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# Nature's Hidden Asset: Exploring Investors' Awareness of Biodiversity

A content analysis study on external communication reports of Swedish financial firms listed in the NasdaqOMX stock exchange in Stockholm

by

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This thesis studies the awareness of the Swedish financial sector on biodiversity and nature-related information by analyzing the external communication reports of firms listed on the NasdaqOMX stock exchange in Stockholm. The reports are analyzed with the help of a checklist and a Python script. The checklist covers key topics, including the importance of biodiversity in sustainable development, and the need for transparent reporting on nature-related impacts and risks. It addresses biodiversity conservation, threats, and the potential for biodiversity loss. To explain motivations for biodiversity-related information disclosure, a theoretical framework was built that is based on such theories as institutional, stakeholder, disclosure theories, legitimacy theory and accountability. The findings signal that investors are more inclined to refer to biodiversity and nature-related impacts in their reports in order to comply with the institutional regulatory pressure, uphold their legitimacy in the market by fostering positive engagement with stakeholders, and manage their risk portfolio effectively.

**Keywords:** biodiversity; biodiversity loss; nature-related impacts; non-financial reporting; investors; financial industry, TNFD.

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# List of Abbreviations

EFRAG	European Financial Reporting Advisory Group
GBF	Global Biodiversity Framework
GRI	Global Reporting Initiative
CSRD	Corporate Sustainability Reporting Directive
IFC	International Finance Corporation
IFRS	International Financial Reporting Standards
IPBES	Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services
NFRD	Non-Financial Reporting Directive
SASB	Sustainability Accounting Standards Board
SFDR	Sustainable Finance Disclosure Regulation
TNFD	Taskforce on Nature-related Financial Disclosures
UN CBD	United Nations Convention on Biological Diversity
UN FCCC	United Nations Framework Convention on Climate Change
WWF	World Wildlife Fund



# 1 Introduction

This chapter introduces the topic of the study, highlights the motivation behind the research aim and scope, and defines the research problem and research questions. In addition, it presents the data applied in the study with the main results and contributions listed. Finally, section 1.4 of this chapter contains the outline of the study.

## 1.1 Research Problem

### 1.1.1 Biodiversity and Nature-related Information Disclosure

Nowadays, the world is noticing an increasing number of regulatory requirements on global and local levels accompanied by rising stakeholder pressure to disclose nature- and biodiversity-related impacts of economic agents. At various levels, including the UN and the EU, people are witnessing more attention to the topic of biodiversity manifested in such academic and policy documents as the IPBES Global Assessment Report (2019), the Dasgupta Review (2021), the UN Convention on Biodiversity, CBD (2022), and regulatory guidelines as the EU Sustainable Finance Disclosure Regulation (SFDR) and the recently enacted EU Corporate Sustainable Reporting Directive (CSRD). Naturally, those initiatives and similar to them, mandatorily or voluntarily, require companies to disclose sustainability-related information to provide stakeholders, including investors, with the necessary access to the information they might require. For instance, this information might be crucial for investors when estimating their investment risks. In addition to the external requirements from stakeholders and regulatory landscape pressure, companies decide to disclose their sustainability-related impacts as they seek to add legitimacy to their business activities by employing transparent corporate reporting procedures, effectively conveying them to the public as well as by complying with external norms and industry standards (Suchman, 1995). Therefore, sustainability reporting has transformed into a legitimizing tool within the paradigm of the socially established contract between businesses and their stakeholders (Deegan, 2002) as well as a mechanism to control stakeholder pressure (Fernandez-Feijoo et al., 2014). Such information disclosures allow companies to prove their accountability by accepting their responsibility in the market and fostering their relationship with stakeholders (Lerner & Tetlock, 1999; Vance, Lowry & Eggett, 2013).

One may conclude there are various incentives why companies decide to disclose their sustainability-related information. Not surprisingly, in the past decade, sustainability reporting has significantly evolved. However, with stakeholder engagement playing a considerable role in what companies decide to disclose, one specific stakeholder group stands out. Investors have a genuinely important role in the quality of the content when companies formulate their

sustainability strategies and publish non-financial reports or sustainability-related sections in annual reports.

### 1.1.2 Investors: Role and Perspective

As stated previously, investors, also referred to as financial institutions or financial firms in this study, play a significant role in redirecting the financial flows to ensure a successful transition to a more sustainable future (Weber, 2014). At the same time, similarly to businesses, investors must comply with a set of internal and external factors to ensure their successful presence in the market. This stakeholder group highly depends on a clear, transparent and comprehensive disclosure of all kinds of information that may affect their investment risk portfolio. In addition, investors can trigger a so-called trickle-down effect by expecting companies to meet certain reporting requirements.

Nowadays, investors are more worried about the potential financial losses that they have to face and that are brought about by climate change (Bos & Gupta, 2019 cited in Andersson and Arvidsson, 2022). Interestingly, climate risks are growing in their impacts and become increasingly included in the near-time and immediate timelines by different large financial institutions (BlackRock, 2023). At the same time, while the business case for addressing climate change and disclosing climate-related information is now widely accepted, the business case for addressing biodiversity, specifically by financial institutions, has received far less attention (Mulder, 2007).

Based on the sections above, the *research problem* lies in the imbalance between extensive focus on sustainability-related information disclosure by companies and limited knowledge regarding biodiversity-related information disclosure and the role and position of the financial sector in this area. This research gap inhibits the assessment of biodiversity reporting frameworks, evaluation of disclosed information quality, and understanding of investors' awareness and attitudes toward biodiversity disclosures. Bridging this gap is crucial for effective biodiversity reporting and integrating biodiversity considerations into investment strategies and policies.

## 1.2 Research Aim, Scope and Delimitations

This research focuses on one of the least studied concerning biodiversity stakeholder groups, i.e., investors, and intends to explore their awareness of the current agenda of the biodiversity loss crisis. Since financial institutions are regarded as one of the key stakeholders for many companies and key actors in sustainability transition, their decisions strongly affect capital flows and reporting requirements for companies as well as the quality and structure of the information that companies disclose. The awareness of the financial sector institutions on the impacts on nature, ecosystems and biodiversity has not been widely reviewed, which can be also attributed to the fact that the overall agenda has usually been more climate-focused and

no sufficient accounting mechanisms in the field have been implemented (Jones & Solomon, 2013). What is more, until recently, investors failed to account for biodiversity and nature-related impacts in their decision-making process due to delimitations they face in the material accounting methods as measurement methods developed in the non-accounting sciences are based on more than narrowly defined economic values that are needed to be incorporated into biodiversity reporting (Khan, 2014). However, as sustained in Houdet et al. (2012), for cost-benefit analyses and making biodiversity an essential component of businesses' management accounting strategy, it has been stated that quantifying the marginal economic worth of biodiversity and ecosystem services is essential. It is noted that these facts imply a lack of standardized techniques for estimating biodiversity impacts and biodiversity accounting in the financial sector.

Nevertheless, in recent years, there has been growing recognition within the financial sector about the significant impacts it has on nature, ecosystems, and biodiversity. It has become of urgent importance to signal the awareness of the financial sector of biodiversity and nature-related impacts, which stems from the material risk assessment practices. Since climate crisis is now being recognized as an investment risk (Fink, 2020 in Arvidsson & Dumay, 2022), financial institutions, such as banks, asset managers, and insurance companies, have started to acknowledge the material risks that ecosystem degradation and biodiversity loss pose to their portfolios and long-term sustainability, for instance, these risks may include direct exposure to sectors with high environmental footprints, reputational risks, and potential regulatory changes.

Additionally, regulatory bodies in various countries are starting to mandate greater transparency and disclosure of environmental risks. For instance, the European Union's Sustainable Finance Disclosure Regulation (SFDR) requires financial market participants and advisors to disclose the integration of sustainability risks, including positive and negative environmental risks, into their investment decision-making processes. Besides, to support investors in their awareness of sustainability-related impacts, there has been a rise in initiatives and frameworks aimed at integrating environmental considerations into financial decision-making, for instance, the Task Force on Climate-related Financial Disclosures (TCFD), the Equator Principles, the Natural Capital Finance Alliance (NCFA), and the Global Alliance for Banking on Values (GABV). However, it is important to note that those initiatives incorporate different types of sustainability-related risks, including not only environmental but social ones as well.

While progress has been made, there is still room for improvement. Many financial institutions are in the early stages of incorporating nature, ecosystem, and biodiversity considerations into their risk management frameworks and investment strategies. With the growing risk-related considerations in the financial sector and the strengthening legislation like the newly adopted Corporate Sustainability Reporting Directive (CSRD) that has substituted the EU's Non-Financial Reporting Directive (NFRD) and has resulted in a more strengthened sustainability-related information disclosure by companies, including the protection and restoration of biodiversity and ecosystems, the *aim* of this research is therefore to gain more understanding on the awareness of investors of biodiversity and nature-related impacts of their financial decisions. In addition to aiding further research, collaboration, and data availability, increasing awareness within the financial sector about the impacts on nature,

ecosystems, and biodiversity will contribute to the improvement of policies aimed at transparent and feasible information disclosure. This, in turn, will provide companies and legislative bodies with a better understanding of the financial industry's perspective on biodiversity loss and capital mobilization to address this crisis. It will help foster a more informed and effective approach toward mitigating environmental risks and promoting sustainable practices within the financial sector.

In order to assess the awareness of the Swedish financial sector on biodiversity and nature-related impacts, the following research questions have been devised:

*RQ1: Do Swedish financial firms refer to biodiversity and nature-related impacts in their external communication reports?*

*RQ2: Have Swedish financial firms increased their references to biodiversity and nature-related impacts in their external communication reports?*

In addition, it is of interest to study the possible reasons behind the Swedish financial firms' decisions to refer to biodiversity-relevant information in their reports. Therefore, the third research is as follows:

*RQ3: Why do Swedish financial firms decide to include information related to biodiversity and nature-related impacts in their external communication reports?*

The scope of this study contains the analysis of 71 Annual, Sustainability and Annual and Sustainability reports from 2019 and 2021 years of 36 Swedish financial firms listed on the NasdaqOMX stock exchange in Stockholm: <https://www.nasdaqomxnordic.com/shares/listed-companies/stockholm> Since the results of the study are closely connected to the sample, there are consequently certain delimitations, namely geographical space, time constraints, data source and digital requirements of the analyzing tool. First, only Swedish financial firms are included in the study. Sweden was chosen as a country that has pioneered sustainable system-wide solutions and has allowed for the integration of different theoretical frameworks, namely institutional, stakeholder, legitimacy and other theories specified in Chapter 3. Furthermore, only firms listed on the NasdaqOMX website are included in the sample. Additionally, the list of the firms has been revised in order to include only those financial companies that have their reports openly shared as pdf-files, which is required by the Python scripts. The script's purpose is to aid in keyword-based searches that are based on the self-designed checklist. This checklist contains questions that focus on references to biodiversity and nature-related information. The script facilitates searching for possible explanations regarding the inclusion or avoidance of biodiversity-relevant information disclosure by Swedish investors. Moreover, when the keyword search is carried out, not all keywords selected might match the terminology used by investors in their reports. Following this fact, there is always a possibility that not all information is thoroughly collected while analyzing the data, which can be emphasized as an additional delimitation of the employed analyzing tool. To mitigate the potential negative impact of this delimitation, the author referred to external biodiversity-

relevant resources, policies, and scientific and academic studies. Importantly, the results are affected by the time constraints of the research, as only reports from 2019 and 2021 are studied. The choice of those years is explained by the necessity to study the evolution of investors' awareness of biodiversity, provided the topic has been relatively new in the reporting frameworks, so earlier periods had to be excluded. Moreover, it was decided to exclude the 2020 year due to the global domination of the COVID-19 topic in the information space. Finally, as data sources, only firms' external communication reports are applied because this source allows to assess how firms communicate their ideas and policies openly. At the same time, this method does not allow to take a closer look at the internal *de facto* processes in firms when working with biodiversity and nature-related information disclosure.

### 1.3 Contribution

The present research contributes to the field of corporate non-financial information disclosure by exploring a more specific area of biodiversity-related information disclosure and the theories that explain why companies decide to report on sustainability-related topics. In addition, its focus on the financial sector provides more knowledge in regard to investors' attitudes concerning biodiversity-relevant information disclosure. As sustained by the findings, Swedish investors signal their awareness of biodiversity and nature-related impacts and there are different reasons behind it. Firstly, it has been observed to be primarily influenced by the institutional context, specifically the regulatory pressure. This demonstrates that financial institutions are starting to actively embrace nature and biodiversity in their activities in the current institutional landscape of stricter environmental regulations and various voluntary and mandatory reporting frameworks, even though the overall approach still prioritizes climate change. The lack of common reporting standards makes it impossible to develop a single standard for the disclosure of data pertaining to biodiversity and the natural world. This finding supports the institutional theory and offers additional proof that institutional context is essential in guaranteeing that all system participants can function steadily within the same structures and rules.

Moreover, financial companies are interested in referencing biodiversity-related information and have increased their use of it due to stakeholder engagement and the desire of the companies to maintain their legitimacy and credibility in the market. Financial firms are more likely to interact with NGOs and civil society on biodiversity-related issues, according to the research's findings, which is consistent with the legitimacy theory's hypotheses that investors may be attempting to maintain their legitimacy in the eyes of various stakeholders, including the general public.

Eventually, financial institutions decide to integrate biodiversity and nature-related information in their external communication reports to secure more data that can potentially change their risk portfolio and hence have a positive impact on future capital flows. These efforts can be seen in investors' increasing readiness to consider sustainability-related concerns in risk assessments, as well as their increasing adoption of vocabulary more closely tied to biodiversity. Financial institutions try to increase market awareness of biodiversity-

related topics by including physical and transactional risks in their external reports in order to reduce the potential transaction costs that could result from informational imbalances between the system's agents.

## 1.4 Outline of the Thesis

The present research consists of six chapters in total. The first chapter discusses the background of the research problem, introduces the reader to the aim and scope of the research and lists the research questions. The second chapter provides the research context by exploring the global situation related to biodiversity loss and connecting this global picture with the role of the financial sector and corporate information disclosure. Chapter 3 lists the theoretical frameworks that are applied in order to explain the factors that stand behind investors' non-financial information disclosure and presents the previous research that explores the nature of sustainability-related information reporting. Chapter 4 describes the applied data by arguing for its representativity, reliability and validity and explains the data selection process. At the same time, data delimitations are highlighted. The same chapter presents the methodology of the research, presents the tools for information analysis created by the author and discusses the possible delimitations of the chosen method. The fifth chapter presents the empirical analysis of the findings and links them to the applied theoretical frameworks to provide answers to the research questions. Finally, Chapter 6 discusses the conclusions of the research, addresses the research questions, summarizes the links between the present research and previous knowledge on the topic and provides suggestions for further research. At the end of the text, the reader can find references applied in the thesis and find appendices A, B and C that include information on the methodological tools, data selection and analysis results respectively.



## 2 Background

Currently, there is a growing concern over biodiversity conservation in economic activities. Agents at different levels try to increase overall awareness of this issue and define possible actions to minimize any negative impacts on nature and biodiversity and, where possible, boost feasible positive impacts. This chapter explores the research background by reviewing the global state-of-art regarding the biodiversity crisis and the existing challenges and remedies connected to this issue. In addition, by reviewing the existing sustainability reporting agenda and its biodiversity-related aspect, the chapter explains the role of financial institutions, and hence argues for the necessity to explore the perspective of the investors as a key stakeholder group and key actors in the sustainability transition.

### 2.1.1 The Dire State of Nature

Our planet is a beautiful yet rather complex system to live in. Quite often one can hear “There is no planet B” (United Nations, 2014); at the same time, the rate at which humanity continues exploiting the planet’s resources to accommodate the constantly increasing demands has raised strong concerns. Following the concept of ecological economics that claims human socio-economic development is contained within the planet’s environmental system, there is increasingly alarming evidence of humans exceeding the system’s constraints. According to the planetary boundaries framework (Rockström et al., 2009; Steffen et al., 2015), see Fig. 1, the planet’s ecosystems can meet the needs of humanity until a certain threshold, after which it becomes more likely that crossing these boundaries will result in significant, sudden, or irreversible environmental changes (Steffen et al 2015 cited in Stockholm Resilience Centre, n.d.).

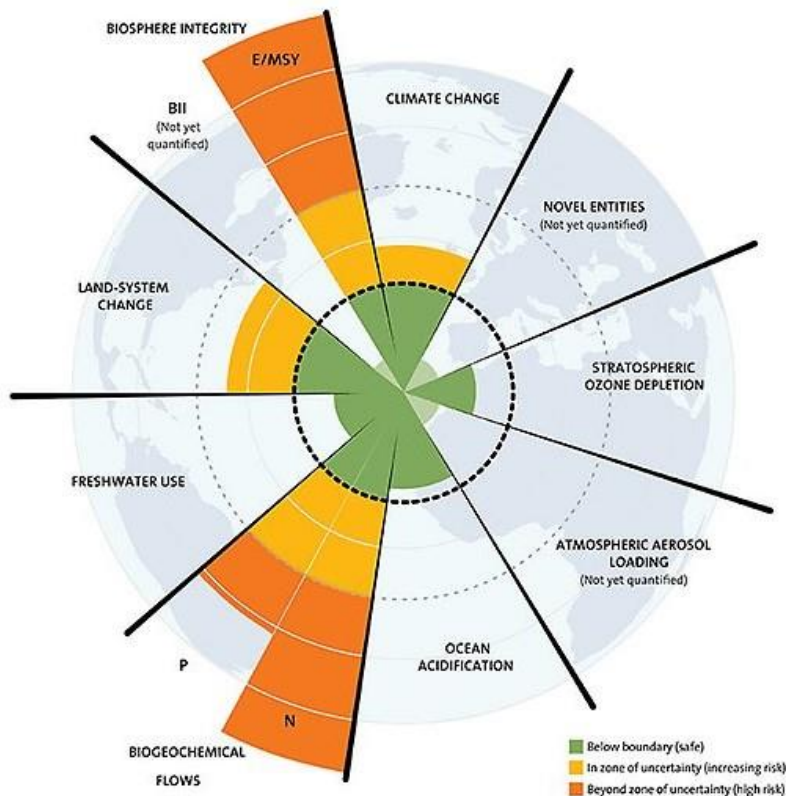


Figure 1. The planetary boundaries framework.

Source: Steffen et al 2015 cited in Stockholm Resilience Centre, n.d.

The nine segments represent the nine planetary spheres human society highly depends on for its future socio-economic development. One of the most affected segments is the biosphere integrity. In the past 50 years, human-caused ecosystem changes have occurred more quickly than at any other time in human history, raising the possibility of sudden and irreversible alterations (Stockholm Resilience Centre, n.d.) Various studies suggest that one of the biggest hazards to our planet and us as humanity is biodiversity loss (Roberts et al., 2021; Kulta, 2022). The World Wildlife Fund (2020) categorizes the current era as the sixth mass extinction. Climate change continues to be a crucial and harmful source of ecosystem change, along with the fact that human actions connected with overexploitation of natural resources and natural ecosystem services, are the leading driver of biodiversity loss.

The existing ‘business as usual’ approach in the economic dimension of our society is regarded as one of the crucial causes of the current biodiversity crisis and is barely acceptable. If the world is to stop the accelerating loss of biodiversity, it must radically alter how society evaluates economic success. A rather clear reasoning for this argument is presented in the famous Dasgupta Review on the Economics of Biodiversity (2021). It emphasizes the global crisis facing the natural world and the need for collaboration among all nations to address it. The author of the report highlights that humans are completely dependent on the natural world for survival but are damaging it so severely that many of its natural systems are on the verge of collapse. Therefore, by placing considerably more demands on nature, our society exposes

itself. In addition, the report addresses the issue of biodiversity loss by framing it in the context of economics and providing recommendations for change that integrate ecological and economic considerations. Those considerations are crucial if we wish to reframe our economic system which has proved to be increasingly flawed and unsustainable. Therefore, to achieve sustainable development practices, humanity needs to change the way it measures economic success and include the value of nature in its decisions (Dasgupta, 2021). However, there are various ways of assessing nature's value. As sustained by the report, the value of nature is defined through the concept of accounting prices, which reflect an accommodation between economic futures that are both socially desirable and socio-ecologically possible. Valuation methods involve estimating the use value of nature by determining the productivity of its processes, which involves a blend of ecological and economic reasoning. At the same time, it is important to note that the intrinsic worth of nature, perhaps even moral worth, cannot be solely measured through economic means and should also be recognized.

### 2.1.2 Challenges and Remedies

Following the afore-described ideas, one can conclude that nature and biodiversity are of utmost importance for humans' economic, social and moral development. The constantly increasing demands have caused growing pressure on nature and led to the existing extinction crisis, meaning we are on the verge of exceeding the planet's boundaries or we have already seriously exceeded some of them. Not surprisingly, biodiversity loss and ecosystem collapse are seen as significant concerns over the next decade, rising to 4th place in The Global Risks Report 2023 published by the World Economic Forum (2023). Furthermore, the report states that the main challenge associated with the biodiversity crisis is connected to the fact that over half of the world's economic output is estimated to be dependent on nature, and the collapse of ecosystems will have far-reaching economic and societal consequences. These include an increase in infectious diseases, a decline in crop yields and nutritional value, increasing water stress worsening potentially violent conflict, the loss of livelihoods reliant on food systems and nature-based services like pollination, and increasingly severe floods, sea-level rises, and erosion caused by the degrading of natural flood protection systems. Additionally, the impacts of climate change on ecosystems can further constrain their mitigation effects since increased severity and frequency of extreme weather events are already causing mass mortality events, while sea level rises. Admittedly, the global perspective on the biodiversity crisis is rather complex, as it refers not only to the environmental boundaries of our planet but also to the economic boundaries of our socioeconomic systems. The risks associated with biodiversity loss, such as reductions in the productivity and resilience of ecosystems along supply chains, have significant macroeconomic and financial implications (Dasgupta, 2021).

Luckily, the global community has started to the urgency of the issues associated with the biodiversity loss crisis and has started to act on various levels. One of the examples is the UN Framework Convention on Climate Change (UNFCCC) and the UN Convention on Biological Diversity (CBD), both of which were formed at the 1992 Rio Earth Summit. Those initiatives have established provisions that address biodiversity loss on a global scale. Currently, the new overarching framework has been designed to tackle the global biodiversity

loss issue, namely the Kunming-Montreal Global Biodiversity Framework (GBF). Its overarching goal is to halt and reverse nature loss by 2030, and it contains four overarching goals to be achieved by 2050, underpinned by 23 action-oriented targets for 2030 (CBD, 2023).

Changes in policies slowly but surely have come into life at the national level. For instance, the National Nature Assessment and the Natural Capital Account are two new programs that have been recently introduced in the United States. The ultimate goal is to ensure secure access to information that should help in making decisions about how money for ecosystem restoration could protect endangered species, help the economy rebound, and redress injustices against populations with limited access to the environment (White House, 2022). Furthermore, as research shows, account boundaries at the national level should be widened to encompass ecosystem assets. Additionally, as changes in the state or quality of assets may be more significant than changes in quantity, accounting for ecosystem assets may become of the utmost importance (Fenichel & Obst, 2019).

At the corporate level, the majority of businesses, investors, and other financial institutions fall short of accounting for nature-related risks fully and appropriately although approximately US\$40 trillion in economic value generation is significantly or substantially dependent on nature (TNFD, 2022). Companies are also becoming more aware of their close relationship with biodiversity, which is frequently described as the idea of "mutual dependency": given that business and economic growth are largely responsible for biodiversity loss (e.g., habitat changes for roads and markets and polluting company outputs) (Houdet et al., 2012; Khan, 2014), biodiversity loss poses risks to the business, such as changes in resource availability and ecological infrastructure and hence becomes a fundamental component of business survival (IFC, 2023). In order to succeed in their sustainability transition, companies decide to disclose their sustainability-relevant information. Sustainability reporting has become more prevalent in many global economies (Faisal et al., 2012), with the rate of sustainability reporting currently reaching around 80% worldwide (KPMG, 2020). Companies are expected to include different data related to their long-term strategies and material impacts, enhancing transparency about businesses' commitment to sustainable development by accurately and credibly describing their impacts on the economy, environment, and people (GRI, 2023). In this regard, the material impacts fall within the scope of biodiversity-related information disclosure, however, frequently, those are not categorized as biodiversity-related indicators and are kept as material assessment practices. Based on industries' specifications, such reporting frameworks as Global Reporting Initiative (GRI) and Sustainability Accounting Standards Board (SASB) provide the applicable material topics that a company needs to include in their sustainability report in order to deliver exhaustive information to their stakeholders. Businesses, especially if they operate within industries that highly rely on ecosystem services, e.g. Industrials, Manufacturing & Metals, Mining, Oil & Gas, Construction & Materials are more incentivized to account for their impacts (KPMG, 2020) to ensure their viability on the market and understand the risks associated with the long-term development. Interestingly, companies from high- and low-profile industries have different records of disclosing information. Low-profile industries are those with a lesser danger of being criticized in concerns of corporate social responsibility, while high-profile sectors are those with consumer visibility, a high level of political risk, or concentrated fierce competition (Jennifer Ho & Taylor, 2007; Reverte,

2009). The oil and gas industry, medicines, and mining are a few examples of high-profile businesses. Low-profile sectors can include textiles, chemicals, and machinery production. As sustained by Faisal et al. (2012), sustainability reporting practices vary across high- and low-profile industries. As a result of their societal influence, businesses in high-profile industries may feel a stronger need to increase their accountability and exposure. Therefore, they tend to provide more sustainability information than businesses in low-profile industries. Furthermore, more sustainability communication is linked to the inclusion of voluntary assurance statements in sustainability reports. To conclude, the disclosure of sustainability-relevant information at the corporate level plays an important role both for companies, their stakeholders, and the future transition towards more sustainable business practices.

### 2.1.3 The Role of Financial Institutions

Investors are uniquely equipped to help mitigate risks associated with the biodiversity loss crisis and push forward the low-carbon transition. The financial market can play a significant role in biodiversity conservation by providing transition finance through impact investing (OECD, 2022). Private sector investment is increasingly being advocated to address the shortfall in for-profit conservation finance, which is severely underfunded (Thompson, 2023). The use of bonds for biodiversity conservation is becoming significant, with impact bonds being particularly suited to conservation impacts that are difficult to commodify and that have historically been funded by donors (Huwylar et al., 2016).

The importance of the financial sector in addressing the crisis is shared by global actors as well. For instance, the target group of the afore-described Kunming-Montreal Global Biodiversity Framework is financial institutions. Since financial institutions have a critical role in ensuring the stability of the economy, the GBF offers financial firms a foundation for coordinating their cash flows aiming at biodiversity preservation. The GBF's goals include policies and rules for balancing private and public financial flows, regular monitoring, assessment, and disclosure of risks, dependencies, and impacts on biodiversity, raising the level of financial resources, and promoting creative financial mechanisms like payments for ecosystem services, green bonds, biodiversity offsets and credits, and benefit-sharing mechanisms (UNEP, 2023). By incorporating biodiversity into their investment decision-making, investing in cutting-edge financial solutions, and revealing nature-related dependencies, impacts, risks, and opportunities, financial institutions may help the accomplishment of the GBF objectives.

Financial firms have indeed a strong impact on capital flows and mobilization for sustainable transition, thus, it is of crucial importance to explore their awareness of the biodiversity loss crisis and nature-related impacts. However, the current research has been rather focused on the corporate disclosures of companies from different industries (van Liempd & Busch, 2013; Usher & Maroun, 2018; Andersson & Arvidsson, 2022; Sun & Lange, 2023). At the same time, different studies highlight the importance of investors in the context of corporate reporting (Ruiz et al., 2021; Velte, 2023) as companies are in the first place affected by capital flows and only then by the overarching issues like climate change (Arvidsson & Dumay, 2022). Therefore, this study is situated in the context of the pressing need to transform the whole socio-economic landscape that has led to a highly urgent state with the biodiversity loss

crisis. Moreover, with investors playing a genuinely crucial role on the path to a successful sustainable transition, this research contributes to the existing body of knowledge as it explores the awareness of Swedish publicly listed investors on biodiversity-related matters in sustainability reporting and supports future efforts of establishing harmonized policies to combat the biodiversity loss crisis with optimized capital flows.

# 3 Theory and Previous Research

This chapter provides insights into the theoretical frameworks and the relationship of the current study with previous research. Currently, most of the existing research is highly focused on companies' corporate reporting and sustainability-related information disclosure while this thesis aims to explore the perspective of investors on the disclosure of biodiversity and nature-related information. The Institutional, Stakeholder, Disclosure, Legitimacy and Accountability theories are applied to investigate the reasons why this type of information is considered by Swedish financial firms, which provides a clearer understanding of the motivations for investors to prioritize biodiversity and nature-related information. Additionally, it suggests policy ideas that target biodiversity preservation and seek to bring about transformative changes in the socio-economic dimension, with the goal of halting and potentially restoring biodiversity loss.

## 3.1 Theoretical Framework

This section aims to build a theoretical framework that can give an understanding of why information disclosure takes place and how biodiversity-related information disclosure relates to information disclosure in general. Since this research is centered around the report study and attempts to explain the motivations behind why financial firms decide to include biodiversity-related information in their annual or sustainability reports, it is highly applicable to investigate several theoretical approaches that contextualize the reasons behind corporate reporting.

### 3.1.1 Institutional Theory

Institutional theory was developed by North (1971, 2018) and explains the roles that social, political, and economic systems have in how agents, in the case of this study businesses and investors, function and acquire legitimacy. In other words, institutions represent the structures that are imposed on agents to ensure they all can operate simultaneously in some system. According to Peters et al. (1999), an institution is a formal or informal structural, sociological, or political phenomenon that extends beyond the level of the individual, is based on ideals that are universal, has some stability, and influences behavior. Greenwood et al. (2015) sustain there are two types of institutional pressure that affect institutional changes, namely enforced changes and mimetic changes, meaning rules can be introduced by enforcement or can be mimicked by the agents inside the system to copy successful practices. As highlighted by North (2018), institutions consist of official laws, unwritten regulations (such as customs and self-imposed codes of conduct), and mechanisms for their effective implementation. In a

more generalized way, one may say that companies and investors are players, and institutions set the game's rules. Given the players' ultimate goal of profit maximization and business regulation, the "player" will work to develop the skills and knowledge that will increase their chances of surviving in a competitive environment. As argued by North (1971), all transaction costs are a result of informational imbalances between the agents within some system also referred to as parties to an exchange, which connects this framework to the disclosure theories presented later in the section. Political and economic institutions' primary role is to minimize these costs because they pose a significant threat to economic growth.

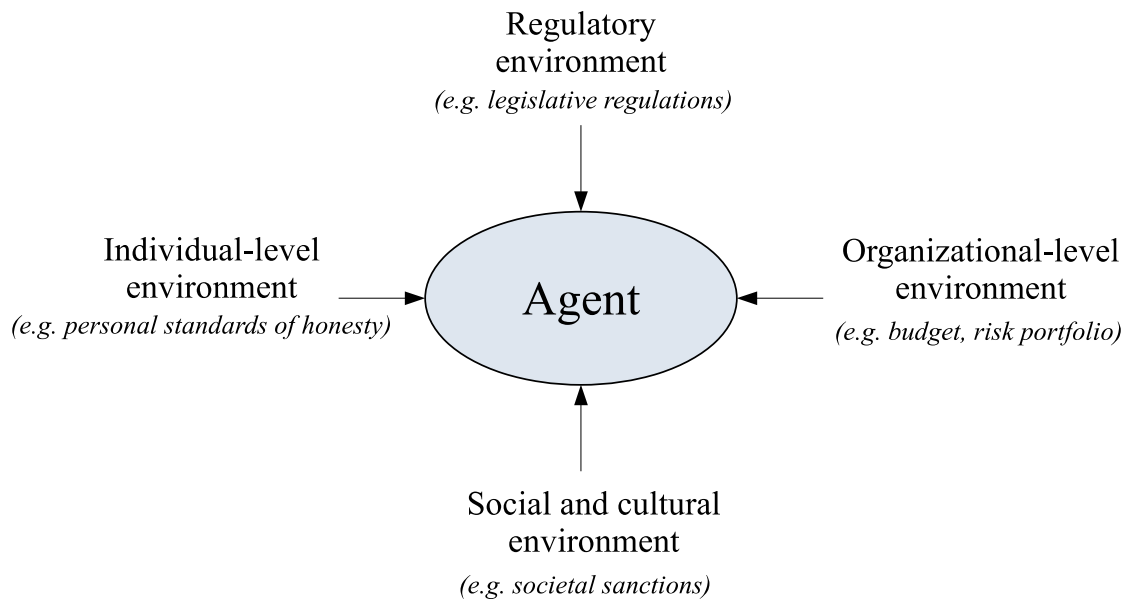


Figure 2. Institutional Theory.  
Source: Author's own adaptation based on North (2018).

### 3.1.2 Stakeholder Theory

Stakeholder theory is commonly applied in management studies and suggests that an organization should not only meet but maximize its value to each of its stakeholders. Stakeholder theory and corporate reporting are closely associated since stakeholders are everyone who has the potential to influence or be affected by a firm in return (Freeman, 2010). As Freeman et al. (2004) highlight, the focus of stakeholder theory is defined by two basic concerns. First, the purpose of the firm is to be agreed on. This enables managers to describe how their main stakeholders share a common understanding of the value they provide and drives the business ahead, enabling it to produce excellent performance as measured by both its goals and financial market indicators. Second, the responsibility of the management to stakeholders is to be defined. This forces management teams to clearly state their preferred business methods, in particular, the kinds of connections they need to establish with their stakeholders in order to fulfill their objectives.

Logically, corporate reporting is closely connected to stakeholder theory as this is the process of a firm disclosing information about its interactions with stakeholders (Parmar et al., 2010).



Furthermore, stakeholder theory has been applied to forecast the level of corporate social disclosure, leading to the conclusion that the degree of disclosure is correlated with stakeholder power and needs, strategic stance, and economic performance (Lubatkin, 2007). All in all, the stakeholder perspective plays a crucial role in corporate reporting practices and offers an effective framework for analyzing the relationship between an agent (a company) and its stakeholders.

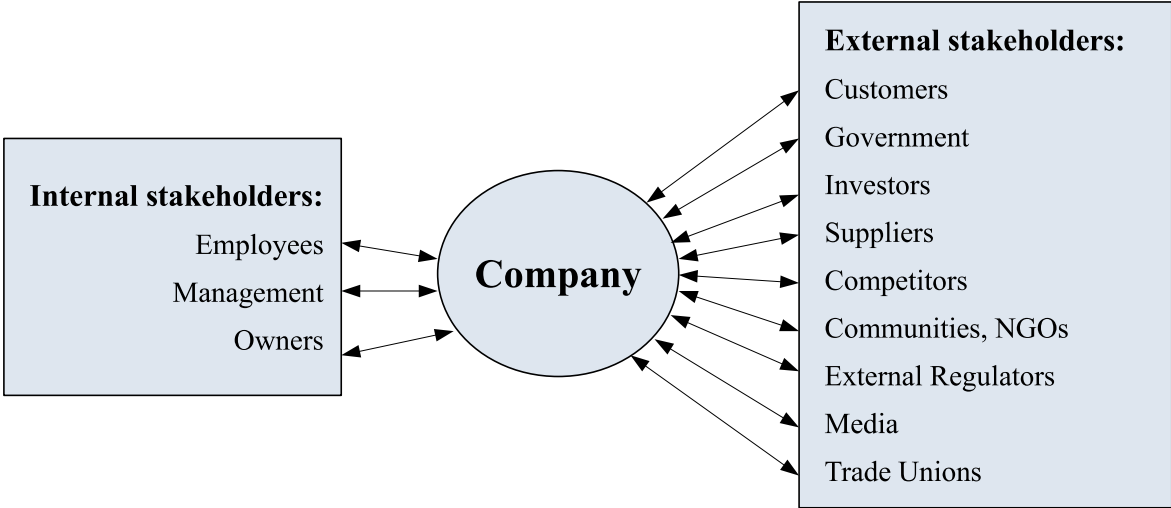


Figure 3. Stakeholder Theory.  
 Source: Author’s own adaptation based on Freeman (2004; 2010).

3.1.3 Disclosure Theories

Disclosure theories attempt to explain the reasons why companies decide to disclose any information related to their operations. In their disclosure theories overview, Urquiza et al. (2010) sustain that businesses are willing to share more information when the perceived benefits outweigh the costs in a certain situation. Given that disclosure is a multidimensional concept that incorporates various views and attributes, which links this section back to the stakeholder theory, it is expected that the factors that determine how much information is disclosed will vary depending on the priority views and attributes. For instance, based on cost/benefit correlation, companies will decide themselves what is more crucial for them, e.g. information quality, disclosure quantity, both or none. Theoretical contributions from the agency theory, signaling theory, and political process theory serve as the foundation for disclosure theories.

According to agency theory (Jensen and Meckling, 1976), principal-agent challenges are situations when a principal (such as an asset owner) and the agent (such as an asset manager) do not have the same incentives, interests or information. While the differences in incentives and interests between the two parties are likely to be a common feature of these types of transactions, the asymmetry of information makes it possible for the agent to take advantage of the principal's inferior knowledge, thus, causing agency costs. As a result, it asserts that conflicts are to be expected when a principal and an agent in a corporation have asymmetrical

and imperfect information. Larger businesses have more contracts; thus, it is expected of them to provide more voluntary information in order to cut agency costs. Disclosure helps to reduce the agency costs that arise from more diversified ownership.

Another disclosure theory, signaling theory, argues that asymmetric information between agents leads to adverse selection. Therefore, companies voluntarily provide information, sending signals to the market, to prevent this entanglement. Additionally, businesses with a high level of profitability will be more likely to release more information to the market in order to boost investor confidence and avoid undervaluing their stock (Singhvi & Desai, 1971). To sum up, size, profitability, and growth are elements that affect the choice to voluntarily reveal in order to prevent adverse selection in the market.

Finally, political process theory suggests that judgments made by regulators are dependent on the data provided by companies. Companies voluntarily release information to reduce the political costs of being misjudged. Size and profitability are incentives for companies to reveal more information to reduce these costs (Watts and Zimmerman, 1986). A firm's large revenues should be justified by greater information disclosure in order to escape legal obligations.

#### 3.1.4 Legitimacy Theory and Accountability

Legitimacy theory discusses how companies manage and uphold their credibility as legitimate in the eyes of a variety of stakeholders, including clients, shareholders, and the general public (Suchman, 1995). Additionally, as sustained by Lombardi et al. (2022), companies tend to disclose information to secure social approval and maintain their social legitimacy. Organizations view legitimacy as a key resource that may be managed through institutional or strategic approaches, where institutional approaches entail adhering to external norms and expectations, such as industry standards or governmental rules, and strategic approaches require proactive actions and increased accountability efforts, such as participating in charitable endeavors, engaging socially and environmentally responsible policies (Suchman, 1995). In addition, legitimacy facilitates accountability improvement. By increased legitimacy, companies fulfill their prospective duty to explain one's acts to a third party who has the authority to judge them, and to impose possible rewards or punishments (Vance et al., 2015). Interestingly, companies from high-profile industries are more likely to be incentivized to disclose more information. This might be explained by their interest to uphold their legitimacy in the market as well as avoid political risks and advert market selection ignited by fierce competition (Jennifer Ho & Taylor, 2007; Reverte, 2009).

#### 3.1.5 Theoretical Framework in the Context of Biodiversity-Related Information Disclosure

Contextualizing the theoretical framework regarding biodiversity-related information disclosure, the aforementioned theories provide insights into the investors' decision-making processes. In the context of institutional theory, financial firms may refer to biodiversity in

their non-financial information disclosures to conform to institutional expectations and norms regarding environmental responsibility. They may do so to signal their adherence to sustainable practices, gain legitimacy, and align with industry best practices.

Following Disclosure theories, such as the agency, signaling and political process theories, investors might first and foremost disclose information as a strategic decision to manage information asymmetry between themselves and stakeholders. By providing transparency about their nature-related impact and efforts to preserve biodiversity, financial firms aim to reduce information asymmetry, build trust, and enhance their reputation with stakeholders. In addition, as sustained by the political process theory, investors might seek to influence regulators in order to create a more conducive regulatory landscape for themselves.

Stakeholder theory emphasizes the significance of various stakeholder groups in influencing organizational decisions. Financial firms recognize that stakeholders, for instance, customers, communities, and regulatory bodies, increasingly prioritize sustainability and environmental considerations. By referring to biodiversity in their non-financial disclosures, financial firms aim to address stakeholder concerns, meet expectations, and foster or maintain positive relationships with stakeholders who value considerations connected to biodiversity and nature-related impacts.

Finally, Legitimacy theory sustains that to maintain their legitimacy, organizations work to keep their behavior consistent with societal norms. Financial institutions may leverage biodiversity to show their dedication to sustainability and environmental stewardship in their disclosures of non-financial information, upholding their credibility in the eyes of stakeholders. Additionally, accountability mechanisms, such as corporate social responsibility reporting or sustainability reporting, provide a framework for financial firms to be transparent and accountable for their impacts on biodiversity.

Overall, as presented in Figure 4, financial firms decide to refer to biodiversity in their non-financial information disclosures due to a combination of factors, including conforming to institutional expectations, managing information asymmetry, addressing stakeholder concerns, maintaining legitimacy, and demonstrating accountability. By incorporating biodiversity-related information into their disclosures, financial firms align themselves with nature-relevant goals, signal their commitment to responsible practices, and establish themselves as environmentally conscious entities.

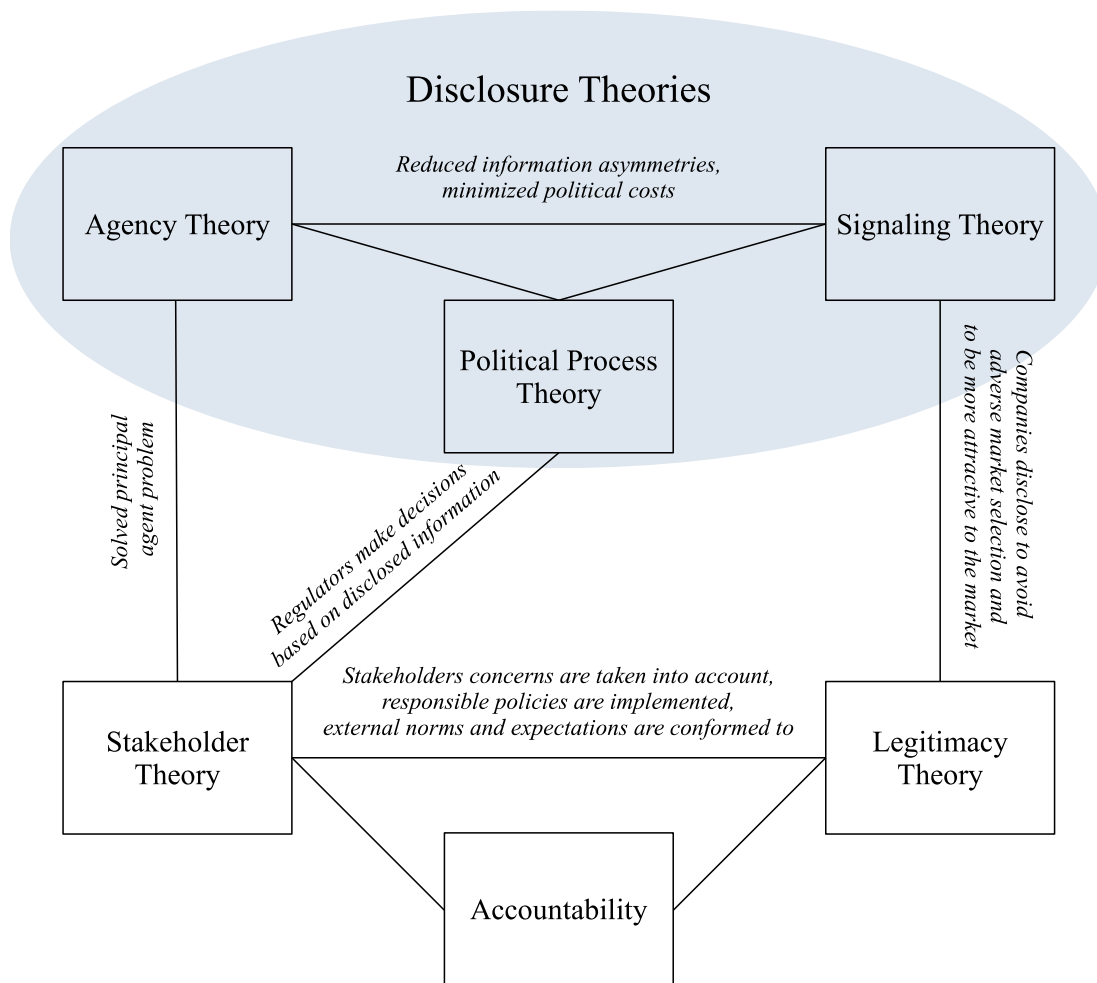


Figure 4. The Theoretical Framework.

Source: Author's own adaptation based on Urquiza et al. (2010), Suchman (1995), Menicucci & Paolucci (2018).

## 3.2 Previous Research on Sustainability-Related Information Disclosure

This section explores the previous research on corporate disclosure of sustainability-related information and sustainable finance, linking both to the theoretical framework described in the section above. It is common that companies, based on their industries and sizes, are prone to disclose information to comply with the industry-specific requirements as well as to uphold their legitimacy in the market by avoiding the principal-agent problem, ensuring positive selection in the market and minimizing the political risks that might arise.

### 3.2.1 Incentives to Disclose Sustainability-Related Information

Nearly 40 years ago, sustainability reporting entered the corporate world as a crucial tool for managing the transition to a new business environment characterized by increased concern

and consciousness about sustainability (Stubbs et al., 2013). Various theories explain why market agents decide to report. Meeting stakeholder expectations regarding an agent's performance is one of the primary concepts underpinning corporate reporting (Parmar et al., 2010; Hörisch et al., 2014). In the corporate context, considering stakeholders' information demands and addressing those demands contribute to additional value-creating and foster legitimacy and accountability, i.e. stakeholders' pressure ignites the two-side flow of value creation, delivery and capture (Attanasio et al., 2022). In addition, legitimacy plays another important part in information disclosure, especially in such geographical and cultural contexts where stakeholders can execute special power on companies (Ruiz et al., 2021). Just as importantly, institutional constraints, both internally and externally, e.g. regulatory pressures, societal sanctions, and transaction costs based on information asymmetries, make companies adjust to the changing institutional context and comply with its regulations (North, 1971; North, 2018). In addition, complying with institutional norms can to some extent advance companies' legitimacy as firms decide to conform to external norms and expectations such as industry standards or government regulations to maintain legitimacy (Suchman, 1995).

While there are different agents that operate within the business landscape, e.g. companies, customers, suppliers, financiers (such as stockholders, bondholders, and banks), authorities and communities, the previous research on sustainability reporting has been extensively focused on companies (Nitkin & Brooks, 1998; Berns et al., 2009; van Liempd & Busch, 2013; Usher & Maroun, 2018; Arvidsson & Dumay, 2022; Sun & Lange, 2023). To ensure a higher quality of the information disclosed, companies apply various guidelines and frameworks (Hedberg & Von Malmborg, 2003; Ruiz et al., 2021). At the same time, with stakeholders playing an important role, some studies explore the positive pressure impact of stakeholders on businesses' sustainability reporting (Johnson et al., 2018; Ruiz et al., 2021; Attanasio et al., 2022), starting from secured legitimacy to improving organizational structures and spurring more innovative solutions.

Furthermore, industry-specific requirements and stakeholders can result in additional pressure on companies to disclose more sustainability-relevant information. High-profile industries, i.e. industries with higher consumer visibility, for instance, oil & gas, mining, and medicine, might be more prone to disclose sustainability-related information and adopt sustainability assurance statements in order to boost their accountability and legitimacy (Islam & Deegan, 2008; Faisal et al., 2012), decrease political risk in their market, thus, improve their communication and interaction with the industry-specific stakeholders (Roberts, 1992). Moreover, companies that operate in such industries tend to be more reliant on the material services of ecosystems, e.g. natural resources, medicine, manufacturing. In addition to a high- or low-profile industry, companies' readiness to disclose information is highly affected by their size. The demand for external funding increases when a company grows in size and has a wider choice of products. Information disclosure is used to minimize agency costs and diminish information asymmetries, giving businesses more competitive access to financial markets (Frias-Aceituno et al., 2014).

### 3.2.2 Biodiversity-Related Information Disclosure

Research on biodiversity-related information disclosure has gained prominence in recent years as organizations and stakeholders recognize the importance of addressing biodiversity conservation and its impact on sustainable development. At the same time, there has been a lack of studies that could sufficiently address the academic state of the art associated with disclosing biodiversity-related information.

Despite the fact that the research landscape is highly dominated by studies that explore the motivations for corporate disclosure of non-financial information, biodiversity is typically included as a part of environmental disclosure and is mainly attributed to such motivations as regulatory costs (Blacconiere & Patten, 1994), institutional and industry pressures (Braam et al., 2016; Benvenuto et al., 2023) and legitimacy in the operating market (Faisal et al., 2012; Rimmel & Jonäll, 2013). At the same time, there is a clear lack of analyses that would assess the more practical presence of biodiversity, for instance by studying indicators, targets, goals, and the level of detail provided in reporting. As argued by Reale et al. (2018), companies should evaluate their negative impacts more clearly in order to set realistic reporting indicators and corporate goals that would assist in their biodiversity conservation practices.

Nevertheless, the number of legislative and voluntary information disclosure frameworks, that either include or explicitly focus on biodiversity, has increased in recent years, for instance, GRI, SASB, TNFD, CSRD, SFDR, EFRAG, IFRS. Various studies have assessed the effectiveness of some of the referred frameworks in the context of guiding businesses and financial firms in their sustainability reporting and formulating their sustainability strategies (Busco et al., 2020; Afolabi et al., 2022; Pizzi et al., 2022). The frameworks have strong potential to increase the quality in such categories as data availability, measurement methodologies, comparability of reported information, and reduce the lack of standardized reporting requirements in the context of biodiversity-related information disclosure. However, as can be seen from the list of the frameworks in this paragraph, it is rather confusing to navigate in their variety, which might cause more misunderstanding rather than bring more clarity in the field.

### 3.2.3 Financial Markets: Transition Finance and Risk Portfolio

As stated earlier, investors play a crucial role in a successful transition toward sustainable development. Transition finance is centered around systems becoming sustainable and is aimed at providing more opportunities for the agents of those systems to apply more sustainable solutions (OECD, 2022). What is more, transition finance offers a unique chance of reducing transitional costs as significant business opportunities can result from biodiversity conservation, ecosystem sustainable use, and restoration, including long-term business model viability, cost savings, improved operational efficiency, increased market shares, new business models, markets, products, and services, as well as improved stakeholder relations (OECD, 2019). The impact investing toolkit can significantly contribute to the conservation of biodiversity by financing for-profit conservation projects in addition to yielding financial

returns by securing premium prices for sustainably produced goods or selling ecosystem services (Thompson, 2023).

At the same time, the financial sector is placed in a highly risky context (Gitman et al., 2015). One of the principal risks is the system risk that is the result of unsustainable development patterns at the level of economic and financial systems which altogether might be amplified by the societal discontent with the status quo and will lead to market reorganizations that are conflict-, tension-, and shock-driven, and uncertain (Loorback et al., 2020). Another group of risks that investors are exposed to is transition risk that arises in the short term. This type of risks is likely to be substantially discounted because they are long-term in nature (Thomä & Chenet, 2017). The system risks, such as climate change or biodiversity loss, are rather equally distributed across the whole economy and all economic agents, while transition risks, as well as physical risks, are more industry-specific and have a higher chance to affect financial firms that invest in different industries. Therefore, even though investors have been always operating in a highly risky environment, nowadays there are additional stress factors that investors have to take into consideration and that have arisen as a result of the existing system and transition risks. Financial firms grow strongly reliant on other agents that operate with them in the market, namely governments and companies. As argued previously, investors can play a pivotal role in a successful transition toward sustainable development; however, it is the governments that need to create the necessary institutional context and pave the effective regulatory way (Deutz et al., 2020). In addition, adequate and transparent information disclosure by businesses is required, even though companies and their stakeholders, including investors themselves, appear to be confused about which reporting frameworks should be applied to achieve compliance with international and local standards and provide reliable and trustworthy data (Lund University, 2021). However, investors and their views and understanding of certain concepts, in the case of this research those are biodiversity-relevant concepts, have a strong impact on how policies are formed and what kind of information is disclosed by companies. Investors have a highly positive impact on the quality of disclosed information (Ruiz et al., 2021), which in the context of information disclosed on nature-impacts of companies' activities is increasingly important as the necessary reporting frameworks have not yet been established.

# 4 Data and Method

This chapter discusses the data sample chosen to answer the research questions and presents the research method applied in the study. The three core criteria for gathered data, representativity, validity and reliability, are ensured via data sourcing, collection and selection processes. Additionally, data delimitations are critically assessed. The methodological framework consists of qualitative document analysis in the form of a report study with the help of a checklist and a Python script that aims to facilitate data analysis.

## 4.1 Data

### 4.1.1 Data Representativity, Reliability and Validity

The research questions are aimed at exploring the awareness of investors regarding biodiversity-related issues by looking at their mentioning of biodiversity and nature-relevant information. Research questions 1 and 2 are aimed at capturing the fact of referencing biodiversity and nature-related impacts and its evolution, while Research questions 3 focuses on the explanations of why firms decide to reference this type of information in their disclosures. In order to answer the research questions, it was decided to construct the data sample based on sustainability, annual or integrated reports of Swedish financial firms listed on the NasdaqOMX stock exchange in Stockholm: <https://www.nasdaqomxnordic.com/shares/listed-companies/stockholm>. Those are large firms; hence, they are more likely to have a considerable impact on the financial market, reporting policies, and their portfolio companies from different industries. Moreover, those investors are more inclined to apply a rather proactive approach to guidelines implementation to send signals to their stakeholders to stay more attractive in the market (Singhvi & Desai, 1971). The Swedish context is applied since this country has been among the earliest pioneers in sustainable finance and the green bond market, with one of the highest market growth rates reported (Torvanger et al., 2021). Moreover, Sweden is a country known for having a proactive approach to devising environmental regulations (Burck et al, 2019; Karlsson, 2021). All in all, the presented source of data as well as the chosen geographical context justify the representativity of the applied dataset in the study.

To answer the second research question and explore the evolution of investors' inclusion of biodiversity-related information disclosure, external communication reports from two years are analyzed, namely years 2019 and 2021. The decision to focus on those years is justified by the need to examine the development of investors' understanding of biodiversity given that earlier periods had to be eliminated due to the topic's relative immaturity in the reporting



frameworks. Additionally, the 2020 year was excluded due to the COVID-19 topic's dominance in the information arena on a worldwide scale.

Furthermore, to succeed in answering the research questions, it is of critical importance to ensure data reliability and validity. Data reliability refers to the consistency and dependability of the applied data over time and across different geographical and cultural contexts, while data validity describes how precisely the gathered data measures or represents the researched concept (Mariel et al., 2021). It is crucial to take into consideration these aspects to ensure the dependability of a study (Wach & Ward, 2013). Since the NasdaqOMX stock exchange in Stockholm includes a wide variety of companies from around ten various industries and grants open access for public trade and applies similar conditions for companies across different markets and geographical contexts, one may conclude that the data collected for this research complies with the above-described reliability and validity conditions. At the same time, should different geographical contexts be applied, the author believes it is important to highlight the possible variations in the results based on the features of a country, culture and institutional factors, legal and regulatory contexts along with the market and organizational structure of the firms selected for future analysis.

#### 4.1.2 Data Delimitations

The data applied in this study has certain delimitations. Firstly, as specified by Faisal et al. (2012), such factors as place of origin, institutional and societal features, social and economic development stage, legal and regulatory environment, and business system type can strongly affect the level and type of social voluntary disclosure in a country of origin for companies. Therefore, since the analysis solely includes financial firms from Sweden, other contexts can produce different results, i.e. based on reporting culture or context-specific organizational structures of firms (Faisal et al., 2012; Ruiz et al., 2021). Moreover, due to existing delimitations of the facilitating program and English-based checklist for data assessment, only English reports as pdf-files could be included in the dataset, which in the end excluded 6 reports in 2019 and 7 reports in 2021, 14% and 16% of the whole data respectively. However, this does not affect the representativity of the data as all the firms presented in the financial sector are relatively similar in size and operate within the same institutional context. Finally, the period delimitations, specifically the fact that only 2019 and 2021 reports are analyzed, have a certain impact on the findings. At the same time, given that earlier time periods had to be excluded due to the topic of biodiversity and nature-related information disclosure being relatively new in the reporting frameworks, the choice to focus on those years is supported by the necessity to evaluate the evolution of investors' awareness of biodiversity. The year 2020 was left out because of the COVID-19 topic's global dominance of the information space.

#### 4.1.3 Data Selection Process

The total financial firms listed on NasdaqOMX stock exchange in Stockholm equals 37; however, only 36 firms were included in the analysis with the final dataset consisting of total of 71 external communication reports for the two years. The inclusion criteria for the

documentation consisted of such factors as file format and file language. Due to the specifications of the tool specially designed to facilitate the data analysis, only those reports that are published as pdf-files could be included. In addition, only reports in English were included in the final dataset. The process of data selection is visually presented in Table 1 for both years, 2019 and 2021. The lists of financial firms and their reports, based on the report type, are included in the research and can be found in Tables 3 and 4 in Appendix B.

Table 1. Report selection process.

	2019	2021
<b><i>Report selection process</i></b>		
Total number of reports	42	43
Excluded non-pdf reports	1	1
Excluded non-pdf reports in Swedish	6	6
<b>Selected number of reports</b>	<b>35</b>	<b>36</b>

## 4.2 The Methodological Approach

### 4.2.1 Qualitative Document Analysis

To study the research questions, the author decided to apply the method of qualitative document analysis, more specifically the report study. This is a research method that is utilized in order to analyze the content of written information, including reports. This method includes the following stages: a). listing criteria for documents; b). collecting documents; c). identifying the main areas of analysis; d). document coding; e). verification; f). analysis (Wach & Ward, 2013).

When selecting documents for the analysis, the author followed the following selection criteria: type of firms, type of documents, possible delimitations of the selected documents, including time constraints in terms of the year of publication. As stated previously, Swedish financial firms listed on the NasdaqOMX stock exchange in Stockholm were included in the dataset, more specifically their annual, sustainability and/or integrated (annual and sustainability in one) reports as a source of their external communication with their stakeholders. In terms of the time constraint, it was decided to use reports from 2019 and 2021 to look at whether the firms' awareness and readiness to acknowledge biodiversity and nature-related impacts have changed.

At the stage of report collection, the firms' webpages were used as the source. One firm had their integrated reports for 2019 and 2021 in the form of a webpage, while all other firms had their reports as pdf files. This format was found more conducive to being integrated into the research facilitating tool, i.e. the Python script, that was applied to search for the necessary information.

In order to classify and later analyze the reports, the author created a checklist with specified keywords that were consequently gathered in keyword groups for further analysis. The checklist is designed to cover different biodiversity-related topics and aims to study whether investors are aware of biodiversity and nature-related definitions, whether they connect biodiversity-relevant impacts to their physical and transition risks, whether they are planning to or already implementing any reporting frameworks that are embracing biodiversity, and whether they are engaging in any kind of partnerships with government or civil society within the topic of biodiversity and nature-saving activities. The checklist includes 13 yes/no-questions that are based on the policies, guidelines and reports published by the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services, IPBES, (2019), European Central Bank (2019), and Corporate Finance Institute (2023).

Based on the checklist, the collected data is coded 1 (the report includes information related to the item) or 0 (the report does not include information related to the item). For each question in the checklist, several keywords are identified to facilitate the information search. The checklist along with the keyword groups and sources applied can be found in Appendix A. However, to avoid plain searching for the keywords, special attention is paid to the meaning and relevance in context. This is ensured via the analysis of the context around the identified keywords.

To confirm the consistency and reliability of the coding and the evaluation process, the analysis is verified by the author; all reports are examined at least twice unless there is a specific necessity to spend more time and effort on some of them. However, since Morse et al. (2002) highlight the importance of various methodological tools, including verification by several researchers, the author acknowledges this delimitation and attempts to mitigate it by adhering to detailed coding instructions and implementation of the analysis facilitating tool described in the section 4.2.2, which jointly should contribute to the rigor of the study and robustness of the results.

Finally, once all the stages are followed correctly and the necessary information is gathered and verified, the data is analyzed to answer the three research questions that seek to explore investors' readiness to reference biodiversity and nature-related information in their external communication reports in 2019 and 2021 as well as to examine the possible factors that explore the incentives behind investors' decisions.

#### 4.2.2 Analysis Facilitating Tools: Checklist and Python Script

##### **Checklist**

The report analysis is based on a checklist that was devised by the author in order to assess the content of the reports. The development of the checklist involved a meticulous process aimed at identifying key questions and areas for assessment related to biodiversity disclosure within financial firms' reports. A comprehensive review of existing literature was conducted, focusing on scholarly publications, mandatory and voluntary disclosure frameworks, and international initiatives. The research encompassed relevant sources such as reports from the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES), International Union for Conservation of Nature (IUCN), and global biodiversity frameworks

like the Kuming-Montreal Global Biodiversity Framework (GBI). Besides, prominent sustainability reporting frameworks, i.e. GRI and TNFD, as well as open-source information of financial institutions, such as the European Central Bank and Corporate Finance Institute, were taken into account to encompass the relevant topics. The topics covered in the checklist reflect the growing recognition of the critical role that biodiversity plays in sustainable development and the need for transparent reporting on its impacts and risks, addressing various aspects of biodiversity, including its conservation, threats, and the potential for offsetting its loss. It includes terms and concepts such as biodiversity conservation, nature-based solutions, ecosystem services, and the Sustainable Development Goals (SDGs) 14 and 15. The checklist also examines the identification of physical and transition risks associated with biodiversity loss, as well as the acknowledgment of nature and biodiversity-related impacts. It considers mechanisms to increase capital flows into biodiversity conservation and references to existing frameworks. Furthermore, it explores the expectation for companies to provide biodiversity information and support nature-saving initiatives through partnerships with organizations and governments. The checklist aims to ensure transparency, accountability, and sustainable practices in biodiversity reporting within the financial sector.

The checklist consists of 11 questions that seek to address the research questions by identifying the references to biodiversity and nature-related information along with searching for possible explanations to include or avoid biodiversity-relevant information disclosure by Swedish investors. The checklist questions are presented in Appendix A and specifically focus on the following topics:

*Question 1* defines the type of the report, i.e. annual, sustainability or integrated types. It is necessary to mention that the type of the report is defined based on the information published by the financial firms on their webpages, therefore, if the report is titled as annual report but might include some sections on sustainability, it is still included in the group of annual reports.

*Questions 2 and 3* are aimed at exploring whether firms decide to acknowledge biodiversity and nature-related information in their external communication with their stakeholders. The vocabulary of those questions is built on the IPBES 2019 report as well as UN Agenda 2030. Interestingly, with the existing tendency in non-financial information disclosure to focus more on climate-related information, the author might have avoided the topic of climate change but decided not to exclude climate-related considerations from the analysis, as climate change is one of the most prominent emerging drivers of biodiversity loss (IPBES, 2019; MISTRA BIOPATH, n.d.).

*Questions 4, 5, and 6* study whether firms can relate their risks to biodiversity and nature-negative impacts.

*Question 7* explores whether firms decide to include in their reports any measures they might take to halt biodiversity loss.

*Question 8* seeks to study whether firms refer to or apply any external guidelines and frameworks related to biodiversity.

*Questions 9, 10 and 11* explore whether firms decide to engage with their stakeholders on the topic of biodiversity.

The checklist questions are aimed at capturing the changes in investors' acknowledgment level as well as identifying the reasons why those investors who decide to include biodiversity-relevant information in their reports do it, for instance to comply with the institutional regulatory pressure, engaging with stakeholders, or securing their attractiveness in the market, which altogether is consistent with the theoretical framework described in Chapter 3.

## **Python Script**

The Python script is used to autonomously find keywords in reports. Since the keywords can have many synonyms or similar terms, the keywords are grouped in keyword groups. The goal of the script is to generate a table with per report a row and per keyword group a column where the page numbers are listed where a keyword of that group could be found. The keywords are gathered in a txt file, where each line is a comma-separated list that represents a keyword group. The script analyzes all the reports in a given folder. Each file has a specific filename format so the program can recognize the institution name, the type of report and the year. For each report, the script reads every file and extracts all the raw text using a Python package called *pypdf*. In the raw text, the keywords are searched, and the corresponding page number is saved. It is important to note that this search is case-insensitive, which implies it does not differentiate between capitalized and non-capitalized letters.

Nevertheless, since the information search is highly reliant on the identified keyword groups, not all chosen keywords might correspond with the vocabulary used by firms in their reports. Therefore, even though while the creation of the checklist the author referred to external biodiversity-relevant resources, policies and scientific and academic reports, there is always a chance that not all information is captured when the data is screened, which can be highlighted as a delimitation of the applied analyzing tools.

# 5 Empirical Analysis

This chapter describes the results of the carried analysis, discusses the findings and links them to the theoretical framework. Overall, when comparing 2019 to 2021, Swedish financial firms have started to mention biodiversity and nature-related information in their reports more commonly. The three most probable reasons for these developments are assumed to relate to the pressure from the regulatory landscape and reporting frameworks, the inclusion of biodiversity in risk-related considerations, and increased engagement with stakeholders in order to uphold legitimacy and ensure positive selection in the market.

## 5.1 Results

Referring to question 1 in the checklist, Figure 5 shows the overall change of the type of reports published by the Swedish financial firms in 2019 and 2021. As can be concluded from the Figure 5, there has been an increase in the number of integrated reports published by the Swedish financial firms in 2019 and 2021. At the same time, the number of stand-alone annual reports and sustainability reports in 2021 has dropped but insignificantly. This suggests that more firms have switched to integrated reporting systems. However, it is important to mention that the type of the report is determined by the data provided by financial institutions on their websites; therefore, if the report is titled as an annual report but contains parts on sustainability, it is still categorized as an annual report in the present analysis.

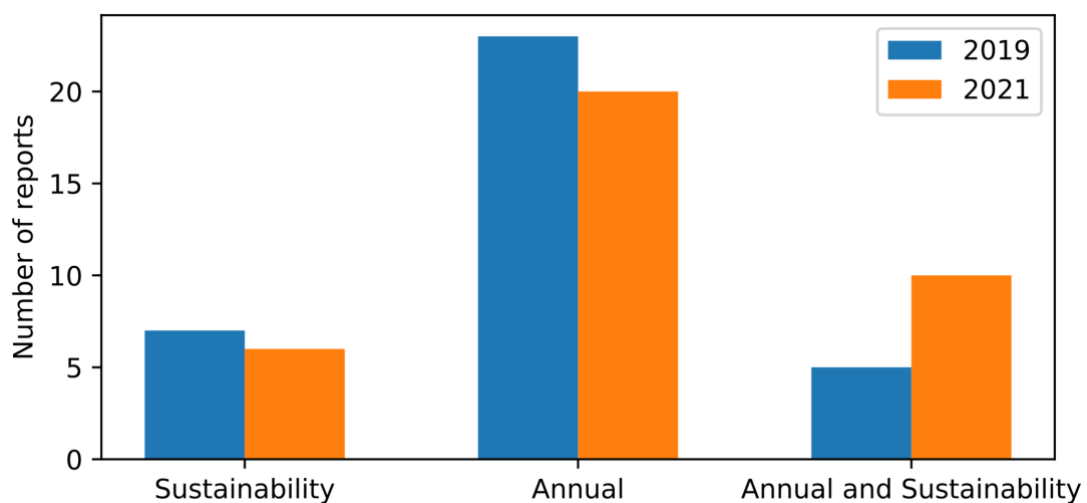


Figure 5. Firms' reports based on the type and year.  
Source: Author.

Tables 5 and 6 in Appendix C present the results of the report study. Tables 5 and 6 set forth the numbers and shares of companies that include information related to biodiversity and nature-related impacts in their external communication reports (in 2019 and 2021 respectively), according to the created checklist. The figures in Tables 5 and 6 show that the overall mentioning of biodiversity-related topics increased in 2021 compared to 2019 since for all checklist questions there has been an increase in the keyword groups match in the reports.

Notably, results for Questions 6, 9 and 11 remained unchanged, which can be attributed to several factors. First, since Question 6 includes a reference to nature-related risk, financial firms might not have a clear comprehension as to how to include this type of risk in their external communication reports. The possible solution might appear when the market-led, science-Taskforce on Nature-related Financial Disclosures (TNFD) framework finalizes its guidelines and recommendations, including the Taskforce's proposed approach to disclosure metrics for the market agents in September 2023. The TNFD is focusing on risks to the value of natural capital resulting from corporate operations that fail to consider the financial materiality and repercussions of biodiversity loss. Frameworks like TNFD will allow governments and institutional investors to better incorporate knowledge about the nature of such financial flows into their national policies, making relevant strategic plans more effective. These guidelines are expected to support investors in their approach to nature-related risk mapping and reporting, hence, redirecting financial flows and accelerating nature-positive transformation of economy.

Question 9, as it was related to the possible interactions and investors' expectations of their potential and actual portfolio companies, did not show any response either for 2019 or 2021. The reasons might be connected to the fact that this question is connected to rather sensitive data and requires a more detailed assessment that can be done in the form of interviewing financial firms' representatives on the topic related to interacting with portfolio companies on biodiversity. It is rather interesting to learn what investors rely on if they decide to include biodiversity-relevant considerations in the assessment of their portfolio companies. Question 11 to some extent also relates to this analysis delimitation as interaction with government on biodiversity-relevant topics can be explored only if the study focuses on how investors comprehend nature-related impacts and initiatives, not just if they include these considerations in their external communication reports. Therefore, the current results suggest it might be interesting to continue with the research and apply more in-depth study methods such as semi-structured interviewing or surveying with sustainability representatives of the firms included in this analysis. Further research will provide more *de facto* information on the investors' understanding of biodiversity and nature-related impacts and its relevance regarding interaction with government and portfolio companies.

On the contrary, the most prominent reference increase has been experienced in such topics as *sustainability risks* (physical and transition risks) and *interaction with stakeholders*, in particular with NGOs and civil society. To begin with, for physical and transition risks in 2019 the numbers were 21% and 39% respectively, while in 2021 both categories increased to 50% and 43% respectively, which signals investors have become more inclined to include sustainability-related risks in their reports, and therefore, biodiversity-relevant information is associated with sustainability risks management for investors. However, more research is

needed to investigate this correlation. In addition, as specified previously, those risks do not include nature-related risks, which can be explained by the relative novelty of the topic and the lack of frameworks that could support investors in their risk mapping. This change might be attributed to an increasing role of nature and ecosystems, as their depletion and deterioration can cause very specific and viable physical risks, therefore, should be comprehensively included in the risk mapping and assessment procedures. Interestingly, physical risks were mainly mentioned regarding the investors' portfolio companies that operate within the material industry. This indicates the urgency of sustainability risks for the industries that are highly reliant on nature and its ecosystem services and signals that financial institutions are becoming more aware of the risks that are associated with material effects and sustainability transition, including the context of biodiversity loss and the decrease in ecosystem services. This finding supports the institutional theory ideas as the organization-level environment has become more subject to the changes connected to external factors, such as biodiversity loss and climate change, hence, there have been more references to biodiversity and nature-related relevant vocabulary in the context of risk reporting. To conclude on the risk-connected topic, when the risk-related content of the reports is assessed, it can be identified that firms' reports mention their sustainability-related risks in a rather general manner and commonly disregard specific time horizons applied to the risks.

When it comes to interaction with stakeholders, namely with civil society, the number of firms in the dataset that referred to this topic has increased from 4% in 2019 to 13% in 2021. Moreover, even though the absolute figures account for 1 and 4 references in 2019 and 2021 respectively, the share increase amounts to 75%. Additional study might explore if this trend has continued to grow. This finding supports the ideas described by the disclosure theories as well as legitimacy theory since in order to minimize the negative effects of the principal-agent problem and to uphold their legitimacy in the market by positioning themselves as responsible investors, financial institutions are becoming more prone to engage with civil society, especially on such a sensitive topic as biodiversity loss.

Another interesting finding is the references to external guidelines and reporting frameworks that include the topic of biodiversity. As shown in Tables 5, 6 and supported by Table 2 on page 32, the number has increased but slightly. Therefore, it was interesting to analyze if the nature of the references themselves has changed. Figure 6 describes the frameworks that have been most commonly referred to in firms' reports. The diagram depicts that the most popular frameworks are Principles for Responsible Investment and EU Taxonomy, with the latter experiencing the most prominent increase in being referenced between 2019 and 2021. Both frameworks are aimed at supporting investors in their decision-making process; however, their nature is different. While the Principles for Responsible Investment is a voluntary initiative that was formed by a worldwide group of institutional investors in response to the growing importance of environmental, social, and corporate governance issues in investment operations (PRI, n.d.), the EU Taxonomy is mandatory for the large listed companies that have more than 500 employees during a financial year (European Commission, 2021). The figure presents a significant increase in references to the EU Taxonomy in 2021, which can be explained by the fact that it officially entered into force in 2020. However, in 2019 there were already large investors, e.g. most commonly banks, that took a proactive approach and referenced the EU Taxonomy as the tool they were exploring in order to improve their accounting and reporting mechanisms in the field of non-financial reporting. This finding



supports the previously described idea about high-profile industries, i.e. industries with higher consumer visibility, as firms from such industries are more likely to adopt a proactive approach to information disclosures. Interestingly, the increases in references to United Nations Environment Programme Finance Initiative (UNEP FI) and the SASB reporting framework provide more supporting evidence for the fact that investors assess the material effects in their investment decision processes and prefer to stick to internationally recognized frameworks in order to ensure the transparency of their data. Moreover, UNEP FI is a founding member of the TNFD and is actively supporting the development and distribution of a global framework for corporations and financial institutions to analyze, manage, and report on their nature-related dependencies and impacts. To summarize, even though the overall increase in the references to external frameworks and guidelines has been modest, the essence of this increase provides supporting evidence for the importance of external regulatory pressure on investors because it makes reporting not only mandatory but also provides support as to how and what to report. This finding aligns with the institutional theory since the regulatory environment is placed among the key institutional constraints that frame the behavior of agents within the system, in the case of this research the behavior of investors in the existing market system.

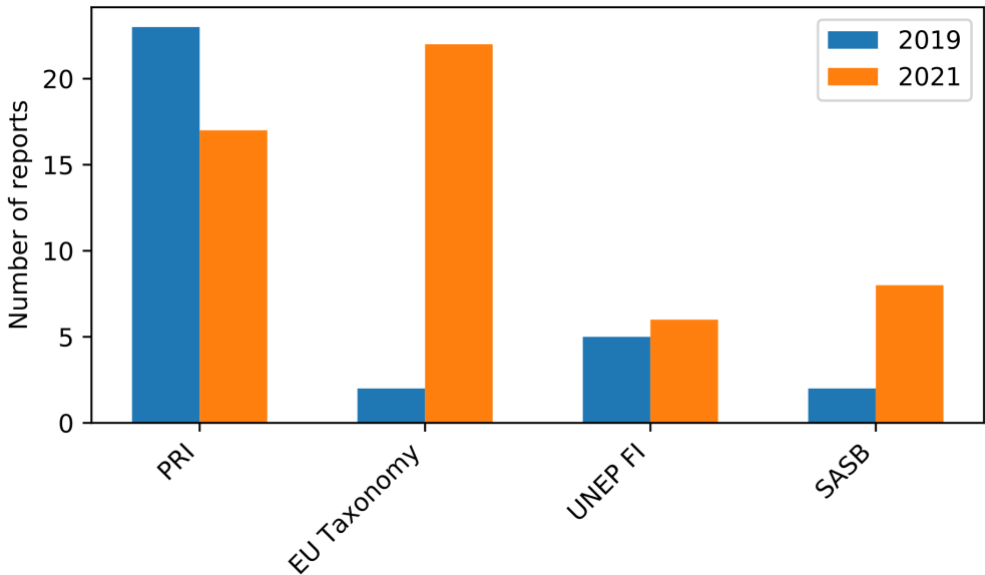


Figure 6. Four most referenced frameworks for information disclosure in 2019 and 2021.

Source: Author.

To explore the nature of biodiversity-relevant vocabulary referencing, the author analyzed the most repeated keyword group and stand-alone keywords. Table 2 shows the occurrence of the keyword groups in reports both in 2019 and in 2021. Based on the table figures, one can see that Swedish financial firms have added more biodiversity-related vocabulary to their reports (Question 2). This might be explained by the institutional and stakeholder pressures that firms have experienced as the topic of nature and biodiversity loss have grown in its urgency, as well as additional guidelines have been imposed on firms by national and international authorities. In addition, even though the focus of the referenced vocabulary continues to be highly climate-centric, the increase in 2021 has happened in the vocabulary that connects to

nature-related impacts, e.g. *biodiversity loss, ecosystem services, environment impact, natural resources*.

Table 2. Occurrence of keyword groups in 2019 and 2021 reports.

Question	Occurrence 2019	Occurrence 2021
<b><i>Acknowledging biodiversity</i></b>		
Q2: IPBES vocabulary	141	178
Q3: SDGs 14, 15	0	2
<b><i>Mentioning sustainability, incl. nature-related, risks</i></b>		
Q4: physical risks	8	18
Q5: transition risks	10	16
Q6: nature-related risks and impacts	0	0
<b><i>Nature-positive contribution</i></b>		
Q7: implementation of mechanisms to halt biodiversity loss	1	1
<b><i>Complying with external guidelines and reporting frameworks</i></b>		
Q8: external guidelines and frameworks that include biodiversity	23	25
<b><i>Engaging with stakeholders</i></b>		
Q9: interaction with companies on biodiversity	0	0
Q10: interaction with NGOs and civil society on biodiversity	1	4
Q11: interaction with government on biodiversity	0	0

Another interesting finding is the most repeated keyword in all reports in both years. As described previously, when creating the checklist, the author planned to avoid climate-related vocabulary in order to exclude any biasedness toward the topic of climate change. However, due to a very strong interconnection between climate change and biodiversity loss, it was decided to keep climate-related vocabulary from the IPBES report (2019). Based on the carried analysis, the most reoccurring keyword in the topic related to Question 2 is *climate* both for 2019 and 2021 (see Fig. 6), which suggests that the overall landscape for sustainability reporting is still highly focused on climate change: 91% (32 out of 35) of annual, sustainability and integrated reports in 2019 and 100% (36 out of 36) of annual, sustainability and integrated reports in 2021 refer to the notion of *climate*. What is more, despite *climate* being the most mentioned keyword, *nature* takes second place in both years, which is also a signal that firms have increased nature-related references in their reports. Nevertheless, in most cases, the word *nature* is applied in a rather broad context, which makes it certainly difficult to conclude that the firms have significantly increased their awareness of nature-related impacts and nature-related risks.

Furthermore, Figure 7 shows that the ten top-mentioned keywords in the 2019 and 2021 reports have experienced an increase in their referencing numbers. Interestingly, the most prominent increase has been identified for such words as *biodiversity* and *resource management*, which signals that the financial firms included in the study have started to acknowledge biodiversity in their reports more frequently in 2021 compared to the level in 2019. On the contrary, the only category that has experienced a decrease in the number of references is *green bonds*. Such a result can be attributed to changes in market dynamics and investor demand for green bonds. Additionally, due to the higher volatility of green bonds, the COVID-19 pandemic might have a greater impact on this category; however, additional research in the Swedish green bond market is needed to provide more specific conclusions.

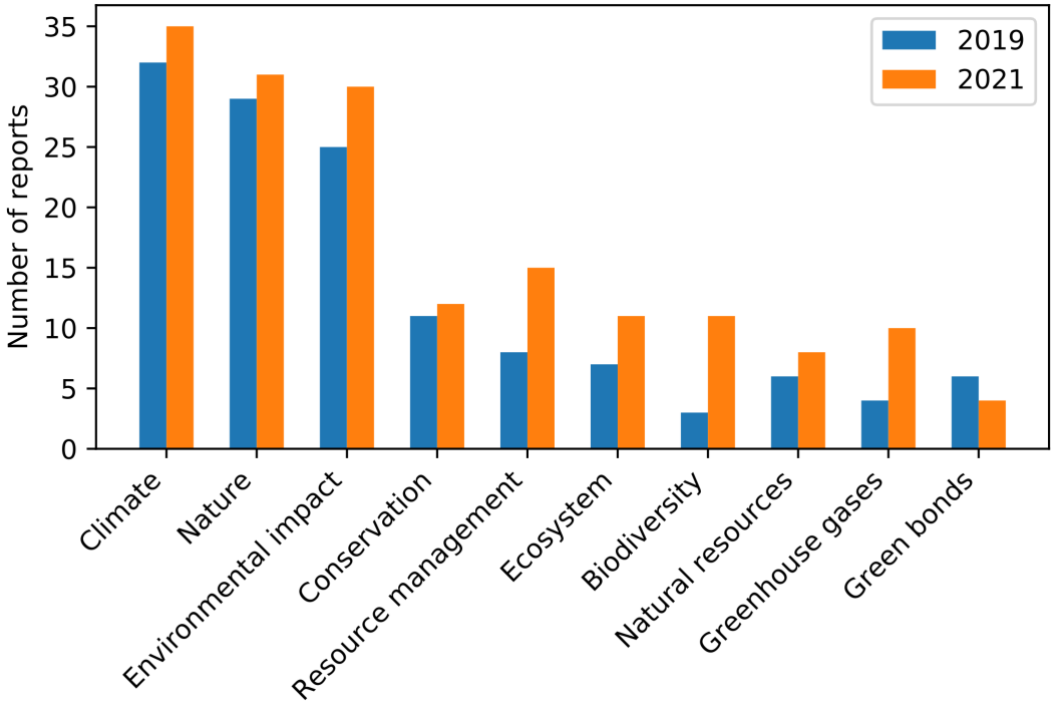


Figure 7. Ten most reoccurred biodiversity-relevant keywords in 2019 and 2021 reports. Source: Author.

## 5.2 Discussion

The findings can be interpreted in the following way. First of all, Swedish financial firms indeed include various types of biodiversity-relevant information in their external communication reports and over the two years the references have experienced an increase. Second, based on the checklist questions, three specific topics received the highest number of matches. These topics align with the institutional theory stemming from regulatory guidelines and reporting frameworks, the incorporation of biodiversity into risk-related considerations, and increased engagement with stakeholders to maintain legitimacy and ensure favorable market positioning.

Firstly, financial firms demonstrate a notable inclination to reference external reporting frameworks and guidelines, both on a voluntary and mandatory basis. This suggests that within the prevailing institutional context characterized by stricter regulations and diverse reporting frameworks, financial firms are actively embracing the realm of nature and biodiversity, not solely focusing on climate-related aspects. This observation aligns with the principles of institutional theory, which posits that institutional context plays a pivotal role in facilitating the smooth operation of all actors within a system by establishing common structures and rules (North, 1971; Peters et al., 1999). Moreover, by adhering to the institutional regulations, investors can strongly ensure their legitimacy in the market, uphold their high-profile position for the consumer visibility and prove their accountability to their stakeholders by securing a more positive reputation in the market, which aligns with the disclosure theories, namely the agency and signaling theories. Furthermore, financial firms may be driven by the desire to mitigate the negative effects of the principal-agent challenge arising from information asymmetries. Consequently, they opt to voluntarily disclose a greater volume of biodiversity-relevant information to improve their market position and reduce the transaction costs associated with information sharing. In addition, as highlighted in the political process theory and supported by the findings in this and other studies (Watts and Zimmerman, 1986; Andersson & Arvidsson, 2022), larger financial firms, usually banks, are more inclined to disclose extensive information in order to avoid any questioning of their potential market power and larger revenues, minimize any political costs in the market induced by their size, and potentially influence future reporting guidelines.

Secondly, as institutions create the rules of the “game”, the “players”, in the context of this study investors, will attempt to acquire the skills and knowledge that will improve their chances of survival in a competitive setting, amid the players' ultimate goals of profit maximization. These attempts are manifested in investors' increased readiness to comply with the reporting guidelines, e.g., EU Taxonomy, and study those before they are launched in the market as well as to include sustainability-related risks and utilization of more biodiversity-relevant vocabulary connected to risk description. By including physical, transaction and nature-related risks in their external reports, financial firms send signals to the market of increased awareness on biodiversity-related topics, seeking to decrease the potential transaction costs that might arise as a result of informational imbalances between the agents within the system. At the same time, even though some financial firms in the study indicate their methods to report their sustainability-related risks and assess potential sustainability-related risks of their portfolio companies, there is no unified procedure that all firms could stick to. This finding contributes to the popular opinion that the lack of unified risk mapping and risk reporting framework aggravates information comparability and credibility (Andersson and Arvidsson, 2022), which is crucial in interacting with stakeholders, including potential portfolio companies and policymakers. Since the topic of biodiversity is relatively fresh, especially in the context of its integration into financial and reporting mechanisms, this finding is highly important to the future of biodiversity-related information disclosure. Importantly, following the connection between political process theory and stakeholder theory, the afore-described finding offers some insight into which topics are prioritized by investors in regard to biodiversity, thus, contributing to the process of creating potential future regulations within the field. For instance, a more careful sustainability-related risks assessment would support financial firms in their investment decision processes and thus have

good potential in accelerating investment flows into a more nature-positive economic development.

Finally, the research findings pertaining to financial firms' engagement with stakeholders indicate that these firms are more likely to interact with civil society and non-governmental organizations (NGOs) regarding biodiversity-related topics. This observation aligns with the principles of legitimacy theory, as it suggests that investors seek to establish their credibility and legitimacy in the eyes of diverse stakeholders, including the general public. The increased attention to biodiversity can be attributed to a strategic approach aimed at enhancing investors' legitimacy and accountability in the market. This involves taking proactive measures such as participating in charitable initiatives and adopting socially and environmentally responsible policies. The findings of this study, in line with legitimacy theory, reveal that financial firms apply biodiversity-related information referencing in order to legitimize their operations when society's norms and expectations of business entities change or when businesses believe themselves to be in violation of society's existing norms and expectations. Therefore, the finding that financial firms intensify their engagement with civil society on the sensitive issue of biodiversity loss supports the notion that companies align themselves with society's expectations of larger actors assuming responsibility in the market. Considering the higher visibility of the financial sector to various stakeholders, it is logical to expect a greater emphasis on active communication with stakeholders. This serves multiple purposes, including reducing societal pressure and criticism, as well as addressing the information needs of stakeholders who seek insights into the sector's associated risks. By engaging with stakeholders, financial firms aim to manage societal expectations, demonstrate transparency, and fulfill their obligations to various stakeholder groups.

To conclude, the report study suggests that Swedish financial firms have indeed increased their referencing of biodiversity and nature-related impacts, with a particular focus on risk-related information. The feasible reasons behind this change appear to be connected with the fact that the firms are more likely to mention the biodiversity-related information in order to comply with the regulatory landscape, to ensure a more comprehensive risk assessment policies for the future investment decision processes and to uphold their legitimacy in the eyes of their stakeholders, specifically civil society as the topic of biodiversity is highly sensitive for the public. Another important finding suggests that financial firms strongly rely on existing reporting frameworks both externally to tackle the external institutional pressure and internally to secure effective risk mapping and reporting mechanisms and ensure positive market selection, hence, a more unified framework would contribute to more comparable and compatible biodiversity-relevant information disclosure.

## 6 Conclusions

This chapter presents the conclusions of the conducted research. First, it addresses the research questions and discusses contributions to the theoretical framework and previous research. In essence, the carried research aligns with the built theoretical framework and presents strong supporting evidence for the importance of institutional and stakeholder pressure on firms' disclosures of sustainability-related information. At the same time, due to the relative novelty of the biodiversity topic in corporate information disclosure, it is highly interesting to continue with future research and investigate the *de facto* situation in the financial market by interviewing investors, comparing firms' financial performance with their readiness to embrace biodiversity and nature-related impacts, as well as comparing the level of investors' awareness in regard to biodiversity with other industries. In addition, since currently a new framework for nature-related information disclosure is being developed, it is highly likely to improve investors' awareness of nature-related risks and thus their ability to cope with those types of risks and exert their influence on other industries by more sustainability-efficient management of financial flows.

### 6.1 Addressed Research Questions

The findings of the conducted analysis suggest the following answers to the research questions specified in the introductory section.

*RQ1: Do Swedish financial firms refer to biodiversity and nature-related impacts in their external communication reports?*

Yes, Swedish financial firms refer to biodiversity and nature-related impacts in their reports.

*RQ2: Have Swedish financial firms increased their references to biodiversity and nature-related impacts in their external communication reports?*

Yes, the overall mentioning of biodiversity and nature-related information in firms' reports has increased between 2019 and 2021. The overall biodiversity-relevant vocabulary increase amounted to around 20%. Moreover, out of 71 reports analyzed in the study, the following biodiversity-relevant topics have experienced growth in references: sustainability-related risks (from 18 to 34), external guidelines (from 23 to 25) and public engagement (from 1 to 4), which in shares would account for 53%, 8% and 75% increases respectively.

*RQ3: Why do Swedish financial firms decide to include information related to biodiversity and nature-related impacts in their external communication reports?*

The inclusion of biodiversity and nature-related impacts in the reports of Swedish financial firms can be attributed to the following research findings. The primary influence on this decision is the institutional context, specifically regulatory landscape pressures. Stricter environmental regulations and the presence of voluntary and mandatory reporting frameworks have motivated financial institutions to actively incorporate biodiversity-relevant information in their external communication reports. However, it is important to note that the overall focus remains predominantly climate-centered, indicating a gradual shift towards incorporating nature and biodiversity. It is worth noting that there is currently a lack of unified reporting guidelines for disclosing biodiversity and nature-related information, highlighting the need for consistent standards. This finding aligns with institutional theory, emphasizing the importance of the institutional context in ensuring stability and adherence to shared structures and regulations within the system. Implementing a more unified reporting approach is likely to enhance the interaction between firms and their stakeholders.

Another factor contributing to financial firms' interest in including biodiversity-related information and the increased referencing of such information is linked to stakeholder engagement and the firms' intention to maintain their market legitimacy. Research findings regarding firms' interactions with stakeholders suggest that financial firms are more inclined to engage with non-governmental organizations (NGOs) and civil society on biodiversity-related issues. This aligns with the tenets of legitimacy theory, which posits that firms seek to uphold their legitimacy in the eyes of diverse stakeholders, including the general public. By adopting a strategic approach to enhancing their legitimacy and accountability in the market, financial firms may proactively engage in philanthropic activities and adopt socially and environmentally responsible policies, hence signaling the growing importance given to biodiversity-relevant considerations.

Finally, Swedish financial firms appear to incorporate biodiversity and nature-related information in their external communication reports to access additional data that can influence their risk portfolio and, subsequently, impact future capital flows. This drive is evident in investors' increasing inclination to consider sustainability-related risks and their heightened utilization of terminology closely associated with biodiversity in risk assessments. By including physical, transactional, and nature-related risks in their external reports, financial institutions aim to mitigate potential transaction costs arising from information asymmetry among system agents. Furthermore, these efforts seek to enhance market awareness of biodiversity-related topics, thus contributing to a more informed and efficient decision-making process within the financial industry. This strategic approach aligns with the objective of reducing informational imbalances and fostering transparency in relation to biodiversity-related risks.

## 6.2 Contributions to Theory and Previous Research

The findings of this study contribute to the previous knowledge of corporate information disclosure by confirming the idea that information disclosure is an increasingly important decision to be made by companies as it can result in both positive and negative outcomes.

From the theoretical perspective, the results of this research are in line with the ideas formulated by disclosure theories as well as institutional and stakeholder theories and put those theories more to the fore of the disclosure analysis. Besides, companies' intention to uphold their legitimacy in the market plays an important role when they decide to engage in biodiversity-related information disclosure by conforming to the external stakeholders' expectations. The institutional context has been seen to exert a large influence on Swedish financial firms, particularly in 2021, as conforming to regulations and adopting both mandatory and voluntary reporting guidelines have been mentioned by a more than 80 % of the firms included in the study. Moreover, according to disclosure theories, and more specifically to agency theory, among other benefits, the information provided can support in communication with external and internal stakeholders and be applied by owners and managers in decision-making processes. In addition, it offers a way for shareholders and other investors to monitor managerial actions. The amount of information disclosed is usually affected by different external and internal factors, for instance, the regulatory context in the country of origin, the size of the industry, company size, profitability, etc. Overall, since the financial markets appear to have characteristics of a high-profile industry, it is expected to take a more proactive approach in sustainability-related information disclosure as it assumes more accountability for the impacts that financial flows can cause in other sectors.

From the point of previous research, this study adds more knowledge in the area of nature-related information disclosure and investors' approach to it as biodiversity has just started to move in the spotlight of disclosure initiatives. The findings might be highly contributive from the policy perspective since currently more international reporting frameworks, such as GRI, SASB and TNFD, are developing mechanisms for the successful integration of nature-related considerations in financial processes, therefore, learning more about investors' perspective on the topic is increasingly supportive in order to produce a successful and comprehensive reporting mechanism that would ensure comparable and compatible data disclosure. Additionally, the financial sector can support policymakers in improving future guidelines on nature-related information disclosures for companies in different sectors.

## 6.3 Implications for Further Research

The findings of the current research offer valuable insights into the readiness of Swedish financial firms to include biodiversity and nature-related information in their external communication. However, there are several streams for further research that can contribute to a deeper understanding of the topic and its different aspects.



Firstly, as the current research focused on annual, sustainability, and integrated reports as the external communication tool, it would be beneficial to investigate why certain biodiversity-related information may not be included in these reports. Factors such as information sensitivity and the absence of comprehensive accounting methods could be explored further. Conducting surveys or semi-structured interviews with sustainability representatives of the examined companies would provide more in-depth data on their perceptions and *de facto* decision-making processes regarding biodiversity disclosure.

Additionally, examining how investors perceive biodiversity and its implications, as well as understanding how this understanding translates into interactions with the government and portfolio companies, would be an important area for future research. Exploring the perspectives and behaviors of investors in relation to biodiversity could provide insights into the role of investor engagement in driving biodiversity-related disclosures and practices not only in the financial but in other industries as well.

Further research on comparative studies across different industries to determine variations in information disclosure practices related to biodiversity can shed light on sector-specific motivations and barriers. This research can explore how companies perceive and address the concept of double materiality, considering the interconnectedness between financial performance and biodiversity-related impacts. It can uncover sector-specific approaches to biodiversity as a material issue in corporate reporting, with industries directly dependent on natural resources and ecosystem services or having significant ecological impacts likely disclosing more comprehensive information compared to those with less direct exposure to biodiversity issues.

Furthermore, it would be beneficial to analyze the link between the findings of the present research and the firms' financial performance. Examining whether higher involvement in addressing biodiversity loss and nature-related impacts correlates with firms' profitability and market position would provide insights into the potential financial implications of biodiversity-related efforts. This understanding could support the promotion of nature-positive practices and encourage broader investor participation in biodiversity-relevant initiatives.

Finally, considering the ongoing discussions and modifications surrounding the TNFD reporting framework, analyzing the likelihood of firms from various sectors, including finance, to integrate these guidelines into their risk mapping would be of interest. Investigating potential conflicts with existing risk mapping and reporting procedures, as well as identifying factors that both facilitate and impede firms' willingness to adopt the framework, would contribute to understanding the implementation challenges and opportunities associated with the TNFD guidelines.

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# Appendix A: Checklist for Report Study and Python Script

## Checklist

1. *Which report type does a firm have?*
  - a. Annual and Sustainability report (also referred as Integrated report)
  - b. Annual report and Sustainability report
  - c. Annual report only
2. *Does the report/section mention any of the following terms?*
  - 1.1. Biodiversity
  - 1.2. Biodiversity loss
  - 1.3. Biodiversity offset
  - 1.4. Biodiversity threat, biodiversity threats
  - 1.5. Biodiversity risk, biodiversity risks
  - 1.6. Biodiversity investment, biodiversity investments
  - 1.7. Biocultural diversity
  - 1.8. Conservation
  - 1.9. Biodiversity conservation, biological conservation
  - 1.10. Biosphere
  - 1.11. Nature
  - 1.12. Nature's contribution
  - 1.13. Nature-related, nature-related impact, nature-related impacts, nature-related risk, nature-related risks
  - 1.14. Nature-based, nature-based solutions, nature-based risks
  - 1.15. Natural resources
  - 1.16. Natural heritage
  - 1.17. Resource management, natural resource management, sustainable resource management, resource efficiency
  - 1.18. Exploitation, natural resource exploitation, overexploitation
  - 1.19. Degradation
  - 1.20. Nature-positive, nature-positive development
  - 1.21. Ecosystem, natural ecosystems
  - 1.22. Ecosystem services
  - 1.23. Food provision
  - 1.24. Water purification
  - 1.25. Flood control
  - 1.26. Carbon absorption
  - 1.27. Artistic inspiration
  - 1.28. Recreation
  - 1.29. Non-material contributions

- 1.30. Ecological footprint
  - 1.31. Ecosystem approach, ecosystem-based approach
  - 1.32. Ecosystem integrity
  - 1.33. Environmental impact, ecological impact
  - 1.34. Environmental security, ecological security
  - 1.35. Environmental value
  - 1.36. Environmental Impact Assessment
  - 1.37. Climate, climate change
  - 1.38. Extinction, extinct, extinct species
  - 1.39. Green infrastructure
  - 1.40. Green bonds
  - 1.41. Green growth
  - 1.42. Greenhouse gases, GHGs
  - 1.43. Habitat, habitat degradation, habitat fragmentation, habitat modification, natural habitat
  - 1.44. Human-induced
  - 1.45. Payments for ecosystem services, PES
  - 1.46. Social-ecological system
  - 1.47. Species, threatened species
- (IPBES, 2019)

All words and phrases listed above are used as a **keyword group** for Question 2.

3. *Does the report incorporate related Sustainable development goals (SDGs), in particular Goals 14 and 15?*

**Keyword group:** SDG 14, SDG 15.

4. *Are there identifications of physical risks, e.g. loss of ecosystem services, water pollution, deforestation, species extinction, resource loss?*

**Keyword group:** physical risks, loss of ecosystem services, water pollution, water stress, deforestation, species extinction, resource loss, wildfires, windstorms, river flooding, landslides, coastal flooding (European Central Bank, 2019)

5. *Are there identifications of transition risks, e.g. changes to the regulatory landscape, consumer pressures/preferences?*

**Keyword group:** transition risks, regulatory landscape, consumer pressures, consumer preferences, ESG transition (Corporate Finance Institute, 2023).

6. *Does the firm include nature/biodiversity-related risks/impacts?*

**Keyword group:** nature-related impact, nature-related risk, biodiversity-related impact, biodiversity-related risk

7. *Does the report mention any mechanisms that are projected to increase capital flows into biodiversity conservation?*

**Keyword group:** biodiversity offsets, natural infrastructure, green financial products, nature-based solutions, carbon markets, official development assistance, sustainable supply chains, philanthropy and conservation NGO (Deutz et al., 2020).

8. *Are there any references to existing frameworks in regard to biodiversity: the Kuming-Montreal Global Biodiversity Framework (GBI), UNEP FI, ESRS, TNFD, GRI 304, IPBES, IUCN Red List, NBSAP, PRI, F4B?*

**Keyword group:** the Kuming-Montreal Global Biodiversity Framework, GBI, UNEP Finance Initiative, UNEP FI, EU Taxonomy, European Sustainability Reporting Standards, ESRS, Corporate Sustainability Reporting Directive, SASB, Taskforce on Nature-related Financial Disclosures, TNFD, GRI Biodiversity Standard, GRI 304, Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services, IPBES, IUCN Red List, National Biodiversity Strategy and Action Plan, NBSAP, Principles for Responsible Investment, PRI, Finance for Biodiversity Foundation, F4B.

9. *Does the report mention any expectation of the firm to receive information from the companies it has invested in or plans to invest in regard to biodiversity/nature?*

**Keyword group:** information transparency in a portfolio company's statement, portfolio company's statement, portfolio company's impact on biodiversity, portfolio companies' impact on biodiversity, customers portfolios on biodiversity.

10. *Are there any nature-saving initiatives supported by the firm listed, for example, with external agencies (WWF, Greenpeace, or local NGOs)?*

**Keyword group:** nature-saving initiative, World Wildlife Fund, WWF, Greenpeace, local environmental initiatives, conservation NGO, local biodiversity initiatives.

11. *Does the report mention any partnership with governments centered around biodiversity?*

**Keyword group:** partnership with government for biodiversity, partnership with government

## Python Script

```
from pypdf import PdfReader
from os import listdir
from os.path import isfile, join
import parse
import pandas as pd
import re

# configuration
reports_path = 'Reports/'
keywords_path = 'keywords.txt'
file_format = '{}_{}_{}.pdf'

# read in the keywords
with open('keywords.txt') as f:
    lines = f.readlines()

keywords = []
for line in lines:
    keyword_str = line.strip("\n")
    keywords.append(keyword_str.split(', '))

# create a dataframe
column_names = ['Name', 'Year', 'Type']
for k in keywords:
    column_names.append(k[0])
df = pd.DataFrame(columns=column_names)

report_counter = 1
for f in listdir(reports_path):
    if isfile(join(reports_path, f)):
        print('----- Report {} ----- (file: {})'.format(report_counter, f))
        res = parse.parse(file_format, f)
        data = []
        data.append(res[0]) # Name
        data.append(res[2]) # Year
        if res[1] == 'ann':
            data.append('Annual') # Type
        elif res[1] == 'sus':
            data.append('Sustainability') # Type
        elif res[1] == 'annsus':
            data.append('Annual and Sustainability') # Type
        else:
            data.append("")

# create PdfReader object
reader = PdfReader(join(reports_path, f))

keywords_pages = []
```

```

for k in keywords:
    keywords_pages.append([])

for j in range(len(reader.pages)):
    page = reader.pages[j]
    text = page.extract_text()

    for k in range(len(keywords)):
        for m in range(len(keywords[k])):
            if re.search(r'\b{ }\b'.format(keywords[k][m]), text, re.IGNORECASE):
                print('Found keyword "{}" on page {}'.format(keywords[k][m], j))
                keywords_pages[k].append(j)

for k in range(len(keywords)):
    data.append(', '.join([str(kp) for kp in keywords_pages[k]]))

df.loc[len(df.index)] = data
report_counter = report_counter + 1

df.to_excel('output.xlsx')

```

## Appendix B: Financial Firms Included in the Analysis in 2019 and 2021

Table 3. Financial firms' external communication reports from 2019 included in the research after the data selection, types of reports specified.

Financial firm	2019 pdf-report in English		
	Annual report	Sustainability report	Integrated report
Avanza Bank Holding	no	no	yes
Bure Equity	yes	no	no
EQT	yes	no	no
Industrivärden	yes	yes	no
Intrum	no	no	yes
Investor	yes	no	no
Kinnevik	yes	yes	no
Latour	yes	no	no
Lundbergföretagen	yes	yes	no
Nordea Bank Abp	yes	yes	no
Ratos	yes	no	no
Sampo Oyj SDB	yes	yes	no
Nordnet	no	no	yes
SEB	yes	yes	no
Sv. Handelsbanken	yes	no	no
Swedbank	no	no	yes
Catella	yes	no	no
Collector Bank	yes	no	no
Hoist Finance	yes	no	no
Mangold	yes	no	no
Resurs Holding	no	no	yes
TF Bank	yes	yes	no
Traction	yes	no	no
VEF	yes	no	no
VNV Global	yes	no	no
NAXS	yes	no	no
Qliro	yes	no	no
Solid Försäkringsaktiebolag	yes	no	no
N = 28	N <sub>ann</sub> = 23	N <sub>sus</sub> = 7	N <sub>annsus</sub> = 5
	Total N = 35		

Table 4. Financial firms' external communication reports from 2021 included in the research after the data selection, types of reports specified.

Financial firm	2021 pdf-report in English		
	Annual report	Sustainability report	Integrated report
Avanza Bank Holding	no	no	yes
Bure Equity	yes	no	no
EQT	no	no	yes
Industrivärden	yes	yes	no
Intrum	no	no	yes
Investor	yes	no	no
Kinnevik	yes	yes	no
Latour	yes	no	no
Lundbergföretagen	yes	yes	no
Nordea Bank Abp	yes	no	no
Ratos	no	no	yes
Sampo Oyj SDB	yes	yes	no
Nordnet	no	no	yes
SEB	no	no	yes
Sv. Handelsbanken	no	no	yes
Storskogen Group	yes	no	no
Swedbank	no	no	yes
Catella	yes	no	no
Collector Bank	yes	yes	no
Hoist Finance	yes	no	no
Mangold	yes	no	no
Resurs Holding	no	no	yes
TF Bank	yes	yes	no
Traction	yes	no	no
VEF	yes	no	no
VNV Global	yes	no	no
CoinShares International	yes	no	no
NAXS	yes	no	no
Qliro	yes	no	no
Solid Försäkringsaktiebolag	no	no	yes
N = 30	N <sub>ann</sub> = 20	N <sub>sus</sub> = 6	N <sub>annsus</sub> = 10
	Total N = 36		



## Appendix C: Firms' References to Information Relevant for Each Topic in the Checklist

Table 5. Firms' references to information relevant for each topic in 2019.

	Number of firms	Share of all firms in the dataset
<b>Mentioning biodiversity-relevant vocabulary</b>		
Question 2: IPBES vocabulary	27	96 %
Question 3: SDGs 14, 15	0	0 %
<b>Mentioning sustainability, incl. nature-related, risks</b>		
Question 4: physical risks	6	21 %
Question 5: transition risks	11	39 %
Question 6: nature-related risks	0	0 %
<b>Mentioning nature-positive contribution</b>		
Questions 7: implementation of mechanisms to halt biodiversity loss	1	4 %
<b>Complying with external guidelines and reporting frameworks</b>		
Question 8: external guidelines and frameworks that include biodiversity	21	58 %
<b>Engaging with stakeholders</b>		
Question 9: interaction with companies on biodiversity	0	0 %
Questions 10: interaction with NGOs and civil society on biodiversity	1	4 %
Questions 11: interaction with government on biodiversity	0	0 %

Table 6. Firms' references to information relevant for each topic in 2021.

	Number of firms	Share of all firms in the dataset
<b>Mentioning biodiversity-relevant vocabulary</b>		
Question 2: IPBES vocabulary	29	97 %
Question 3: SDGs 14, 15	2	7 %
<b>Mentioning sustainability, incl. nature-related, risks</b>		
Question 4: physical risks	15	50 %
Question 5: transition risks	13	43 %
Question 6: nature-related risks	0	0 %
<b>Mentioning nature-positive contribution</b>		
Questions 7: implementation of mechanisms to halt biodiversity loss	1	3 %
<b>Complying with external guidelines and reporting frameworks</b>		
Question 8: external guidelines and frameworks that include biodiversity	25	83 %
<b>Engaging with stakeholders</b>		
Question 9: interaction with companies on biodiversity	0	0 %
Questions 10: interaction with NGOs and civil society on biodiversity	4	13 %
Questions 11: interaction with government on biodiversity	0	0 %