herold (2018) the institutional theory and the idea of isomorphism is limited in explaining the heterogeneity in sustainability reporting. However, the MLP can possibly explain this as a lack of dominant design in the areas of biodiversity

disclosures. This research could potentially provide insight whether isomorphism in this area is beginning to emerge yet.

In the landscape level there seems to be already existing pressure towards the regime level due to biodiversity loss. As represented in the section 1.1, the biodiversity loss is one of the major environmental challenges of our time which is one of the landscape level features in this context. Additionally, the political landscape is creating pressure towards the regime as in the United Nations level in the Conference of Parties to the Convention on Biological Diversity, first part held in October 2021 and the second part from April to May 2022, the world leaders aim to agree on a Global Biodiversity Framework for the post-2020 period (European Commission, 2021; Secretariat of the Convention on Biological Diversity, 2021b). For instance, EU has an ambitious goal for the conference of protecting 30% of Earth's land and seas by 2030 (European Commission, 2021b).

In the socio-technical regime level, as stated in the section 2.1.2, in the science regime the research on corporate biodiversity disclosures and reporting is still nascent. Regarding the policy level, EU might be requiring stricter sustainability reporting for all large companies on their impacts on biodiversity if the proposal for Corporate Sustainability Reporting Directive (CSRD), adopted in April 2021, will be passed (European Commission, 2021; Proposal of the European Parliament, 2021). As discussed in section 2.1.2 in the industry regime, there are significant variations whether companies are reporting on biodiversity, on the quality as well as between the industries possibly impacted by the legitimisation needs and the demands of the stakeholders. Regarding the technology side, there is a multiplicity of available tools for measuring biodiversity with different approaches (WWF, 2019). These vary from footprint, mapping, monetary, qualitative and quantitative tools to integrated accounting tools. Hence, it seems clear that the development in this area has merely started. Regarding the markets and user preferences, the consumers are increasingly giving emphasis on sustainability of the products that they consume as majority identifies to be either conscious consumer or environmentally friendly (Baldwin, 2009). Consumers are aware of the biodiversity loss, thus highlighting the need for practices that are improving ecosystem resilience (Foti et al., 2019). Furthermore, the COVID-19 pandemic has increased to some extent permanently people's appreciation of nature and time spent there (Office for National Statistics, 2021).

### 3 DATA AND METHODOLOGY

This research aims to bring clarity on the biodiversity disclosures reported by the companies by examining the practices of the pioneer companies in sustainability. This section is divided into three parts that aim at explaining the chosen methods for the empirical part of this research. First, the research design is discussed. This is followed by the explanation of the data collection and the data analysis.

#### 3.1 Research Design

The research was conducted as qualitative research that is discover oriented (Hair Jr et al., 2016). Hair Jr et al. (2016) point out that qualitative research is the most appropriate approach when previous research explains the research question only partially and incompletely, and the primary aim of research is in proposing new ideas. To fill the research gap, discussed in detail in chapter 1.1, this research aims at discovering what are the biodiversity disclosures currently used by the sustainability pioneer companies as the research on biodiversity disclosures is still in a nascent phase. Additionally, it was identified that the previous research answers the research question only on superficial level and the research aims to gain in depth knowledge of the disclosures to provide new ideas for companies in disclosing biodiversity related information. Hence, qualitative research is the most suitable approach to answer the research question.

The chosen research method is a content analysis conducted on the companies' reports. This has been identified as the most common research method in biodiversity reporting (Roberts et al., 2021). Content analysis is conducted on the companies' reports where biodiversity related information is disclosed. One major benefit of content analysis of reports is unobtrusiveness which should yield less biased results compared to direct methods (Kolbe & Burnett, 1991).

Despite the popularity of analysing existing companies' reports, the lack of primary data in the field of study has been challenged (Roberts et al., 2021). Nevertheless, the focus in this research will be on the existing reports in order to be able to gain a wider perspective for the disclosures of the pioneer companies compared to, for instance, what interviews would be able to provide despite the possible in-depth insights that might be missed with this method. However, content analysis is not a method without challenges. As content analysis is not highly standardised, reporting the results can be challenging due to multiple phases conducted during the research (Elo & Kyngäs, 2008). Hence, the phases of the research are described in detailed manner in the section 3.3 on data analysis.

To discover what disclosures the pioneer companies in sustainability are providing in their reporting regarding biodiversity this thesis focused on

companies that have been ranked as the most sustainable in the world. Hence, this research is deviating from the past practice in the area of research on biodiversity reporting. It has been discussed in chapter 2.1.2 that the previous research has focused on the largest companies despite the clear doubt about correlation between biodiversity reporting and the company size.

## 3.2 Data Collection

The data was collected from reports of non-financial information of the top 50 companies of the Corporate Knights' index of the world's most sustainable corporations in 2021, the Global 100 Most Sustainable Corporations ranking (Corporate Knights, 2021a). This is a well-known ranking of the Corporate Knights that is a business and society magazine focusing on clean capitalism (Corporate Knights, 2021b). The companies, countries, industries and whether the companies reported on biodiversity are shown in Table 1 starting from the company ranked as the most sustainable followed by other companies in descending order in the sustainability ranking.

The reports in this research included, for example, sustainability reports or annual reports. The search for the reports was made in Google search engine in November 2021 by using the terms "sustainability report" and "company name". Only the most recent report was included in the research to discover the current state of biodiversity disclosers in corporate reporting. The data collection additionally included content referred by the reports on information related to biodiversity such as websites. These are included due to voluntary nature of biodiversity disclosures to gain as complete picture of companies' biodiversity disclosures as possible. However, the data collection was limited to the primary referred document or source by the reports. Hence, further links or documents were excluded from the data collection. As the companies need to be publicly traded to be included in the Global 100 ranking, the reports were easily accessible from all the companies in the data set (Corporate Knights, 2020).

It has been argued that due to comparability, reliability, and transparency superior sustainability performer companies prefer disclosures of high-quality regarding sustainability (Hummel & Schlick, 2016). The assumption in this research was that the most sustainable companies in the world would be pioneers also in the area of biodiversity disclosures in their sustainability reporting. This choice of data also aims to overcome to common issue in the past literature of limited reporting (Adler et al., 2018; Hassan et al., 2020; Skouloudis et al., 2019). Another assumption, by choosing the most sustainable companies, was that among these enterprises biodiversity reporting is more common.



TABLE 1 *Company profiles in order of the sustainability ranking*

<b>Company</b>	<b>Country</b>	<b>Industry</b>	<b>Reported on biodiversity</b>
Schneider Electric SE	France	Electrical equipment	X
Ørsted A/S	Denmark	Energy	X
Banco do Brasil SA	Brazil	Financial services	X
Neste Oyj	Finland	Oil and gas	X
Stantec Inc	Canada	Professional services	X
McCormick & Company Inc	U.S.	Consumer staples	
Kering SA	France	Luxury	X
Metso Outotec	Finland	Industrial machinery	
American Water Works Company Inc	U.S.	Water and wastewater	
Canadian National Railway Co	Canada	Rail transport	X
Rexel SA	France	Distribution of electrical supplies	
Atlantica Sustainable Infrastructure PLC	UK	Energy	X
Cisco Systems Inc	U.S.	Tech hardware	
Storebrand ASA	Norway	Insurance	X
Owens Corning	U.S.	Construction materials	X
Eisai Co Ltd	Japan	Health care	X
Cascades Inc	Canada	Packaging materials	X
Brambles Ltd	Australia	Containers	X
Iberdrola SA	Spain	Energy	X
Taiwan Semiconductor Manufacturing Co Ltd	Taiwan	Tech hardware	X
Vestas Wind Systems A/S	Denmark	Energy	
UPM-Kymmene Oyj	Finland	Forest	X
Osram Licht AG	Germany	Electrical equipment	X
Chr Hansen Holding A/S	Denmark	Chemicals	X
Siemens AG	Germany	Electrical equipment	X
Trane Technologies PLC	U.S.	Electrical equipment	
Verbund AG	Austria	Energy	X
Akzo Nobel NV	Netherlands	Chemicals	
IGM Financial Inc	Canada	Financial services	X
Hewlett Packard Enterprise Co	U.S.	Tech hardware	X
Acciona SA	Spain	Infrastructure	X
Sysmex Corp	Japan	Health care	X
ABB Ltd	Switzerland	Electrical equipment	
Arçelik AS	Turkey	Electrical equipment	X
BT Group PLC	UK	Telecommunications	X
Novozymes A/S	Denmark	Chemicals	X
ING Groep NV	Netherlands	Financial services	X
Johnson Controls International PLC	Ireland	Electrical equipment	X
Alstom SA	France	Rail transport	
City Developments Ltd	Singapore	Real estate	X
Konica Minolta Inc	Japan	Electrical equipment	X
Natura &Co Holding SA	Brazil	Cosmetics	X
Autodesk Inc	U.S.	Software	X
National Australia Bank Ltd	Australia	Financial services	X
Transcontinental Inc	Canada	Packaging materials	
BNP Paribas SA	France	Financial services	X
Bank of Montreal	Canada	Financial services	X
Ball Corp	U.S.	Packaging materials	X
Allianz SE	Germany	Financial services	X
HP Inc	U.S.	Tech hardware	X

### 3.3 Data Analysis

The content analysis was conducted by using the inductive approach. Inductive content analysis focuses on identifying patterns in large amount of data (Hair Jr et al., 2016). Inductive content analysis includes open coding of data, grouping, creation of different categories and lastly abstraction (Elo & Kyngäs, 2008). This approach is chosen as the previous research found that most of the companies that were observed did not report on biodiversity or it was not substantial (Adler et al., 2018; Hassan et al., 2020; Skouloudis et al., 2019). Hence, this research aimed to identify patterns of what kind of disclosures the pioneer companies are using regarding biodiversity.

In order to find the relevant information in the reports, the following search terms were used: “biodiversity”, “biological diversity”, “natural capital”, “ecosystem services”, “extinction”, “natural resources” and “304”. Natural capital and ecosystem services were used as those are closely linked to biodiversity (Fairbrass et al., 2020), and as biodiversity reporting is nascent area of reporting, the terminology might not be highly standardised yet. The same applies for natural resources. Extinction is used in case a company is involving extinction accounting in its reports as some companies have reported on it (Roberts et al., 2021). Lastly, 304 was used as a search term as biodiversity related information in GRI reporting is disclosed under that number (GRI Standards, 2016). After finding the relevant information in the reports, the information was coded, then grouped, different categories were formed which was followed by the abstraction to give an overview of the results and the connections between different categories.

## 4 RESULTS

This section is divided into four parts. First, an overview of the results is described, then the three main categories of the findings on corporate biodiversity disclosures are presented. These are biodiversity impact assessment, biodiversity impact management, and lastly biodiversity protection as a product or a service.

### 4.1 General Findings

The reporting on biodiversity in companies' reports had considerable variability. Some companies had already in-depth biodiversity reporting which consisted of dozens of pages while others had a few sentences on the topic. The range was from one sentence to a separate biodiversity report of 147 pages. It is noticeable that 11 companies out of 50 did not report anything on biodiversity despite being ranked among the world's most sustainable companies. The companies that did not report on biodiversity and explained this decision claimed either that the topic is not material to them, the information is not available, the services provided by the company protect and restore biodiversity via clients, or the physical operations have a low impact on biodiversity.

Additionally, companies had different viewpoints as well to the scope of biodiversity. Some included a wider perspective including direct and indirect impacts on biodiversity such as the effect of effluents on biodiversity. Others reported only on highly targeted actions towards protecting biodiversity. In addition, companies report to operate in compliance with laws that are preserving biodiversity which raises a question why this is separately reported.

In general, many of the reviewed companies were starting their work regarding biodiversity. Frequently, activities were on a testing phase before wider scaling up, impact assessment methods were under development, companies were partaking on developing international or industry's best practices regarding biodiversity assessments or actions, and targets were set on having company's impact on biodiversity assessed or biodiversity roadmap developed. When targets regarding biodiversity were set, those were several times completely new targets set in the year 2020. Additionally, biodiversity loss as a contemporary environmental challenge was usually explained in the reports for the viewers.

An overview of the discovered corporate disclosures on biodiversity are presented in Figure 3 where the number of companies reporting on each category is provided in brackets. Generally, the disclosures can be divided into three main areas that are biodiversity impact assessment, the impact management, and biodiversity handprint of the companies via their products or services which are

protecting or restoring biodiversity. Majority of the reporting on biodiversity falls under the first two categories. The content of these three categories is further discussed in the following sections.

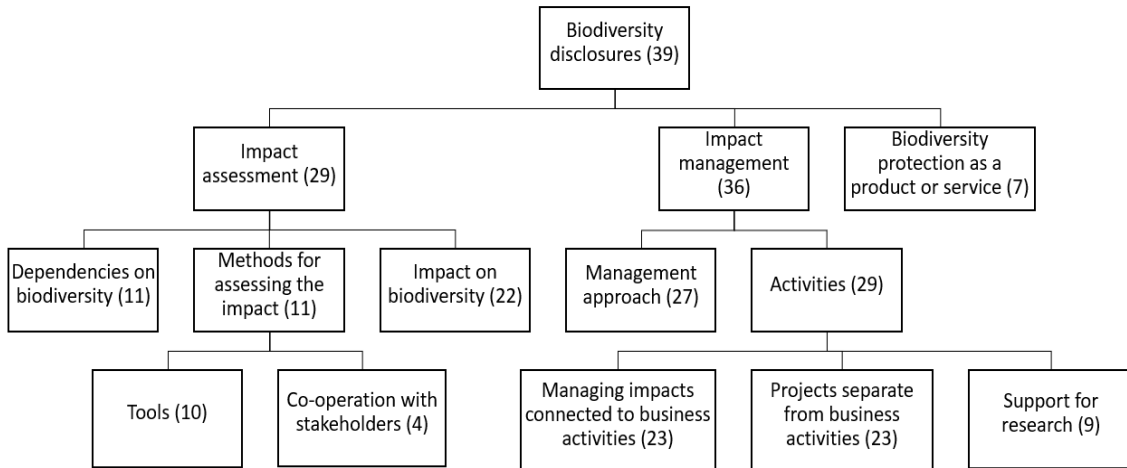


FIGURE 3 Biodiversity disclosures in corporate reporting and the number of companies reporting on each category

## 4.2 Biodiversity Impact Assessment

This section illustrates the results regarding impact assessment disclosures on biodiversity. This section consists of three parts including company dependencies in biodiversity, methods for assessing the biodiversity impacts, and lastly impact of business activities on biodiversity.

### 4.2.1 Corporate Dependencies on Biodiversity

This part presents the disclosures companies provided regarding their dependencies on biodiversity or their business risks related to the biodiversity loss. Less than half of the companies that reported on biodiversity reported on either of the previously mentioned topics. The focus on biodiversity reporting was clearly more on how company impacts on biodiversity rather than how biodiversity impacts the business activities of the companies.

One company disclosed that there are no significant risks related to biodiversity. Nevertheless, some companies disclosed having identified how business activities depend on biodiversity without further details of these dependencies or potential financial consequences. It was also noted that biodiversity loss was one reason for a company to start natural and social capital accounting while others highlighted the importance to establish nature-related risks as a concept.

The more detailed disclosures regarding biodiversity dependencies were related to innovating new products, use and availability of certain materials, availability of ecosystem services, and risk mitigation on lending. Biodiversity was seen as a source of innovation for new products especially in the health care as well as in the skin care industries. Regarding use and availability of certain materials, resources derived from forests were mentioned separately. Companies noted to be depending on ecosystem services including waterway maintenance services, land stabilisation and erosion control, and protection against floods and severe weather events. Financial service providers have taken biodiversity as part of their risk management in lending. Responsible lending for other companies includes identifying, mitigating, managing, and measuring the biodiversity risks associated with the business of a company applying for a loan.

#### **4.2.2 Methods for Assessing the Biodiversity Impact**

There were multiple ways how companies disclosed on their methods for assessing the company's impact on biodiversity. Many companies acknowledged that the company activities have or potentially have an impact on biodiversity without declaring the method how the assessment was made. The companies that disclosed their methods had varying systems in place. Some used tools developed in-house or other publicly available tools while others relied on the expertise of certain stakeholders. An overview of the different methods are represented in the Table 2.

TABLE 2 *Methods for assessing biodiversity impact*

Tools	Tools developed in-house	Biodiversity Impact Assessment EP&L Environmental impact assessment Comparison with sites of high biodiversity value
	Other available tools	Corporate Ecosystem Services Review Corporate Environmental Footprint Global Biodiversity Score LIFE Institute Methodology IWAI Methodology Integrated Biodiversity Assessment Tool (IBAT)
Co-operation with stakeholders	Local communities	Identifying potential biodiversity issues
	NGOs	Biodiversity in supply chains Tools for investors to work with deforestation
	Researchers	Research on impacts and dependencies on biodiversity in a certain industry

There are different tools for company's biodiversity impact assessments that were developed within the company in question. Biodiversity Impact Assessments are conducted by the City Developments Limited, a construction company, for new projects on greenfield sites in or near biodiversity sensitive areas. The assessment includes determining existence of species or habitats of national conservational importance, evaluating the potential impact of the development due to its design, construction, or maintenance, and making recommendations for impact mitigation. Environmental impact assessments were used by multiple companies in the design and construction stages of construction projects as well. These were also conducted to understand potential biodiversity risks and to identify mitigation measures.

Further tools developed in-house included EP&L which is an open-source methodology developed by Kering on natural capital accounting, including biodiversity. Despite of being developed by Kering, the company has made it available for other companies as well. Another approach that was used was comparing company's site locations against sites with high biodiversity value. These included UNESCO World Heritage Sites and Biosphere Reserves, sites of the Ramsar Convention of Wetlands, sites of the Alliance for Zero Extinction, Key Biodiversity Areas of IUCN Global Standard report, Natura 2000 sites in Europe, and national designated nature reserves. Lastly, Acciona used a methodology, which

did not have a specific name for it, that was developed in collaboration with a consultancy company. It combined two international tools which were not named. The methodology has multiple impact categories including but not limited to toxicity, acidification, water, climate change, land use and transformation. The assessment took into account the species affected, the duration of the impacts, whether the impacts were reversible or irreversible, and the surface area of the facilities within protected areas. The company took into consideration its facilities located in areas of great value for biodiversity. In the forestry industry focus on impact measurement was on biodiversity indicators focusing on forests. These included tree species, forest structure and age, habitat restoration, valuable habitats, protected areas, amount of deadwood, and species and habitat projects.

Other publicly available tools were commonly used as well in addition to assessment methods developed in-house. There are multiple different methods in this category as well. Corporate Ecosystems Services Review creates a relationship map that summarises the benefits ecosystems provide for a company and the impacts that the company's business activities have on ecosystems in each stage of a product life cycle. This system was developed for the Millennium Ecosystem Assessment that was initiated by the United Nations. Another method used to identify and assess dependencies and the impacts on natural capital including biodiversity is the LIFE Institute Methodology. Corporate Environmental Footprint was a tool used also to measure company's impact on environment which includes biodiversity. Global Biodiversity Score focuses only on the end-to-end biodiversity footprint rather than the whole environmental footprint as the previous tool. This is a tool provided by the CDC Biodiversité. IWAI methodology estimates annual monetary value on company's impact including positive and the negative impact. Integrated Biodiversity Assessment Tool (IBAT) is a web-based instrument that maps, and reports based on site coordinates area's status as a protected area and whether there are endangered and threatened species close by.

Companies have also utilised stakeholders to assist on their biodiversity impact assessments. Consultations of local communities enabled to identify and manage local potential biodiversity issues. NGOs have co-operated with companies in assisting to better understand a link between supply chain activities of a company and biodiversity. Additionally, NGOs produced a report mapping tools, data sources, and methods for investors to work with deforestation. Researchers on the other hand have co-published a white paper on an industry's dependencies and impacts on biodiversity as well as where to prioritise action.

To conclude there are multiple methods that companies are currently using to measure the impact from business activities on biodiversity. Some methods were used by more than one company while some companies used a publicly available tool as well as a tool developed in-house. One commonality between the tools developed in-house and the publicly available tools is that both had tools designated to measure only biodiversity or the impact on nature as whole while having biodiversity included in this wider assessment. Hence, it could be said that there is no common practice. Tools developed in-house have specific

features to that industry unlike the publicly available tools. Several companies measured their impact in construction projects and not on the existing impact of the company and its offices for example. Stakeholders were often involved to assist on specific issues or to assess the industry as whole. Thus, stakeholders were not involved in measuring companies' impact on biodiversity as whole but either on specific smaller area or on such a broad level that it cannot apply to one company. One issue raising concern is that companies seem to conduct assessments on biodiversity in areas of great biodiversity value. This pre-selection might leave out areas that might have great but undiscovered value for biodiversity.

### 4.2.3 Impact of Business Activities on Biodiversity

The reporting on companies' impacts on biodiversity were frequently reported in accordance with the GRI standards. The specific impacts, when those were disclosed, were usually negative impacts. However, it is common practice to report that companies' activities regarding biodiversity contribute positively to the United Nations' Sustainable Development Goals (SDGs). One company also reported in accordance with GRI Standards as well as the SASB Standard that has two disclosures on biodiversity impacts. Table 3 summarises the main findings related to reporting of impacts on biodiversity.

TABLE 3 *Reporting of business impacts on biodiversity*

Impact of Business Activities on Biodiversity	Negative impacts	GRI Standards	Materiality of biodiversity
	Positive impacts	International frameworks	Sustainable Development Goals Global Compact Principles
		Awards and certifications	WHC Gold Certification MSCI AA-rating ASI's Performance Standard certification Label of the Union for Ethical Bioproducts

Companies commonly report their impacts on biodiversity in accordance with the GRI Standards. Hence, many of the companies reporting in accordance with the GRI standards on biodiversity have identified biodiversity as one material topic for the company. The GRI Standards have four disclosures under the



biodiversity topic. These are 304-1 Operational sites in protected areas or areas of high biodiversity value, 304-2 Significant impacts on biodiversity, 304-3 Habitats protected or restored, and 304-4 IUCN Red list species in areas affected by company's operations. External verifications were also reported on these disclosures. Some companies report in accordance with all or some of the four GRI disclosures focusing on biodiversity. However, there are companies who do not report their impacts with GRI disclosures or have omissions in some or all of the four disclosures. Next the materiality assessments of the companies and the reported content on the four main GRI disclosures are presented.

In GRI reporting companies should report their material topics, hence many companies have identified biodiversity in some form as a material topic for them. These include biodiversity, protecting biodiversity, and responsible forest management and biodiversity. It was also reported that stakeholders see increasing importance in biodiversity in the future compared with the current state. When some form of priority is shown for the material topics, such as materiality matrix, biodiversity is constantly the least important or among the least important topics of the material topics for the companies. When material topics were presented per region, biodiversity was less material in Asia Pacific compared to other regions. Material topics were also presented as a network of relationship between material issues. Other material issues connected to biodiversity in the order of importance included circular opportunities, circular policies, decarbonisation of the economy, climate events, and ESG as a decisive factor.

In accordance with the GRI disclosure 304-1, companies report their operational sites in protected areas, in the vicinity of protected areas or in areas of high biodiversity value. The data implies that most companies leave office spaces outside this disclosure and include only production facilities. Companies report some or majority of the following items which varies somewhat from company to company. The items reported under this disclosure are the location of company's facility either the exact location, country or display on a map, the type of the facility, location with respect to the protected area including the options inside, partially inside, and adjacent to the area, details on proximity to protected area in kilometres, affected surface area or length, percentage of the different type of facilities inside protected areas, type of biodiversity in the area including wetland, birds and terrestrial, and type of the protection in the area. Explanations for the reasons why a facility is inside a protected area were given which usually were due to status change of the area after construction of the facility.

Diverse set of impacts on biodiversity were identified by the companies as required by the GRI disclosure 304-2. However, few companies reported that their business activities do not have any or any significant impacts on biodiversity. There was also a company that reported only to be enhancing biodiversity. Impacts as well as potential impacts on biodiversity identified by the corporations are reported in multiple ways. Mostly companies identified negative impacts on biodiversity. However, some potentially positive impacts were identified as well. These positive impacts include that company's infrastructure can create additional habitats for species and some infrastructure, for example, wind

farms can play role in supporting conservation when co-located near protected areas. More positive impacts were reported together with the SDGs that are presented in the end of this section.

As several companies do impact assessments connected to the construction projects, the activities with potential effects on biodiversity have been divided into design, construction, operation and maintenance, and lastly decommissioning phases. There are also companies that report merely that their construction projects have a negative impact on biodiversity. In the design phase site selection, construction and technology solutions, and selection of materials were reported as activities with potential impact on biodiversity. In the construction stage these included impact of vehicles and machinery, introduction of roads, disturbance of vegetation cover, extended human presence that affects the behaviour of wildlife species, ecosystem fragmentation, habitat alteration, species displacement, noise pollution, and changes to the landscape. The impacts of the construction phase have been reported to be mostly temporary. In the operational stage identified impacts included emissions to the atmosphere including greenhouse gases, habitat and species loss, pollution to air, water and soil, variation in water quality and availability, discharge and spills into water, fires, soil degradation, animal mortality from collisions, barrier effects, and in the energy industry disturbance for vegetation for maintenance of power line roads, animal electrocution, changes to the natural regimen rivers and barrier effect of hydroelectric plants, wildlife mortality due to attraction to evaporation ponds, and trapping. Lastly, in the decommissioning phase biodiversity is impacted by the use of machinery and vehicles for removing of existing facilities, and the extended human presence.

Other methods for reporting companies' impacts on biodiversity included percentual reporting on the most significant impacts by area including fauna, water, landscape, habitat, vegetation, and soil. Monetary value on the company's impacts on the biodiversity were also reported with the IWAI methodology. Another way for reporting the impact on biodiversity was as a part of company's whole environmental action analysed with certain percentage given to biodiversity. Companies also reported to have potentially adverse effects on biodiversity without further explanation.

Companies report also on protected and restored areas as directed in the GRI disclosure 304-3. Some companies disclose their different activities related to area or species protection and restoration, what is the aim of the activities, and the business activity related to the project. Other report habitats restored and protected in hectares per year.

Lastly, regarding GRI disclosure 304-4 companies have different ways to report on the IUCN Red list species and national conservation list species that have habitats in the areas affected by the company's operations. Some companies report number of species per the IUCN Red List classification categories while other disclose the information per country and per type of species including birds, fish, mammals, and amphibians. Companies also give often illustrated examples

of the identified threatened species. Additionally, companies report on the assessments they have made regarding the specific species and the detected effects of company's business activities.

Some companies used also other GRI disclosure to report on biodiversity than 304. These include 102-11 on precautionary principle, 306-5 on waste disposal, 413-1 and 413-2 on social impact assessments including analysis of environmental effects such as effects on local biodiversity, and 102-46 on topic boundaries. Company reported on GRI 102-11 that it supported research as one key measure for the protection of biodiversity. In addition to the topics in GRI disclosures, companies provided their own disclosures on biodiversity, such as energy companies reporting the number of fish passes.

In addition to reporting merely the negative impacts on biodiversity, companies frequently report that their activities for the protection of biodiversity either contribute to the achievement of the SDGs or is aligned with the SDGs. Usually, companies report on the broader goal level on which SDGs their activities impact positively. However, some companies report their impact on the specific SDG target level.

The most common SDG on which companies do contribute to regarding biodiversity is the SDG 15 Life on Land. Other SDGs include SDG 6 Clean Water and Sanitation, SDG 11 Sustainable Cities and Communities, SDG 13 Climate action, SDG 14 Life below Water, and SDG 17 Partnerships for the Goals. Actions to achieve these goals and targets are reported by some but not all. For instance, tree planting program was disclosed to contribute to the SDG target 15.2 which focuses on reforestation, halting deforestation and sustainable management of all types of forests. Other SDG targets to which companies contribute to include target 6.6 on protecting water-related ecosystems, 14.2 on protecting coastal ecosystems, and 15.5 on halting biodiversity loss.

In addition to tree planting and reforestation, disclosed actions described to contribute to SDGs included mitigating impacts on ecosystems, actions to halt biodiversity loss and preservation of natural habitats, pollution prevention programs at company's facilities, decreasing light pollution, standing water bodies used as spawning habitats and fish habitats, fish protection, fish bypasses, soil protection, establishment of reptile habitats, grassland development along embankments, and forest restoration.

Connections were also made between the SDGs and the GRI Standards. GRI disclosure 304-1 was connected with SDGs 14 and 15, GRI 304-2 and 304-3 with SDGs 6, 14 and 15, and GRI 304-4 with SDGs 14 and 15. Additionally, one company connected their actions to another international framework for sustainable development, the 10 Principles of Global Compact. The impact on biodiversity was supporting Principle 7 on precautionary approach to environmental challenges and Principle 8 on promoting greater environmental responsibility.

Lastly, companies reported also on the different awards and certifications they have received on their work regarding biodiversity. The awards include WHC Gold Certification rewarded for headquarters of a company, and US finan-

cial services provider MSCI AA-rating which was especially awarded for a company's measures aiming at reducing effects on biodiversity. The certifications include ASI's Performance Standard certification on responsible sourcing that includes biodiversity, and certified label of the Union for Ethical Biotrade for ethical sourcing of ingredients from biodiversity.

### **4.3 Biodiversity Impact Management**

This section is divided into two parts. First, management approaches are discussed regarding biodiversity management. Second, different activities for the impact management are presented.

#### **4.3.1 Management Approach**

There are multiple approaches and tools what company management use for biodiversity protection as shown in Figure 4. The companies report on the relevant legislation and the political framework influencing the companies related to biodiversity. There are biodiversity strategies and management programmes guiding the companies' work on biodiversity. Companies have also set goals, targets, and key performance indicators (KPIs) related to biodiversity. Lastly, different types of commitments on biodiversity were found in the data. The data was somewhat overlapping. For example, some companies have set certain things as their target while others stated that they have made those their commitment. Additionally, the language used around managing the impacts was diverse although the content was in some cases highly similar. For instance, some companies considered the same biodiversity management approach as their strategy while for others it was a biodiversity management programme.

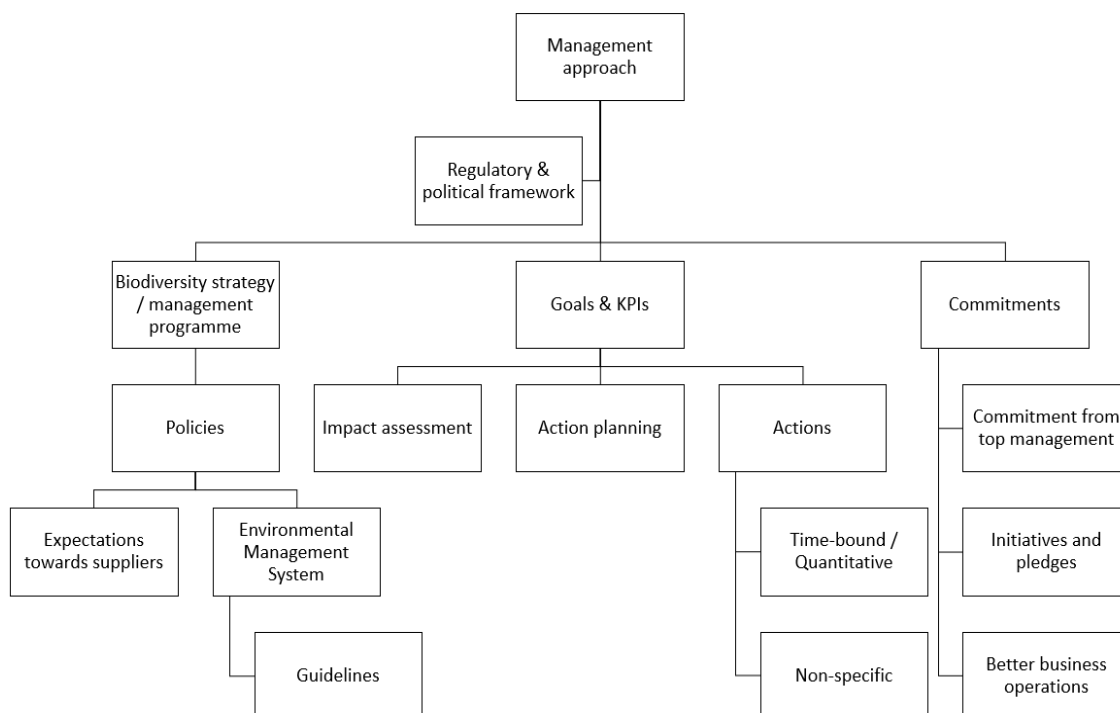


FIGURE 4 *Management approach to biodiversity*

Several companies reported to operate in accordance with the relevant regulation on biodiversity. There are also companies that reported the political framework that influenced their activities as well. On biodiversity the relevant regulation included Marine Mammal Protection Act in U.S. EU Birds and Habitats Directive, EU Renewable Energy Directive, and EU Taxonomy on biodiversity. As several companies reported on following the relevant regulation, it raises a question that is it not a standard to follow the regulation or why it is reported. The political framework included UN 2020 Aichi Biodiversity Targets, United Nations Convention on Biological Diversity, European Green Deal, European Recovery Plan, and United Nations Global Compact Sustainable Ocean Principles.

The companies' management had different biodiversity strategies, biodiversity management programmes, or approaches for managing their biodiversity impacts. The vocabulary on this varied significantly. Under these main elements there were multiple different tools, such as policies, environmental management systems, and guidelines. The data revealed that companies' approaches and management tools they used varied. Some companies used the environmental management systems to translate environmental policies into guidelines, including the biodiversity guidelines. Other companies had different approaches. For example, heads of market regions were accountable for the policy. On many occasions the same elements could be found in the strategy, policy, or guideline depending on the company.

Companies also extended their influence to supply chains. Companies expected suppliers to protect local habitats, meet environmental performance standards, and focus on circularity and nature-based solutions on increasing biodiversity. In one company the remuneration plan with key suppliers was linked to policies and standards, such as biodiversity policy which were then evaluated.

Several companies stated to have a biodiversity strategy for management of the impacts on biodiversity and aiming at stop loss of biodiversity, restoration and protection of biodiversity, obtaining value from biodiversity, or avoiding, reducing and compensating their impacts. Additionally, some called for other companies for ambitious biodiversity strategies.

It was stated that a company had developed a biodiversity strategy to move from project-based approach to programmatic approach on biodiversity. For multiple companies, the practice of managing biodiversity impacts had more project-based approach in use. The project-based approach included assessing local needs, regulation, stakeholder expectations, and designing solutions accordingly per site. The programmatic approach included defining specific biodiversity objectives for the company, identifying required actions, reporting transparently on these, and rooting the programme in cross-organisational governance structure. The programmes had different focus areas. For one company one area was protecting marine biodiversity. The strategies and approaches in general included precautionary principle, prioritising biodiversity, continuous improvement, use of mitigation hierarchy, strive to go beyond compliance through own biodiversity initiatives, positive impact on biodiversity through natural science-based solutions, and internal and external policies including own sustainability standards and regulatory obligations. One company had an approach that advances over time on managing biodiversity impacts. The first level was on assessing physical proximity to biodiversity areas, the second was assessing adverse impacts, and the third was actions for mitigation of impacts.

Companies had policies that established the principles of conduct, the integration into decision-making, scope of application, purpose, and defined high-priority approaches. The policies were called with different titles, including biodiversity policy, environmental protection policy, deforestation policy, and natural environment policy. Some of the policies were supplements of more general policies, such as sustainable development policy. One company had published their biodiversity policy during the reporting year and the company reported that it was fully integrated into business operations as well as benchmarked against global best practices.

The biodiversity policies included mitigating impact to habitats and wildlife, integrating biodiversity into internal decision-making processes, avoiding locating new infrastructure in areas of high biodiversity value, implementing biophilic design to company's buildings, carrying out detailed biodiversity assessments and risk assessments when planning new projects, promoting responsible sourcing, compensate negative impacts, establishing management plans for invasive species, participating and carrying out research on biodiversity, tailoring impact mitigation to unique environment of each site, operating in accordance

with the principles of utilisation of genetic resources according to the UN Convention on Biological Diversity, use of mitigation hierarchy, setting goals and indicators for monitoring, promoting biodiversity into the environmental management systems through specific biodiversity plans, collaborating with stakeholders, encouraging communication and awareness on biodiversity internally and externally, reporting on the biodiversity actions and training, and developing business activities that take into account the conservation of biodiversity.

The companies reported several environmental management systems (EMS) related to biodiversity. These are ISO14001, ISO9001, and EMAS. The EMSs implemented biodiversity commitments in action plans and established the monitoring and control systems. One company disclosed a reason for using EMS for managing biodiversity. It helped in monitoring wildlife-related incidents or risks at their site. One company reported that one advantage of the environmental management system was in that year special emphasis on communication to employees on improvement and protection of biodiversity.

The different guidelines included among other consultation guidelines with local communities to identify and manage potential biodiversity issues. Some of the biodiversity guidelines were established in the reporting year in question. Aim in establishing the guidelines was fulfilling responsibilities regarding biodiversity and increasing employee awareness on recognising the importance of biodiversity. One company had several biodiversity guidelines, one for operational forestry work, another for forest protection, and lastly for cooperation with stakeholders.

The biodiversity guidelines included understanding the impact of business activities and supply chain on biodiversity, conducting management emphasising conservation of biodiversity, reduction of emissions and prevention of pollution, reducing the water consumption, checking impacts on ecosystem when wastewater is emitted into public water areas, establishing risk management systems to eliminate highly polluted wastewater, prohibiting planting invasive alien species on company's premises, protecting rare species in company's sites, effective use of resources, compliance with regulations on the fair use of biological resources, raising biodiversity awareness of employees, collaborating with stakeholders on biodiversity conservation, proactive reporting of information related to biodiversity. In the finance industry, the guidelines for credit for different sectors included different themes, including biodiversity. One company had included biodiversity in its Code of Conduct through policies included in it as it also included biodiversity policy. Companies also faced biodiversity obligations from other companies. Asset managers, compliance, internal audit and legal teams supervised these contractual biodiversity obligations.

The data revealed that the targets, goals, and KPIs what the companies have set for themselves on biodiversity vary significantly. Some naturally vary due to differences between the industries. Many companies reported that the biodiversity related goals were set on the reporting year. Thus, many of the biodiversity goals were new for the companies. Additionally, many companies had

goals related to assessing the current situation related to biodiversity and evaluating as well as planning actions what could be taken to enhance biodiversity instead of the actual actions. Hence, three types of goals were identified from the data presented in the Table 4 below. These are goals related to biodiversity impacts assessment, action planning to enhance biodiversity, and actions to enhance the biodiversity. Some of the biodiversity action goals were highly specific, quantifiable, and time-bound while others were vague.

TABLE 4 *Biodiversity goals, targets and KPIs*

Biodiversity goals	Biodiversity impact assessment	Developing monitoring system
		Understanding of business impacts on biodiversity
		Developing for each business area own biodiversity indicators
	Action planning	Help to create Science-Based Targets for biodiversity
		Local biodiversity conservation programs per site
		Creating biodiversity management plan
		Setting science-based biodiversity goal
	Actions to enhance biodiversity	Time-bound / quantitative: e.g. –No net loss on biodiversity –At least 1 biodiversity project annually
		Non-specific: e.g.–Minimise environmental disturbance –Positive impact on biodiversity

The goals related to biodiversity impact assessment included developing a biodiversity monitoring system, developing a comprehensive understanding of the business operations’ and supply chain’s impact on biodiversity, for one company the goal was by 2025, and developing for each business area own indicators and monitoring methods for biodiversity. The targets related to action planning include help to create Science-Based Targets for biodiversity with a network of partnerships in 3-5 years, 100% of sites with local biodiversity conservation and restoration programmes by 2025, creating a biodiversity management plan and criteria or biodiversity roadmap and for one company the goal was by 2021, and setting science-based biodiversity goal by 2025. Lastly, there were different actions that the companies had set as their goals. Some of these were quite vague, such as expanding product line using alternatives to animal derived substances, increase biodiversity, minimise environmental disturbance, positive impact on biodiversity by implementing biodiversity programme. The more specific, quantitative or time-bound targets what the companies reported were no net loss on



biodiversity by 2030 or neutral biodiversity footprint that refers to avoiding, minimising and compensating any negative impacts on biodiversity, net positive impact on biodiversity, expand payment of access and benefit sharing to the group by 2025 as per Nagoya Protocol and UN Convention on Biological Diversity, foster collective efforts towards zero deforestation by 2025, expand forest preservation with specific number of hectares that varied, increase revenue streams with 55 bio-ingredients, annually at least 1 biodiversity project, biodiversity included in all expansion projects, deforestation free investment portfolios by 2025, and 25 million hectares of farmland has increased productivity by using natural solutions by 2025.

Interestingly net positive impact on biodiversity as a goal was focusing on new projects and facilities and there it was a target when possible. Thus, net positive impact on biodiversity was more of a bonus rather than an absolute goal. However, for one company net zero loss on biodiversity was a mid-target which then would be followed by net positive impact on biodiversity.

Companies reported different types of commitments related to biodiversity. Mainly three different types of commitments could be identified from the data set that are commitment from the top management of a company towards preserving biodiversity, initiatives and pledges to protect biodiversity, and commitments for better business operations from biodiversity's point of view.

In the annual reports as well as in the sustainability reports there is often a statement or review from the top management, often the CEO, chairman, board of directors or a senior sustainability professional of the company, where the companies' top management declared a commitment to preserving biodiversity or growing focus of the company in biodiversity. One statement underlined the importance of circular economy and its connection with low impact on biodiversity. Other statements highlighted some of the company's actions during the past year or the upcoming years to enhance biodiversity. These reviews included statements on company's commitments, such as no net loss on biodiversity.

Companies committed to the following initiatives and pledges. These are commitments to participate in local initiatives that protect and restore biodiversity, Act4Nature initiative that has 10 principles for global biodiversity, Pact for Biodiversity that is about commitment to the three main objectives of the UN Convention on Biological Diversity, and the UK as well as the Australian Engineers Declare Climate Change and Biodiversity Emergency pledges.

Commitments for better business operations included commitments to promoting and improving biodiversity, integrating biodiversity assessment into current and proposed activities, avoiding conversion of habitats with valuable biodiversity, minimising and mitigating impacts on natural habitats and to protect wildlife, avoiding negative impacts on air quality, climate, pollination, water and soil, reporting on biodiversity impacts of the company, understanding and positively influencing supply chain's impact on biodiversity, working with governmental agencies to obtain appropriate clearances, preserving and enhancing biodiversity that surround the business operations, increasing share of certified raw materials, and zero deforestation. One company reported that they had only

committed to zero deforestation in certain rainforests with high biodiversity value.

### **4.3.2 Impact Management Activities**

This part is divided into three categories of activities on biodiversity impact management. These are activities for managing impacts directly connected to business activities, biodiversity projects separate from business activities, and support for research related to biodiversity. However, some companies only disclosed the amount of money they have invested in biodiversity projects.

#### **4.3.2.1. Managing Impacts Connected to Business Operations**

This part presents the findings of companies' impact management activities that are directly connected to their business activities. For several companies these activities were on piloting phase that implies that biodiversity projects are somewhat new in the companies. Activities were undertaken both in companies' operations as well as in supply chains. Managing company's impacts with mitigation hierarchy was frequently reappearing in the reports of the companies. Mitigation hierarchy was described by most of the companies as a sequence of four steps including avoiding creating negative impacts, minimising impacts in duration and intensity, restoring specific biodiversity features that could not be avoided or minimised, and lastly offsetting the residual impacts. Examples of these activities are described below.

Avoidance of negative impacts on biodiversity included anticipating and preventing creation of impacts. These activities included land wildlife monitoring, monitoring and controlling water systems and the species inhabiting them, development of monitoring methods of biodiversity, analysing alternatives to avoid placing new infrastructure in protected areas or areas with high biodiversity, prevention of environmental pollution, building deposits to contain possible spills, protection of rare species that are discovered at company's sites, water treatment prior discharge, establishing buffer zones near ecologically sensitive areas, and proper disposal of waste. Several companies implied that they would place infrastructure in areas with high biodiversity value unless there are no other feasible alternatives. Hence, protecting biodiversity seems to be second in the order of importance compared to profit making. In the energy sector, these included activities such as employing whale monitoring to avoid collisions with boats, monitoring system with alarm protocol to shut down certain wind turbines to minimise collisions of endangered bird species with spinning windmill blades, and overhead grid improvements with supports adapted to avifauna. Also, physical controls were placed, for instance, by fencing evaporation ponds at solar energy areas to prevent drowning and poisoning of wildlife. Some companies were excluding negative activities from their investment portfolios, such as activities that pose a risk of deforestation. In the finance sector, free access was given for financial services providers in Sub-Saharan Africa and in Latin America to online

tool on credit analysis measuring biodiversity risks on decision related to agricultural loans.

Other activities were aiming at directly minimising the negative impact caused by the business operations. These include activities such as reducing air emissions including greenhouse gas emission, reducing water consumption, limiting impact on the nature in the grounds of the companies, creation of rooftop gardens, reduction of invasive species, rescue and translocation of wildlife populations from the area of business operations, ensuring habitat connectivity at company's facilities, sourcing fewer virgin materials, shifting high-impact activities from ecologically sensitive localities, comprehensive environmental clean-up of spills and releases and remediation of affected areas, sourcing certified feedstock, internal evaluations carried out on main suppliers including biodiversity conservation, and effective use of resources during manufacturing process. In the energy sector these included, for instance, the use of bubble curtain that reduces noise pollution in construction phase of offshore windmills. For the finance sector, this included consideration of ESG aspects, including biodiversity, in credit operations that influenced credit limits and assessments were made available for the customer companies' managers for them as a guide for improving. Green loans were also given for companies where margin is smaller when company contributes to different environmental objectives such as biodiversity conservation. In the forestry industry, activities at increasing share of mixed forests were disclosed to help biodiversity.

Restoration activities aimed at repairing already damaged ecosystem services. In the fashion industry a project was undertaken to improve goat pasture biodiversity with goat herders by analysing satellite images. Other occasions when activities at restoring affected areas were undertaken was during construction processes. Companies also disclosed on recovering the ecosystems surrounding their facilities. In the energy industry, constructing fish bypasses is an example of this kind of activities in hydropower plants. In the offices, birdhouses were distributed around the facilities and some plots of land were solely dedicated for autochthonous species. Also, planting of native plants from flowers and shrubs to trees was done in companies' plants. In the finance sector, companies committed to increasing financing commitments for purposes that have positive impact on biodiversity. For the energy sector these activities included creating artificial stone reefs and laying pipes to encourage a nursery ground for cod at offshore wind farms, releasing eels to a river in order to recover the eel population, and improving living conditions of prey population of endangered eagle in onshore wind farm.

Offsetting or compensating for habitat loss were reported as part of the activities of multiple companies. However, for most of these companies the specific actions taken were not disclosed. The disclosed offsetting activities included maintenance of green zones, green bonds of which proceeds will be used to finance biodiversity conservation, development of conservation areas, and purchase of untouched forests.

Additionally, companies had some other activities which aimed at enhancing biodiversity. Financing was linked to biodiversity via green bonds as the margin was tied to biodiversity and climate targets. Companies commonly reported on the size of the total area they had formally conserved.

#### **4.3.2.2. Biodiversity Projects Separate from Business Activities**

This section represents the companies' projects aiming at enhancing biodiversity that do not have a direct link for the business operations of the companies. These include awareness raising on biodiversity, projects directly aiming at enhancing biodiversity, participating in groups developing international or industry specific best practices related to biodiversity, corporate activism, and projects with side benefits for biodiversity aiming at solving other environmental issues. In the biodiversity enhancing activities separate from direct business operations companies had more often partnerships with different kind of organisations to carry out these activities compared to activities linked to direct business operations.

Awareness raising on biodiversity can be directed to the employees, general public, or other companies in the industry. Awareness of employees on the importance of biodiversity and the urgency to address biodiversity loss was often raised via volunteering projects that rarely were connected to the business activities. These projects are represented in the next paragraph. Employees also received environmental training and prizes. Regarding raising awareness of the general public, student tours in ecological parks were given in company's grounds to strengthen their understanding on biodiversity and participation in environmental protection. Another company supported work that provided children opportunities to interact and experience wetlands. Additionally, different educational cartoons were created to increase knowledge and awareness of children on biodiversity in collaboration with a TV channel. One company initiated a podcast related to sustainability where biodiversity was the topic of one episode.

Additionally, companies had different projects that were aiming at enhancing biodiversity that had a philanthropic nature as those were not connected to the daily operations of the companies. It was noted that these initiatives also raised awareness on the environmental issues or were aiming to raise awareness as often the projects were conducted with company's employees volunteering. These projects included nesting boxes of bees, installation of bird and bat boxes, other shelters and supports for species at risk, cultivation towers, vertical gardens, urban gardens, bird feeders, restoration of wetlands, pollinator gardens, bee-keeping at the roof of an office, insect friendly meadows, helping wildlife species in areas devastated by fire, rainforest protection in biodiversity hotspots, supporting training program for restoration of coral reefs, hummingbird gardens, support for bird nesting, promoting the use of soil bricks in Africa that do not require firing which by alleviating deforestation protects biodiversity, use of old concrete materials of a company to enhance marine life in coastline, tree planting,

massive reforestations, roof greening, composting of green waste, beach clean-up from solid waste, and support local initiatives from employees.

There were different groups, partnerships, and alliances where companies participated in developing best practices related to biodiversity conservation. These included roundtable processes led by government ministries on biodiversity, banks, insurance companies and governments cooperating on bringing and developing new set of requirements related to biodiversity and accompanying standards for better reporting, such as Nature-related Financial Disclosures and Science Based Targets Network method for biodiversity targets, bringing together players of an industry to restore biodiversity and protect species, partnering with United Nations' organisation in developing tools for financial institutions in assessing portfolio alignment with biodiversity targets, and participating to industry association submissions on regulation related biodiversity conservation.

Corporate activism was one form taken by especially finance sector to enhance biodiversity. Engaging on sustainability topics, including biodiversity, with their portfolio companies was one way of creating pressure on minimising impacts on biodiversity. Also, finance sector investor coalitions on deforestation engaged in dialogue with authorities of Brazil on deforestation in Amazon and on measures to reduce biodiversity loss. Companies also disclosed on encouraging other companies to act on biodiversity conservation by showing example. Emphasising and evaluating sustainability matters, including biodiversity, in supply chain was one way of corporate activism for some of the companies.

Lastly, companies have several projects that are aiming at solving other environmental issues, most notably the climate change, that have side benefits for biodiversity. Some of these projects were not connected to companies' business operations while others were connected. There are multiple examples of this kind of projects. In northern hemisphere, increasing deciduous trees in forests was disclosed to improve climate resilience of forests due to increased biodiversity. This also made the forests more resistant to adverse weather conditions. Company increased deciduous trees with the help of their own tree nursery where oak and black alder saplings were grown. Another activity was connected to company's decarbonisation project where individual company's locations got support as well for other sustainability activities also related to biodiversity. Carbon offsetting through purchase of Amazonian rainforest was another project benefiting biodiversity despite the goal being on climate change mitigation via preventing deforestation of pristine rainforest. This project also included agricultural training to local communities on keeping trees standing. Carbon emissions were compensated via offsetting also through REDD+ that protect critical forests and biodiversity. Another company had carbon neutral services where offsetting was used for the remaining carbon emissions. These offsets included biodiversity conservation. One company had a youth empowering competition for proposing ideas to address climate change and the topic of 2020 focused on the importance of protecting biodiversity and impact of global deforestation.

Tree planting and reforestation activities were frequently reported by different companies. However, the planted trees were often covering only one species when the species were disclosed. Often the number on how many million trees were planted was highlighted. Hence, the focus in tree planting and reforestation seems to be in quantity rather than quality. This raises a question whether the understanding of biodiversity is limited as planting multiple species would be beneficial for the biodiversity or whether the main aim of the projects was only climate change mitigation without further deliberation on the best practices to enhance biodiversity. Nevertheless, there are exceptions. One company reported on reforestation project where native plants were planted with various stages of growth.

#### **4.3.2.3. Support for Research**

Companies supported research on biodiversity and the impacts they have on it, research on business biodiversity management, and research on biodiversity assessment tools. Examples of these activities are given in the next paragraph.

Companies conduct wide range of research by themselves as well as support research conducted by their stakeholders and universities on key environmental impacts and mitigation approaches, such as ecosystem monitoring. Companies have also supported general research on biodiversity such as work of Species Survival Commission that increase the scope of the Red List of Endangered Species. It was also disclosed that papers were co-published with university, for example, on business operating within planetary boundary. Research of the environmental organisations, such as WWF, was supported. These topics included impact of climate on biodiversity, and on migratory movements of birds. Also, participation in bird watching and data collection of company's volunteers helped to preserve biodiversity. Companies also supported research on the best practices to address biodiversity loss in their business sector and supported and participated research on biodiversity assessment tools based on science. Lastly, ecological studies conducted by stakeholders of the company on the surrounding area before and after construction of a company's facility.

## **4.4 Biodiversity Protection as a Product or Service**

In addition to minimising the negative impacts that companies have from their business operations, some of the companies provide products or services that are assisting in biodiversity protection or helping to measure the level of biodiversity. Other companies require that their products fulfil criteria related to biodiversity.

There are some examples of products and services assisting in biodiversity protection. These include natural plant protection solution, agricultural support solutions using ICT that help to avoid over-fertilisation as fertilisers are applied

based on need, evaluating light sources related to plant growth, and biodiversity protection measures in the form of tree planting.

Other products and services assist in biodiversity measurement. These include, for instance, monitoring techniques on biodiversity that monitor and detect stygofauna, an indicator of aquifer ecological health. Another example is an aerospace programs that provide benefits for biodiversity measurement.

Few companies have set criteria for their products that must be met related to biodiversity. For instance, skin care products were developed based on sustainability pillars, one of which is preservation of biodiversity. Another company's sustainability solutions need to meet at least one of six sustainability criteria. One of these criteria is that the solution conserves biodiversity.

## 5 DISCUSSION

This section analyses the results of this thesis. First, the implications of the wide variety of the disclosures are reviewed. Second, the novelties brought by the results in relations to prior research are discussed. Lastly, commonalities with previous research are pointed out.

### 5.1 Implications of the Wide Variety and Extent of Disclosures

The results of this thesis on the wide variety of different reporting practices, disclosers and the related vocabulary imply that the biodiversity reporting is still an emerging field in sustainability reporting. This becomes clear especially when examining the disclosers related to biodiversity goals. Many of those were set on the reporting year as well as some of the biodiversity strategies were generated in the reporting year. Additionally, the nature of some goals implied that the work on biodiversity is in the very beginning. Different goals included goals when company's biodiversity impact assessment should be done in the near future as well as goals on planning what actions companies should make to enhance biodiversity.

This is in line with the prior research results in this field. Even though the previous research had mostly focused on quantitative topic level disclosers without further details of the content it was evident that the number of different biodiversity disclosures was high (Adler et al., 2017; Atkins & Maroun, 2018; Hassan et al., 2020).

Regarding the multi-level perspective as a theoretical framework, based on this thesis it seems that the dominant design on biodiversity reporting does not exist yet. However, some emerging coherence was detectable from the data. The use of mitigation hierarchy in managing companies' own impacts from their direct business operations was frequently reappearing in different reports. Hence, this might indicate that in the multi-level perspective framework the evolution of biodiversity reporting is in the mid of the niche innovation stages. However, in the future the upcoming EU legislation might bring a quick change to this by mandating what should be reported related to biodiversity.

Other frequently reappearing disclosures were the GRI disclosures on biodiversity. However, it is difficult to assess whether or not the GRI disclosures already provide some form of a dominant design biodiversity disclosures as the GRI disclosures on biodiversity are cherry-picked (Raar et al., 2020). Additionally, GRI themselves are developing new biodiversity disclosers (GRI, 2021a). This might back up the suggestion of Roberts et al. (2021) that the current GRI disclosures are insufficient in stopping the loss of biodiversity, and this has been noted also by the GRI disclosure developers. Regarding the dominant design,



even if it exists already to some extent, it will change due to the upcoming changes in the GRI disclosures on biodiversity.

Another implication comes from variance between the extent of the reporting from minimal of a notion on biodiversity in one sentence to extensive reports of over 100 pages dedicated solely to biodiversity. There is a possibility that biodiversity disclosures for the companies with extensive reporting on biodiversity are part of impression management and maintaining social legitimacy. This is hypothesised by the legitimacy theory according to which the motivation for companies' sustainability reporting is not improving environmental performance rather than fulfilling the social expectations (Chen and Roberts, 2010). As the global interest on halting the biodiversity loss has increased (World Economic Forum, 2021), this might be increasing companies' motivation to report on biodiversity as the social expectations related to biodiversity management are increasing.

## 5.2 Discovered Novelties

Adler et al. (2018) suggested that future research could focus on elaborating the content of biodiversity disclosures of corporations. As the previous research on biodiversity disclosures is mostly quantitative, the disclosures are described in those papers in higher topic level rather than in detailed content level (Adler et al., 2017; Atkins & Maroun, 2018; Hassan et al., 2020). Additionally, the previous research claimed that company reporting was limited on biodiversity disclosures among the studied companies (Adler et al., 2018; Hassan et al., 2020). Hence, the aim was to fill this research gap by discovering what disclosures on biodiversity the pioneer companies are reporting. Thus, this thesis fills that research gap by revealing what disclosures sustainability pioneer companies reported. This was done in the higher category level as presented in the Figure 3 and further in detail in all categories.

The disclosures can be divided into three main categories including biodiversity impact assessment, biodiversity impact management, and biodiversity protection as a product or a service. The first two are related to the companies' biodiversity footprint on minimising the negative impacts and the last one on the biodiversity handprint on increasing the positive impacts. The first two have also several sub-categories. On the third category the number of disclosures in the data was somewhat limited. Thus, it would not be meaningful to create sub-categories for the biodiversity enhancing product and services at this point of the evolution on the disclosures. Regarding biodiversity impact assessment disclosures, there are three sub-categories: dependencies on biodiversity reflecting mostly how the biodiversity is impacting the company, methods for assessing the impact, and lastly company's impact on biodiversity. On biodiversity impact management there are two sub-categories including the

management approach and activities on managing the impacts. The detailed disclosures of the sub-categories are discussed in section 4 of this thesis on results.

Filling the research gap was possible as this study diverted from the common practice in biodiversity reporting research on choosing the data from the rating of Fortune Global 500 (Addison et al., 2019; Adler et al., 2018; Bhattacharya & Managi, 2013; Hassan et al., 2020). The size of the companies in term of revenue is in the focus of the Fortune Global 500 rating (Fortune, 2021). This has been commonly chosen as the data set despite the studies arguing that the size does not correlate on how extensively the companies are reporting on biodiversity (Bhattacharyya & Yang, 2019; Skouloudis et al., 2019). The data set used in this thesis included the top 50 of the Global 100 Most Sustainable Corporations rating by the Corporate Knights (Corporate Knights, 2021a). As a result, 39 out of the 50 companies did disclose information on biodiversity in their sustainability reporting. Hence, it could be said that by choosing the pioneers in the corporate sustainability as the studied entities instead of the largest companies, it overcame the previously common issues of limited reporting among the studied entities (Adler et al., 2018; Hassan et al., 2020) and majority of the studied entities not disclosing on biodiversity at all (Raar et al., 2020).

Another novelty discovered by this thesis was the disclosures related to increasing companies' biodiversity handprint via their products and services. These are enhancing biodiversity assessment or biodiversity management of their customer companies. In the previous research there was no notion of companies reporting on this. Thus, this could be a new phenomenon. However, there is a possibility that this is impression management where companies focus on the positive effects to gain social legitimacy in accordance with the legitimacy theory (Chen & Roberts, 2010). Due to the need of meeting social expectations, the positive information is noted to dominate sustainability reporting (Hahn and Lülfs, 2014).

### **5.3 Commonalities with Prior Research**

There were several similarities with the prior research on biodiversity reporting. In addition to the quite common use of GRI biodiversity disclosures discussed in section 5.1, there are commonalities on the topic level of different disclosures, connection between environmental award and biodiversity reporting, and monetising biodiversity.

This thesis presented different categories of biodiversity disclosures in corporate sustainability reporting in the Figure 3. Majority of the discovered category level disclosures were also discovered in the previous research on biodiversity reporting. Completely new category was disclosures on providing products and services that enhance biodiversity. In the section 5.2 this was analysed further. As the previous research on the biodiversity disclosures is mainly quantitative, it is lacking the further details of what is actually included

in the disclosures, for example, related to biodiversity goals. However, the topic level, such as biodiversity goals, is quite similar with previous research. However, in the previous research the number of different categories used for the quantitative research purposes is higher than the different categories identified in this thesis (Adler et al., 2017; Atkins & Maroun, 2018; Hassan et al., 2020). This can for most part be explained by the detailed description of each category of disclosures in this thesis when compared with previous research where separate categories were not made as all were counted as equal disclosures. For example, all the GRI related reporting have been mentioned separately as disclosures in the previous papers and in this thesis, those were included in the biodiversity impact category, or some activities have been mentioned separately in the previous research and in this thesis, activities were divided into three different sub-categories with the details mentioned inside the categories.

Previous research by Hassan et al. (2020) discovered that there is a correlation between reporting on biodiversity and receiving an environmental award. In this thesis, few studied entities that did have biodiversity disclosures in their sustainability reporting also reported on receiving an environmental award or specifically biodiversity award based on their actions. Hence, this discovery by Hassan et al. (2020) on this phenomenon seems to be present also in this research. However, it should be noted that the research method used in this thesis is qualitative research and the discovered correlation in this research might be, when analysed with quantitative methods, statistically insignificant.

In the prior research, there have been suggestions on giving monetary value for biodiversity and discussions on the implications that come with monetising biodiversity (Atkins & Maroun, 2018; Raar et al., 2020; Rimmel, 2021, Weir, 2019). One company in the data set reported their positive and negative monetary value on biodiversity by using the IWAI Methodology. This way the company overcame the issues in accounting for biodiversity. Other companies did not give a monetary value for biodiversity. This could be due to the challenges related to monetising such as complex matter as biodiversity. As pointed out by Farrell (2007) that giving monetary value for biodiversity is insufficient as the economic worth is priceless.

## 6 CONCLUSION

The aim of this thesis was to shed light on the content of the biodiversity disclosures reported in corporate sustainability reports of the pioneer companies in sustainability. The previous research pointed out that biodiversity reporting was limited among the studied companies (Adler et al., 2018; Hassan et al., 2020). Furthermore, it was completely ignored by most studied entities in their sustainability reporting (Raar et al., 2020). This thesis fills this research gap with the detailed content of corporate biodiversity disclosure which complements this still embryonic field of research on corporate biodiversity reporting (Roberts et al., 2021). Three main categories of biodiversity disclosures were identified with sub-categories and lastly the detailed content of each category was discussed. The three main categories include disclosures on biodiversity impact assessment, impact management and biodiversity protecting products or services.

There are both theoretical and practical implications emerging from this thesis. Firstly, regarding the theoretical implications the multi-level perspective as a theoretical framework can possibly provide a more holistic approach for studying emerging sustainability disclosures, such as the biodiversity disclosures, compared with the commonly used theories in this field. Thus, it overcomes the critique pointed towards legitimacy, stakeholder, and institutional theories, on being narrow in their point of view. Secondly, regarding practice this thesis provides the best practices on biodiversity impact measurement and management disclosures in corporate reporting as well as the notion on increasing company's biodiversity handprint via products and services for corporate sustainability professionals to use. Furthermore, corporate reforestation projects are found to be focusing on climate change mitigation. The impact of these projects could be optimised for both climate change mitigation and biodiversity enhancement by focusing also on the quality rather than only quantity. This could be done via increasing variety in terms of species and the age of the planted species that would lift the impact of these projects from the current suboptimal state in terms of sustainability.

There are several limitations in this thesis. These are the reliability of the data, and the comparability and reliability of the results. First, the reliability of the data is limited as the data comes from secondary sources. The sustainability reports are prepared by the studied entities. Hence, the reports are limited to showing merely the view of the companies. Thus, excluding possible opposite viewpoints. Second, comparability of the results is challenging as the results are combination from the information provided by all the companies from different industries and regions. Thus, the companies highlight different matters. Last limitation is the reliability of the results as the research is qualitative. The importance of the different disclosures and other results can depend on the interpretation of the researcher. Also, the connections made between different disclosure categories might depend on the understanding of the researcher.

Avenues for future research can include quantitative studies to verify the findings of this thesis. Additionally, further studies could focus on specific industries and regions on the content of biodiversity disclosures to reveal possible differences in the disclosures. As the field of biodiversity disclosures is quickly evolving studies could also focus on how the biodiversity reporting changes due to the upcoming EU legislation. Lastly, the usefulness of multi-level perspective as an alternative framework in researching emerging sustainability disclosures could be verified by a longitudinal study. This could also reveal whether a dominant design emerges in biodiversity reporting.

## REFERENCES

- Addison, P. F. E., Bull, J. W., & Milner-Gulland, E. J. (2019). Using conservation science to advance corporate biodiversity accountability. *Conservation Biology*, 33(2), 307-318. [www.doi.org/10.1111/cobi.13190](http://www.doi.org/10.1111/cobi.13190)
- Adler, R., Mansi, M., & Pandey, R. (2018). Biodiversity and threatened species reporting by the top Fortune Global companies. *Accounting, Auditing, & Accountability*, 31(3), 787-825. [www.doi.org/10.1108/AAAJ-03-2016-2490](http://www.doi.org/10.1108/AAAJ-03-2016-2490)
- Adler, R., Mansi, M., Pandey, R., & Stringer, C. (2017). United Nations Decade on Biodiversity. *Accounting, Auditing, & Accountability*, 30(8), 1711-1745. [www.doi.org/10.1108/AAAJ-04-2015-2028](http://www.doi.org/10.1108/AAAJ-04-2015-2028)
- Amin, S., Iqbal, J., & Makki, M. A. M. (2021). The Impact of Audit Committee Characteristics on Corporate Biodiversity Disclosure: An Analysis of Japanese Firms. *Journal of Business and Social Review in Emerging Economies*, 7(2). [www.doi.org/10.26710/jbsee.v7i2.1620](http://www.doi.org/10.26710/jbsee.v7i2.1620)
- Atkins, J., & Maroun, W. (2018). Integrated extinction accounting and accountability: building an ark. *Accounting, Auditing, & Accountability*, 31(3), 750-786. [www.doi.org/10.1108/AAAJ-06-2017-2957](http://www.doi.org/10.1108/AAAJ-06-2017-2957)
- Baldwin, C. (2009). *Sustainability in the food industry* (1. ed. ed.). Wiley-Blackwell.
- Beck-O'Brien, M., & Bringezu, S. (2021). Biodiversity Monitoring in Long-Distance Food Supply Chains: Tools, Gaps and Needs to Meet Business Requirements and Sustainability Goals. *Sustainability (Basel, Switzerland)*, 13(8536), 8536. [www.doi.org/10.3390/su13158536](http://www.doi.org/10.3390/su13158536)
- Bhattacharya, T. R., & Managi, S. (2013). Contributions of the private sector to global biodiversity protection: case study of the Fortune 500 companies. *International Journal of Biodiversity Science, Ecosystems Services & Management*, 9(1), 65-86. [www.doi.org/10.1080/21513732.2012.710250](http://www.doi.org/10.1080/21513732.2012.710250)
- Bhattacharyya, A., & Yang, H. (2019). Biodiversity disclosure in Australia: effect of GRI and institutional factors. *Australasian Journal of Environmental Management*, 26(4), 347-369. [www.doi.org/10.1080/14486563.2019.1629544](http://www.doi.org/10.1080/14486563.2019.1629544)
- Campbell, N. A., Urry, L. A., Cain, M. L., Wasserman, S. A., Minorsky, P. V., & Reece, J. B. (2017). *Biology: a global approach* (11th global ed. ed.). Pearson International Content.

- Carroll, A. B. (2008). A History of Corporate Social Responsibility. *The Oxford Handbook of Corporate Social Responsibility* (1st ed.). Oxford University Press. [www.doi.org/10.1093/oxfordhb/9780199211593.003.0002](http://www.doi.org/10.1093/oxfordhb/9780199211593.003.0002)
- Chen, J., & Roberts, R. (2010). Toward a More Coherent Understanding of the Organization–Society Relationship: A Theoretical Consideration for Social and Environmental Accounting Research. *Journal of Business Ethics*, 97(4), 651-665. [www.doi.org/10.1007/s10551-010-0531-0](http://www.doi.org/10.1007/s10551-010-0531-0)
- Ching, H. Y., & Gerab, F. (2017). Sustainability reports in Brazil through the lens of signaling, legitimacy and stakeholder theories. *Social Responsibility Journal*, 13(1), 95-110. [www.doi.org/10.1108/SRJ-10-2015-0147](http://www.doi.org/10.1108/SRJ-10-2015-0147)
- Cormier, D., Magnan, M., & Van Velthoven, B. (2005). Environmental disclosure quality in large German companies: Economic incentives, public pressures or institutional conditions? *The European Accounting Review*, 14(1), 3-39. [www.doi.org/10.1080/0963818042000339617](http://www.doi.org/10.1080/0963818042000339617)
- Corporate Knights. (2020). 2021 Global 100 FAQ. Corporatetechnights.com. <https://www.corporateknights.com/rankings/global-100-rankings/2021-global-100-rankings/2021-global-100-faq/>
- Corporate Knights. (2021a). 2021 Global 100 ranking. [www.corporateknights.com](http://www.corporateknights.com). <https://www.corporateknights.com/rankings/global-100-rankings/2021-global-100-rankings/2021-global-100-ranking/>
- Corporate Knights. (2021b). About us. Corporatetechnights.com. <https://www.corporateknights.com/about-us/>
- Dietz, S., & Adger, W. N. (2003). Economic growth, biodiversity loss and conservation effort. *Journal of Environmental Management*, 68(1), 23-35. [www.doi.org/10.1016/S0301-4797\(02\)00231-1](http://www.doi.org/10.1016/S0301-4797(02)00231-1)
- DiMaggio, P. J., & Powell, W. W. (1983). The Iron Cage Revisited: Institutional Isomorphism and Collective Rationality in Organizational Fields. *American Sociological Review*, 48(2), 147-160. [www.doi.org/10.2307/2095101](http://www.doi.org/10.2307/2095101)
- Dragu, I., & Tudor-Tiron, A. (2014). From Sustainability to Integrated Reporting – The Political Perspective of Institutional Theory. *Studia Universitatis Babeş-Bolyai. Oeconomica*, 59(2), 20-33. <https://www.cceol.com/search/article-detail?id=34461>
- Elo, S., & Kyngäs, H. (2008). The qualitative content analysis process. *Journal of Advanced Nursing*, 62(1), 107-115. [www.doi.org/10.1111/j.1365-2648.2007.04569.x](http://www.doi.org/10.1111/j.1365-2648.2007.04569.x)

- European Commission. (2021a). *Corporate Sustainability Reporting*. Ec.europa.eu. [https://ec.europa.eu/info/business-economy-euro/company-reporting-and-auditing/company-reporting/corporate-sustainability-reporting\\_en](https://ec.europa.eu/info/business-economy-euro/company-reporting-and-auditing/company-reporting/corporate-sustainability-reporting_en)
- European Commission. (2021b). *Protecting biodiversity worldwide – towards an international agreement at COP 15*. Ec.europa.eu. [https://ec.europa.eu/environment/international/protecting-biodiversity-worldwide-towards-international-agreement-cop-15\\_en](https://ec.europa.eu/environment/international/protecting-biodiversity-worldwide-towards-international-agreement-cop-15_en)
- European Commission. (2021c). *Questions and Answers: Corporate Sustainability Reporting Directive proposal*. Ec.europa.eu. [https://ec.europa.eu/commission/presscorner/detail/en/qanda\\_21\\_1806](https://ec.europa.eu/commission/presscorner/detail/en/qanda_21_1806)
- Everard, M., Johnston, P., Santillo, D., & Staddon, C. (2020). The role of ecosystems in mitigation and management of Covid-19 and other zoonoses. *Environmental Science & Policy*, 111, 7-17. [www.doi.org/10.1016/j.envsci.2020.05.017](http://www.doi.org/10.1016/j.envsci.2020.05.017)
- Fairbrass, A., Mace, G., Ekins, P., & Milligan, B. (2020). The natural capital indicator framework (NCIF) for improved national natural capital reporting. *Ecosystem Services*, 46, 101198. [www.doi.org/10.1016/j.ecoser.2020.101198](http://www.doi.org/10.1016/j.ecoser.2020.101198)
- Farrell, K. N. (2007). Living with living systems: The co-evolution of values and valuation. *International Journal of Sustainable Development and World Ecology*, 14(1), 14-26. [www.doi.org/10.1080/13504500709469704](http://www.doi.org/10.1080/13504500709469704)
- Fortune. (2021). *Methodology for Global 500*. Fortune.com. <https://fortune.com/franchise-list-page/global-500-methodology-2021/>
- Foti, V. T., Scuderi, A., Stella, G., & Timpanaro, G. (2019). Consumer purchasing behaviour for “biodiversity-friendly” vegetable products: increasing importance of informal relationships. *Agricultural Economics (Praha)*, 65(No. 9), 404-414. [www.doi.org/10.17221/377/2018-AGRICECON](http://www.doi.org/10.17221/377/2018-AGRICECON)
- Gaia, S., & Jones, M. J. (2020). Biodiversity reporting for governmental organisations: Evidence from English local councils. *Accounting, Auditing, & Accountability*, 33(1), 1-31. [www.doi.org/10.1108/AAAJ-05-2018-3472](http://www.doi.org/10.1108/AAAJ-05-2018-3472)
- Geels, F. W. (2002). Technological transitions as evolutionary reconfiguration processes: a multi-level perspective and a case-study. *Research Policy*, 31(8), 1257-1274. [www.doi.org/10.1016/S0048-7333\(02\)00062-8](http://www.doi.org/10.1016/S0048-7333(02)00062-8)
- Geels, F. W. (2004). From sectoral systems of innovation to socio-technical systems: Insights about dynamics and change from sociology and institutional



- theory. *Research Policy*, 33(6), 897-920. [www.doi.org/10.1016/j.respol.2004.01.015](http://www.doi.org/10.1016/j.respol.2004.01.015)
- Geels, F. W. (2011). The multi-level perspective on sustainability transitions: Responses to seven criticisms. *Environmental Innovation and Societal Transitions*, 1(1), 24-40. [www.doi.org/10.1016/j.eist.2011.02.002](http://www.doi.org/10.1016/j.eist.2011.02.002)
- Geels, F. W., & Kemp, R. (2007). Dynamics in socio-technical systems: Typology of change processes and contrasting case studies. *Technology in Society*, 29(4), 441-455. [www.doi.org/10.1016/j.techsoc.2007.08.009](http://www.doi.org/10.1016/j.techsoc.2007.08.009)
- GRI. (2021a). *Biodiversity crisis emphasizes need for corporate transparency*. Globalreporting.org. [https://www.globalreporting.org/about-gri/news-center/biodiversity-crisis-emphasizes-need-for-corporate-transparency/?utm\\_campaign=12475103\\_Newsletter-June-2021&utm\\_medium=Engagement%20Cloud&utm\\_source=Global%20Reporting%20Initiative&dm\\_i=4J5,7FDUN,1ABHSA,U67MA,1](https://www.globalreporting.org/about-gri/news-center/biodiversity-crisis-emphasizes-need-for-corporate-transparency/?utm_campaign=12475103_Newsletter-June-2021&utm_medium=Engagement%20Cloud&utm_source=Global%20Reporting%20Initiative&dm_i=4J5,7FDUN,1ABHSA,U67MA,1)
- GRI. (2021b). *GRI Standards English Language*. Globalreporting.org. <https://www.globalreporting.org/how-to-use-the-gri-standards/gri-standards-english-language/>
- GRI Standards. (2016a). *GRI 101: Foundation*. Globalreporting.org. <https://www.globalreporting.org/standards/media/1036/gri-101-foundation-2016.pdf>
- GRI Standards. (2016b). *GRI 304: Biodiversity*. Globalreporting.org. <https://www.globalreporting.org/standards/media/1011/gri-304-biodiversity-2016.pdf>
- Guenther, E., Guenther, T., Schiemann, F., & Weber, G. (2016). Stakeholder Relevance for Reporting: Explanatory Factors of Carbon Disclosure. *Business & Society*, 55(3), 361-397. [www.doi.org/10.1177/0007650315575119](http://www.doi.org/10.1177/0007650315575119)
- Hahn, R., & Kühnen, M. (2013). Determinants of sustainability reporting: a review of results, trends, theory, and opportunities in an expanding field of research. *Journal of Cleaner Production*, 59, 5-21. [www.doi.org/10.1016/j.jclepro.2013.07.005](http://www.doi.org/10.1016/j.jclepro.2013.07.005)
- Hahn, R., & Lülfs, R. (2014). Legitimizing Negative Aspects in GRI-Oriented Sustainability Reporting: A Qualitative Analysis of Corporate Disclosure Strategies. *Journal of Business Ethics*, 123(3), 401-420. <https://doi.org/10.1007/s10551-013-1801-4>

- Hair Jr, J. F., Money, A. H., Samouel, P., & Page, M. (2016). *The Essentials of Business Research Methods*. Routledge. [www.doi.org/10.4324/9781315716862](http://www.doi.org/10.4324/9781315716862)
- Haque, F., & Jones, M. J. (2020). European firms' corporate biodiversity disclosures and board gender diversity from 2002 to 2016. *The British Accounting Review*, 52(2), 100893. [www.doi.org/10.1016/j.bar.2020.100893](http://www.doi.org/10.1016/j.bar.2020.100893)
- Hassan, A. M., Roberts, L., & Atkins, J. (2020). Exploring factors relating to extinction disclosures: What motivates companies to report on biodiversity and species protection? *Business Strategy and the Environment*, 29(3), 1419-1436. [www.doi.org/10.1002/bse.2442](http://www.doi.org/10.1002/bse.2442)
- Herold, D. M. (2018). Demystifying the link between institutional theory and stakeholder theory in sustainability reporting. *Economics, Management and Sustainability*, 3(2), 6-19. [www.doi.org/10.14254/jems.2018.3-2.1](http://www.doi.org/10.14254/jems.2018.3-2.1)
- Herzig, C., & Schaltegger, S. (2006). Corporate Sustainability Reporting. An Overview. *Sustainability Accounting and Reporting* (pp. 301-324). Springer Netherlands. [www.doi.org/10.1007/978-1-4020-4974-3\\_13](http://www.doi.org/10.1007/978-1-4020-4974-3_13)
- Houdet, J., Ding, H., Quétier, F., Addison, P., & Deshmukh, P. (2020). Adapting double-entry bookkeeping to renewable natural capital: An application to corporate net biodiversity impact accounting and disclosure. *Ecosystem Services*, 45, 101104. [www.doi.org/10.1016/j.ecoser.2020.101104](http://www.doi.org/10.1016/j.ecoser.2020.101104)
- Houdet, J., Trommetter, M., & Weber, J. (2012). Understanding changes in business strategies regarding biodiversity and ecosystem services. *Ecological Economics*, 73(1) <https://agris.fao.org/agris-search/search.do?recordID=FR2013101441>
- Hummel, K., & Schlick, C. (2016). The relationship between sustainability performance and sustainability disclosure – Reconciling voluntary disclosure theory and legitimacy theory. *Journal of Accounting and Public Policy*, 35(5), 455-476. [www.doi.org/10.1016/j.jaccpubpol.2016.06.001](http://www.doi.org/10.1016/j.jaccpubpol.2016.06.001)
- IPBES. (2019). *The Global Assessment Report of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services*. (). <https://doi.org/10.5281/zenodo.3553579>
- Jones, M. J., & Solomon, J. F. (2013). Problematizing accounting for biodiversity. *Accounting, Auditing, & Accountability*, 26(5), 668-687. [www.doi.org/10.1108/AAAJ-03-2013-1255](http://www.doi.org/10.1108/AAAJ-03-2013-1255)

- Khan, T. (2014). Kalimantan's biodiversity: developing accounting models to prevent its economic destruction. *Accounting, Auditing, & Accountability*, 27(1), 150-182. [www.doi.org/10.1108/AAAJ-07-2013-1392](http://www.doi.org/10.1108/AAAJ-07-2013-1392)
- Kolbe, R. H., & Burnett, M. S. (1991). Content-Analysis Research: An Examination of Applications with Directives for Improving Research Reliability and Objectivity. *The Journal of Consumer Research*, 18(2), 243-250. [www.doi.org/10.1086/209256](http://www.doi.org/10.1086/209256)
- Krause, M. S., & Matzdorf, B. (2019). The intention of companies to invest in biodiversity and ecosystem services credits through an online-marketplace. *Ecosystem Services*, 40, 101026. [www.doi.org/10.1016/j.ecoser.2019.101026](http://www.doi.org/10.1016/j.ecoser.2019.101026)
- Lamberton, G. (2005). Sustainability accounting – a brief history and conceptual framework. *Accounting Forum*, 29(1), 7-26. [www.doi.org/10.1016/j.acfor.2004.11.001](http://www.doi.org/10.1016/j.acfor.2004.11.001)
- Latapi Agudelo, M. A., Johannsdottir, L., & Davidsdottir, B. (2019). A literature review of the history and evolution of corporate social responsibility. *International Journal of Corporate Social Responsibility*, 4(1), 1-23. [www.doi.org/10.1186/s40991-018-0039-y](http://www.doi.org/10.1186/s40991-018-0039-y)
- Office for National Statistics. (2021). *How has lockdown changed our relationship with nature?* Ons.gov.uk. <https://www.ons.gov.uk/economy/environmentalaccounts/articles/howhaslockdownchangedourrelationshipwithnature/2021-04-26>
- Proposal for a directive of the European Parliament and of the Council amending Directive 2013/34/EU, Directive 2004/109/EC, Directive 2006/43/EC and Regulation (EU) No 537/2014, as regards corporate sustainability reporting COM/2021/189 final, (2021). <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:52021PC0189>
- Puroila, J., & Mäkelä, H. (2019). Matter of opinion - Exploring the socio-political nature of materiality disclosures in sustainability reporting. *Accounting, Auditing, & Accountability*, 32(4), 1043-1072. [www.doi.org/10.1108/AAAJ-11-2016-2788](http://www.doi.org/10.1108/AAAJ-11-2016-2788)
- Raar, J., Barut, M., & Azim, M. I. (2020). The challenge: Re-steering accountability concepts to incorporate biodiversity management and reporting. *Sustainability Accounting, Management and Policy Journal (Print)*, 11(1), 1-30. [www.doi.org/10.1108/SAMPJ-07-2018-0201](http://www.doi.org/10.1108/SAMPJ-07-2018-0201)

- Rimmel, G. (2021). Angry Birds - The Use of International Union for the Conservation of Nature Categories as Biodiversity Disclosures in Extinction Accounting. *Social and Environmental Accountability Journal*, 41(1-2), 98-123. [www.doi.org/10.1080/0969160X.2021.1881577](http://www.doi.org/10.1080/0969160X.2021.1881577)
- Roberts, L., Hassan, A., Elamer, A., & Nandy, M. (2021). Biodiversity and extinction accounting for sustainable development: A systematic literature review and future research directions. *Business Strategy and the Environment*, 30(1), 705-720. [www.doi.org/10.1002/bse.2649](http://www.doi.org/10.1002/bse.2649)
- Secretariat of the Convention on Biological Diversity. (2021). *Conference of the Parties (COP)*. Cbd.int. <https://www.cbd.int/cop/>
- Sjöland, C., Hägglund, T., Enetjärn, A., Möller, F. & Sundin, L. (2021). *Ecogain Biodiversity Index 2021*. Ecogain.se. [https://static1.squarespace.com/static/5ba6c49f9b8fe842619e4cf6/t/60dc255be0e51b1f321a576b/1625040265592/EBI\\_Eng\\_2021.pdf](https://static1.squarespace.com/static/5ba6c49f9b8fe842619e4cf6/t/60dc255be0e51b1f321a576b/1625040265592/EBI_Eng_2021.pdf)
- Skouloudis, A., Malesios, C., & Dimitrakopoulos, P. G. (2019). Corporate biodiversity accounting and reporting in mega-diverse countries: An examination of indicators disclosed in sustainability reports. *Ecological Indicators*, 98, 888-901. [www.doi.org/10.1016/j.ecolind.2018.11.060](http://www.doi.org/10.1016/j.ecolind.2018.11.060)
- Slaper, T. F., & Hall, T. J. (2011). The triple bottom line: what is it and how does it work? *Indiana Business Review*, 86(1), 4. <https://search.proquest.com/docview/861497991>
- Smith, A., Voß, J., & Grin, J. (2010). Innovation studies and sustainability transitions: The allure of the multi-level perspective and its challenges. *Research Policy*, 39(4), 435-448. [www.doi.org/10.1016/j.respol.2010.01.023](http://www.doi.org/10.1016/j.respol.2010.01.023)
- Steffen, W., Richardson, K., Rockström, J., Cornell, S. E., Fetzer, I., Bennett, E., Biggs, R., & Vries, d., W. (2015). Planetary boundaries: guiding human development on a changing planet. *Science (American Association for the Advancement of Science)*, 347(6223), 1259855. <http://dx.doi.org/10.1126/science.1259855>
- Stocker, F., Arruda, M. P., Mascena, K. M. C., & Boaventura, J. M. G. (2020). Stakeholder engagement in sustainability reporting: A classification model. *Corporate Social-Responsibility and Environmental Management*, 27(5), 2071-2080. [www.doi.org/10.1002/csr.1947](http://www.doi.org/10.1002/csr.1947)
- Talbot, D., & Boiral, O. (2021). Public organizations and biodiversity disclosure: Saving face to meet a legal obligation? *Business Strategy and the Environment*, 30(5), 2571-2586. [www.doi.org/10.1002/bse.2764](http://www.doi.org/10.1002/bse.2764)

- Vormedal, I., & Ruud, A. (2009). Sustainability reporting in Norway - an assessment of performance in the context of legal demands and socio-political drivers. *Business Strategy and the Environment*, 18(4), 207-222.  
[www.doi.org/10.1002/bse.560](http://www.doi.org/10.1002/bse.560)
- Weir, K. (2019). The logics of biodiversity accounting in the UK public sector. *Accounting Forum*, 43(3), 348-379.  
[www.doi.org/10.1080/01559982.2019.1605873](http://www.doi.org/10.1080/01559982.2019.1605873)
- Williams, N. S. G., McDonnell, M. J., & Seager, E. J. (2005). Factors influencing the loss of an endangered ecosystem in an urbanising landscape: a case study of native grasslands from Melbourne, Australia. *Landscape and Urban Planning*, 71(1), 35-49. [www.doi.org/10.1016/j.landurbplan.2004.01.006](http://www.doi.org/10.1016/j.landurbplan.2004.01.006)
- World Commission on Environment and Development. (1987). *Our common future*. Oxford: Oxford University Press.
- World Economic Forum. (2021). *The Global Risks Report 2021*.  
[https://www3.weforum.org/docs/WEF\\_The\\_Global\\_Risks\\_Report\\_2021.pdf](https://www3.weforum.org/docs/WEF_The_Global_Risks_Report_2021.pdf)
- World Wildlife Fund. (2020). *How many species are we losing?* Wwf.panda.org.  
[https://wwf.panda.org/discover/our\\_focus/biodiversity/biodiversity/](https://wwf.panda.org/discover/our_focus/biodiversity/biodiversity/)
- WWF. (2019). *Natural Capital and Organisations Strategies: An Overview of Available Tools*. Wwf.panda.org. [https://d2ouvy59p0dg6k.cloudfront.net/downloads/natural\\_capital\\_tools\\_guide\\_for\\_companies.pdf](https://d2ouvy59p0dg6k.cloudfront.net/downloads/natural_capital_tools_guide_for_companies.pdf)