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Biodiversity Commitment and Practices: Behind the Green Curtain

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Abstract

Biodiversity commitment has gained increasing attention as a vital aspect of corporate sustainability. The growing popularity of biodiversity considerations in corporate practices underscores the need to comprehend associated risks. This thesis employs a methodology rooted in contextual analysis, utilizing mentions of "biodiversity" across corporate materials, to assess the commitment levels of the top MSCI AC 15 companies. After screening the corporate reports mentioning "biodiversity", the scoring system was implemented and each company was assessed according to the 10 categories. Each category was evaluated individually, with varying weights assigned based on their perceived importance. The scores for each category were calculated separately, and in the end, the total score was derived by aggregating these weighted scores. Eventually, the companies were categorized as either proactive "action-takers", those which are "Risk-Aware" or potential "Greenwashers." Subsequently, a comparative analysis with existing official rating agencies, in this case comparison with Refinitiv Environmental score, aims to scrutinize the alignment between perceived sustainable champions and their actual commitment to biodiversity. The primary objective is to identify whether companies recognized as sustainable champions genuinely prioritize biodiversity and demonstrate an awareness of associated risks. The findings indicate that while some companies tend to assess biodiversity impacts and consider them significant, others are just beginning to address these issues. For instance, Amazon.com, Alphabet, and Apple showed relatively high commitments towards biodiversity, while companies such as NVIDIA, Broadcom Inc., and Tesla demonstrated lack of awareness and strategic initiatives towards biodiversity conservation. Overall, 7 companies fall under "Action-Taker" category, 5 fall under "Risk-Aware" and 3 fall under "Greenwasher" category.

Keywords: Biodiversity, Refinitiv E score, Biodiversity loss, Biodiversity commitment, ESG

Introduction

Biodiversity risks and climate risks are conceptually different. Biodiversity risk concerns threats to the diversity of life on Earth and its impacts, while climate risk involves potential adverse outcomes stemming from alterations in the climate system. (Coqueret, Giroux, & Zerbib, 2023) Biodiversity plays a pivotal role in maintaining the ecological balance and overall health of the planet. The intricate web of diverse species ensures the resilience and adaptability of ecosystems to changing environmental conditions. The consequences of biodiversity loss are far-reaching, impacting not only the natural world but also human societies and economies. Diminished biodiversity can lead to the disruption of ecosystem services, affecting food security, water quality, and disease regulation. Sustainable nature finance involves redirecting capital towards projects that contribute positively to biodiversity and ecosystem health, thereby mitigating risks associated with nature degradation. This approach not only safeguards the environment but also ensures the long-term resilience and profitability of economic activities tied to nature.

Biodiversity is essential for both social and economic activities. Its main quality is that biodiversity enhances nature's ability to adapt to change. The unsustainable depletion of natural resources boosts those production and consumption that do not comply with the goals of sustainable development. Even though biodiversity is at its initial phases of development, biodiversity loss is still becoming more evident. (Ermgassen, et al., 2022) Therefore, in response to the impact of nature loss on the businesses' financial performance, many of them started to incorporate biodiversity and ecosystem services into their strategies. Investors are also striving to minimize biodiversity risks linked to investments, adopting a "green finance" approach. This investment category aims to redirect financial resources from projects negatively impacting biodiversity toward initiatives that either alleviate adverse effects or contribute to positive environmental outcomes. However, tracking biodiversity financing remains challenging, with a predominant focus on funding for conservation efforts rather than actively addressing the financial strategies to mitigate the biodiversity loss's adverse effects. (Ermgassen, et al., 2022)

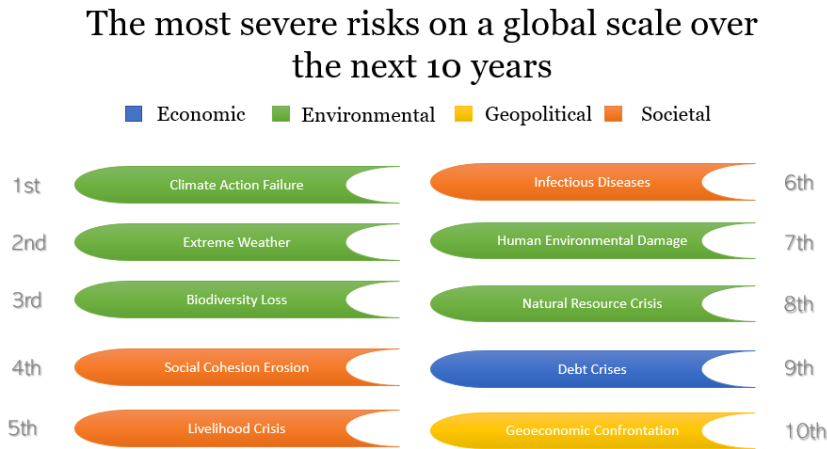
Apart from ecological concerns, the diminishing biodiversity presents a twofold financial risk for enterprises: one associated with their reliance on ecosystem services (referred to as physical risk), and another stemming from their impact on biodiversity (known as transition risk). (Coqueret, Giroux, & Zerbib, 2023) The financial materiality of biodiversity loss underscores the substantial

economic implications resulting from the degradation of biodiversity and ecosystem services. As global ecosystems face unprecedented challenges, the tangible consequences of biodiversity decline are increasingly recognized within financial sectors. The adverse effects extend beyond ecological considerations, impacting businesses, investments, and economic activities. Acknowledging the financial materiality of biodiversity loss becomes crucial for sustainable development, as it prompts a reassessment of economic policies and investment strategies. Recognizing and mitigating these financial risks is pivotal for fostering resilience and aligning economic activities with sustainable practices. Consequently, understanding the financial materiality of biodiversity loss is imperative for informed decision-making in both financial and environmental realms. According to the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES), the following are biodiversity loss’s direct drivers:

- 1. Over-exploitation
- 2. Pollution
- 3. Climate
- 4. Invasive species
- 5. Land use change

As for indirect drivers, IPBES considers people’s disconnect with nature and lack of recognition of the value and importance of nature. (IPBES, 2019) However, the presence of both direct and indirect factors contributing to nature loss creates a dual materiality concern. Double materiality underlines the importance of financial and environmental materiality. The financial materiality

Source: World Economic Forum Global Risks Perception Survey 2021-2022



focuses on how biodiversity influences a company's growth, effectiveness, and standing, while environmental materiality focuses on how a company's actions affect biodiversity.

According to the World Economic Forum Global Risks Perception Survey 2021-2022 among the most severe risks on a global scale over the next 10 years, biodiversity loss is the third.

According to the KPMG survey of Sustainability Reporting 2022, 64% of the G2501 recognize climate change as a threat to their business, moreover, despite increased awareness of biodiversity's significance, fewer than 50% of companies disclose information about biodiversity loss and perceive it as a risk to their business. (KPMG, 2022) However, it is likely to impact a wide range of company operations in the coming years, marking it as a vital risk that needs to be managed for the continuation of business. (KPMG, 2022) As mentioned before, recognizing, and protecting biodiversity is integral to achieving a sustainable and equitable future outlined in the UN Sustainable Development Goals. (SDG, 2022) Preserving biodiversity not only supports environmental health but also ensures the well-being and prosperity of current and future generations. SDG 14 (Life Below Water) and SDG 15 (Life on Land) specifically address biodiversity conservation. SDG 14 focuses on protecting marine ecosystems, preventing overfishing, and preserving coastal and marine biodiversity. SDG 15 aims to sustainably manage terrestrial ecosystems, combat deforestation, and halt biodiversity loss on land. Together, these goals encompass actions to safeguard biodiversity in both aquatic and terrestrial environments, recognizing the critical role biodiversity plays in maintaining the health and balance of ecosystems worldwide. Nevertheless, the foundation of all 17 Sustainable Development Goals relies on the well-being of ecosystems and biodiversity. Even though the 2022 SDG report indicates that advancements toward these two goals are falling behind those of other objectives, there is a steady increase in the number of countries that are integrating biodiversity and ecosystem values in their reporting systems. (SDG, 2022)

Although numerous effects of climate change on biodiversity are well-documented in scientific literature, there is limited knowledge about how the companies' conservation efforts are addressing these issues and how effective these actions are in mitigating impacts and facilitating successful adaptation. A crucial aspect of this issue is the insufficient consideration of habitat connectivity. This oversight is concerning, given the necessity for species and other components of ecosystems to migrate, adapt, or face extinction in response to climate change. (Kopnina, Zhang, Anthony,

Hassan, & Maroun, 2024). A thorough analysis of a company's impact on biodiversity should include evaluating its direct and indirect influences and embracing both beneficial and detrimental aspects. This evaluation should cover processes like supply chain procurement, utilization of land, management of waste, and emission levels, all through the lens of implementing principles of a circular economy. (Kopnina, Zhang, Anthony, Hassan, & Maroun, 2024)

Despite advancements in ESG implementation and CSR frameworks, companies only started to recognize biodiversity as an important consideration in strategic decision-making in recent years. The diminishing of biodiversity poses significant risks to business operations by threatening the availability of natural resources. (Fondevila & Etxeberría, 2023) For instance, companies may prioritize improving their reputation and relationships with stakeholders through biodiversity initiatives rather than solely focusing on biodiversity conservation. Therefore, practices in this domain may prioritize partnerships over technical field actions. (Boiral & Saizarbitoria, 2017) Biodiversity-centric corporate social responsibility (CSR) strategies have received relatively less attention in academic research. (Wolff, Gondran, & Brondhag, 2018) Biodiversity-focused corporate social responsibility practices exhibited significant variation among companies, influenced by factors such as sector, geographic location, size, and organizational maturity.

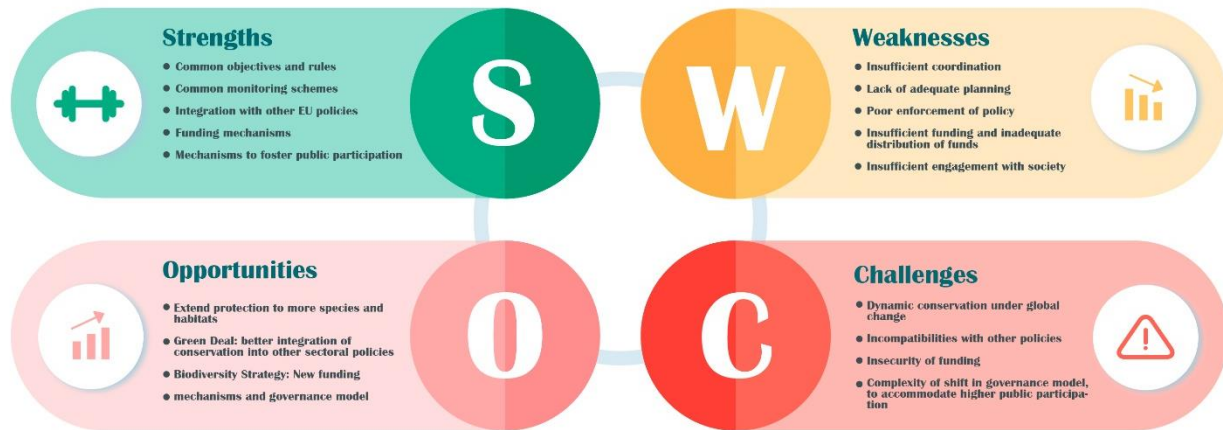
Biodiversity loss is gaining attention in policy discussions both nationally and internationally. The European Commission's European Green Deal outlines a strategy for achieving a climate-neutral Europe by 2050, with a significant focus on biodiversity. This includes plans for a vast network of protected areas and initiatives to restore degraded ecosystems across the European Union. (IPBES, 2019).

Within the Biodiversity Strategy for 2030 and the Green Deal, the EU has embarked on ambitious biodiversity restoration initiatives that are aimed at stopping biodiversity decline and promoting sustainable development by focusing on improving governance and funding mechanisms and habitat restoration. The above-mentioned Biodiversity Strategy for 2030 (EU, 2020) involves three main pillars:

1. Safeguarding and rejuvenating nature by enhancing protected areas and rehabilitating degraded habitats.
2. Implementing a resh governance framework to encourage collective responsibility and active involvement of all relevant stakeholders.

3. Embracing a global biodiversity agenda to enhance the EU's role in curbing global biodiversity loss and minimizing its impact on other biodiversity-rich areas worldwide. (Hermoso, et al., 2022)

The paper established a SWOC analysis of past conservation and challenges for the future:



Source: *The EU Biodiversity Strategy for 2030: Opportunities and challenges on the path towards biodiversity recovery* (Hermoso, et al., 2022)

The Convention on Biological Diversity (CBD) has established a legal framework, whereas the Global Environment Facility (GEF) has established a financial framework. The combined framework remains instrumental in guiding and setting standards for how the international community should tackle the problem of biodiversity loss. (Hermoso, et al., 2022)

The Root Causes project aims to draw attention to the new requirements necessary to curb biodiversity loss. It is based on four key premises:

1. Biodiversity loss is accelerating globally.
2. Previous solutions and efforts have been inadequate.
3. The underlying failure arises from a failure to acknowledge the conflict between growth and consumption versus sustainable development and biodiversity conservation.
4. New conservation approaches must address this conflict to succeed in the long term. (Wood, Stedman-Edwards, & Mang, 2000)

To avoid the most extreme scenarios of biodiversity loss, financial institutions, asset managers, asset owners, and corporate financial officers must take various actions. It is essential for them to comprehend and effectively mitigate the biodiversity risks associated with their financial and tangible investments. On the flip side, these methods can also assist in identifying the potential beneficial biodiversity outcomes of investing in nature-positive financial products and biodiversity offset mechanisms. (Karolyi & Tobin-de la Puente, 2022)

Considering the significant potential economic consequences of biodiversity loss, it's crucial for financial institutions to develop the ability to identify and address risks related to biodiversity degradation promptly. Yet, the scarcity of data resources complicates this task. Therefore, increasing the volume of scientific research in this area is essential for enhancing awareness and understanding (van Toor, Piljic, Schellekens, Oorschot, & Kok, 2020).

The choice of research question stems from a comprehensive review of existing literature and an examination of the broader context surrounding biodiversity commitments within corporate frameworks. While the literature review revealed a wealth of information regarding biodiversity conservation efforts, there appears to be a gap in research specifically focusing on the commitments made by companies and the subsequent analysis of their reports. The existing research papers often provide an overview but lack in-depth exploration into the specific commitments outlined in sustainability and climate reports. Therefore, this study aims to fill this void by conducting a contextual analysis and delving deeper into the commitments made by selected companies, as outlined in their sustainability and climate reports. By scrutinizing these commitments, the research seeks to provide valuable insights into the effectiveness of corporate biodiversity initiatives and their implications for environmental conservation efforts.

Literature Overview

Conventional Environmental, Social, and Governance (ESG) indicators have predominantly emphasized the advancement of sustainable finance and sustainability disclosure. However, Recent studies underscore the pressing need for increased responsibility and efforts to address the issue of species extinction. The article by Kopnina, Zhang, Anthony, Hassan, and Maroun discusses how ESG frameworks can be utilized to guide corporate decisions in addressing biodiversity loss (Kopnina, Zhang, Anthony, Hassan, & Maroun, 2024). It suggests that current ESG indicators have limitations due to their human-centric focus and proposes integrating extinction accounting with an environmental-centric approach to address the root causes of biodiversity loss. The study calls for stakeholders to develop inclusive and ecologically sensitive strategies. It emphasizes how an enhanced ESG framework can enable companies to proactively address extinction risks. However, although there is evidence indicating that progressive companies advocate for a symbiotic relationship between businesses and biodiversity, research demonstrates that biodiversity reporting frequently amounts to greenwashing (Kopnina, Zhang, Anthony, Hassan, & Maroun, 2024).

There is a critical need for enhancing ESG frameworks to more effectively include considerations of biodiversity and prevent extinction. The study points out the necessity for additional research into obstacles hindering businesses from integrating biodiversity preservation into their primary goals. (Hassan, Atkins, & Roberts, 2020) Moreover, the research recommends that to increase public awareness regarding species extinction and to improve corporate reporting on biodiversity, guidelines need to be practical and directly applicable. Researchers in economics and finance have largely overlooked biodiversity risk due to its intricate nature and the inherent challenges in measuring and quantifying its diverse aspects. However, the study conducted by Giglio, Kuchler, Stroebe and Zeng examined the impact of biodiversity loss on economic activity and asset values using various data sources, including textual analysis of companies' 10-K statements to create measures indicating the extent of their exposure to biodiversity risk. (Giglio, Kuchler, Stroebe, & Zeng, 2023)

The paper by Fondevila and Etxeberria focuses on examining the commitments European companies have made towards biodiversity. It aimed to analyze the reporting and accountability practices of EU companies specifically, assessing the significance of biodiversity for businesses,

their involvement in its protection, and the effectiveness of various policies implemented by the EU over time. The study revealed a varied landscape in the frequency of references to biodiversity across companies' reports. While some companies mentioned the topic extensively, especially in 2021 reports, others made no mention of it at all. Most companies only briefly touched upon biodiversity in their 2018 reports, but a significant change was observed in 2021 (Marco-Fondevila & Álvarez-Etxeberría , 2023). Although the analysis didn't delve into specific details about the content of the reports, it offered insight into the growing importance of biodiversity over time. The primary discovery of the study was that in 2018, more than half of the companies did not regard biodiversity as a noteworthy subject, mentioning it only in minor actions or isolated initiatives. (Fondevila & Etxeberría, 2023) While there was a noticeable shift in 2021 reports, with a greater number of companies addressing biodiversity, almost 85% of companies still did not perceive it as a strategic focus. Furthermore, only 34% of companies had operational initiatives related to biodiversity. (Fondevila & Etxeberría, 2023) Regardless, additional research is necessary in this domain to aid practitioners and academics in understanding how to encourage companies to engage in biodiversity protection. The various research directions outlined in this paper warrant further investigation to advance understanding of the role and strategies companies can employ to protect biodiversity.

The paper by Boiral and Saizarbitoria aims to address the gap in the literature regarding the motivations and organizational implications driving corporate commitment to biodiversity conservation, particularly within the mining and forestry sectors. Through a systematic examination of sustainability reports from over 430 organizations, utilizing the Global Reporting Initiative framework, the study explores the factors driving biodiversity management initiatives. The research reveals that companies with substantial environmental footprints are driven to engage in biodiversity conservation by their pursuit of social legitimacy and external acknowledgment. (Boiral & Saizarbitoria, 2017) Existing research on corporate environmental management has predominantly addressed broad themes without specifically delving into biodiversity issues. Likewise, environmental science studies have largely neglected to explore the broader motivations and organizational impacts associated with corporate pledges to conserve biodiversity. Eventually, the study concludes that initiatives for biodiversity management are primarily driven by the desire for social legitimacy and external recognition, especially among organizations with significant environmental impacts.

Traditional qualitative studies focusing on limited samples may not capture these overarching trends. (Boiral & Saizarbitoria, 2017) Hence, this study adds to the growing body of literature on corporate biodiversity management, an area that has not been fully explored in terms of its underlying motivations. It has been suggested that effective biodiversity governance requires more than just legal mechanisms, emphasizing the importance of incorporating diverse sources of normative rules involving all relevant stakeholders to formulate a comprehensive policy portfolio. (Wolff, Gondran, & Brondhag, 2018) This study analyzes corporate practices and stakeholder involvement in implementing biodiversity-related commitments aligned with the French National Biodiversity Strategy. It identifies two types of practices: those directly addressing biodiversity loss and procedural activities supporting better integration of biodiversity issues. External stakeholders play significant roles in the majority of corporate social responsibility actions, with their involvement varying based on their affiliation (Gyan Charitha de Silva, Regan, Pollard, & Addison, 2020). The study offers implications for policymakers, and business managers, and suggests future research directions. Within examining corporate commitments to No Net Loss (NNL) and Net Positive Impact (NPI) on biodiversity, the study found that while the number of companies making biodiversity commitments increased over time, numerous commitments lacked scientific standards for evaluation, as well as transparency and systemic assessment of corporate activities. (Gyan Charitha de Silva, Regan, Pollard, & Addison, 2020)

Financial institutions face substantial financial risks due to biodiversity decline, primarily through physical risks from funding operations that depend on ecosystem services, and through transition and reputational risks associated with financing entities that adversely affect biodiversity (van Toor, Piljic, Schellekens, Oorschot, & Kok, 2020). The paper notes that Dutch financial institutions have significant investments—EUR 510 billion—in companies deeply reliant on ecosystem services like pollination, putting them at risk if these services falter. Furthermore, financing firms involved in harming biodiversity can tarnish their reputation and necessitate costly shifts towards sustainable operations. The research calls for a more detailed investigation into the intricate dynamics between ecosystem services, the impact of biodiversity loss on finance, and how climate change intertwines with biodiversity loss, highlighting the unexplored financial implications of losing various ecosystem services and the need for future-focused research on these interdependencies. (van Toor, Piljic, Schellekens, Oorschot, & Kok, 2020)

Increasing public awareness of the causes of climate change is often seen as crucial for garnering support for policies aimed at mitigating and adapting to climate change. However, it's important to note that higher awareness may not always lead to greater perceptions of the risks associated with climate change. In some studies, there is a negative correlation between awareness and risk perception (Kellstedt, Zahran, & Vedlitz, 2008), while in others, there is no clear relationship (Brody, Zahran, Vedlitz, & Grover, 2008), and in most studies, a positive correlation is observed (Linden, 2015). Therefore, further research is needed to determine whether this negative correlation between awareness and risk perception also holds when focusing on the specific causes of climate change and to explore potential factors that might explain the mixed results in previous studies. The results of the paper by Luis, Vauclair and Lima suggest that in nations with greater carbon dioxide emissions, where individuals have more exposure to climate change-related activities and technologies, their perception of climate change as a societal risk tends to be lower, primarily because they have a better understanding of its causes. (Lima, Vauclair, & Luís, 2018)

Recent research, as indicated by Hong et al. in 2020, has been investigating how climate-related risks impact financial markets. Different studies examining the influence of carbon emissions on stock prices have produced varying results. (Hong, Karolyi, & Scheinkman, 2020)

The research conducted by Juan C. Reboredo and Luis A. Otero outlines that investors are conscious of the potential risk associated with the transition to a low-carbon economy within their investment portfolios. This is evident from the fact that climate-related transition risk has a negative influence on fund flows. Consequently, investors tend to allocate more of their funds to investments with low Climate Risk Scores (CRS) and less to those with high CRS. (Reboredo & Otero, 2021)

Preserving and responsibly managing biodiversity are intricate tasks that present distinctive challenges for policymakers. The complexity arises from the difficulties associated with identifying the root causes of biodiversity loss. Consequently, a diverse set of incentive measures must be employed to ensure that both private interests and the public benefit from the conservation and sustainable use of biodiversity.

These incentive measures contain economic tools like taxes, charges, tradable usage rights, and subsidies, as well as regulatory actions such as imposing development limitations and access restrictions. While some of the direct benefits of biodiversity can be privately captured through

well-defined property rights and existing markets, other financing methods become necessary to realize other values, including indirect utilization benefits, non-use values, and option values.

Developing and putting into action effective policies in many environmental areas can be quite demanding. Nevertheless, it's worth noting that the conservation and sustainable utilization of biological resources pose exceptionally intricate challenges for policymakers (Mountford & Keppler, 1999) This is the main focus of the paper by Helen Mountford and Jan Keppler. Nevertheless, they also dive into the distinct nature of the biodiversity case. The factors influencing biodiversity, especially their consequences, are intricate and often poorly understood. This complexity makes it difficult to pinpoint a single immediate cause or a single underlying economic factor responsible for biodiversity loss. A summary of the complexities related to biodiversity policy is provided in Box 1.

- **Heterogeneity:** lack of homogeneity due to overlapping ecosystems, interdependent ecological functions, and millions of species.
- **Irreversibility:** frequently, once past a certain threshold, impacts are irreversible as in the case of species extinction or ecosystem collapse; policy can thus not balance present private and public costs but must adhere to the precautionary principle.
- **Accumulation of impacts:** impacts accumulate and create large losses in the long run, while potentially smaller costs of prevention must be incurred in the immediate present.
- **Information gaps:** inherent complexity and the lack of information required from policymakers' decision-making under uncertainty.
- **Mix of values:** biodiversity provides private use values, regional ecosystem services, and global (public) existence holders.
- **Mix of pressures:** the pressures on biodiversity result from a mix of pressures from different economic sectors due to a complex web of underlying causes.

Source: (Mountford & Keppler, 1999)

Most of the benefits linked to biodiversity have both private and public dimensions. This is why sustainable use is of great significance. Sustainable use involves extracting the private or commercial value of biodiversity without jeopardizing its overall existence (Mountford & Keppler, 1999). Therefore, effective policies for conserving and sustainably using biodiversity need to create mechanisms that not only safeguard direct utilization benefits through well-defined property

rights but also protect its public values through supplementary methods like positive incentives or regulations that ensure the compatibility of usage with biodiversity conservation.

Many aspects of biodiversity cannot be adequately preserved through market mechanisms because they are too intricate and widespread to be privately allocated. For instance, there is no market where the full value of the tropical rainforest can be realized.

To realize the public value of biodiversity, additional incentive measures are necessary. These may include implementing subsidies for activities that support biodiversity, eliminating subsidies that harm biodiversity, using regulations and access restrictions, and establishing environmental funds. (Mountford & Keppler, 1999)

According to Candice Stevens, a prominent figure in conservation finance, the lack of funding remains a significant challenge for global biodiversity conservation, as highlighted at the 2022 United Nations Biodiversity Conference. She emphasizes the importance of directing financial resources to areas and communities that need them the most, promoting a landscape or seascape approach. Stevens also stresses the need for recognizing local governance structures and enabling local rights holders to directly benefit from conservation finance (Stevens, 2023). Researchers can contribute to these efforts by aligning their work with finance solutions, providing research material, data, and baseline studies to support innovative financing approaches. Many conservation areas lack awareness of their costs and funding gaps, making baseline studies and clear cost-tracking methods essential for conservation finance. (Stevens, 2023)

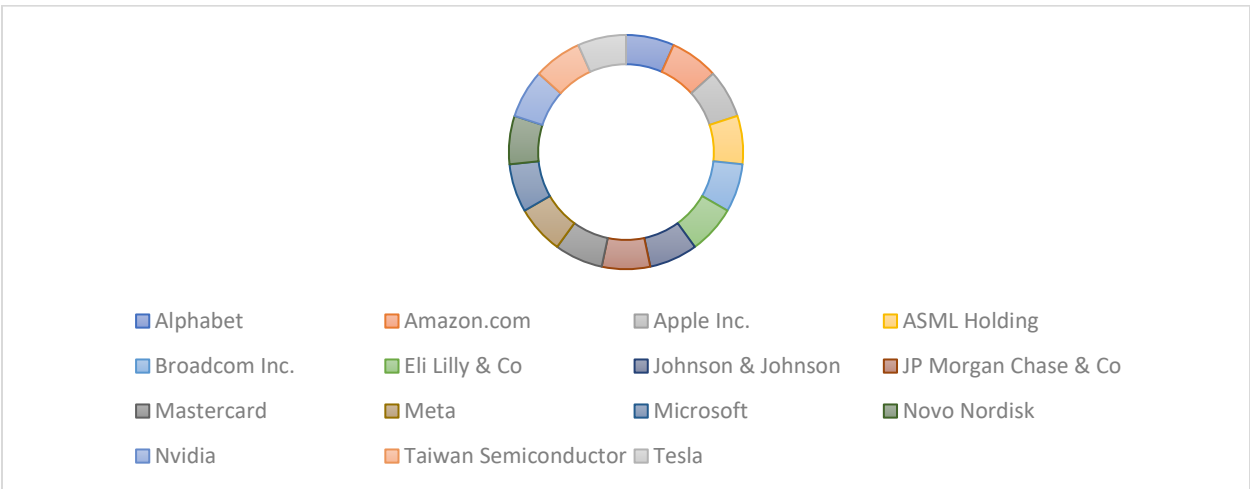
In light of the changing significance of green finance, the research conducted by Khan, Ahmed, and Saeed quantifies green finance under the term "climate mitigation finance" and assesses its influence on the environmental footprint in twenty-six Asian economies. The empirical results demonstrate that green finance effectively diminishes environmental footprints, indicating its eco-friendly nature. Particularly within the Asian context, green finance performs in line with expectations. (Khan, Riaz, Ahmed, & Saeed, 2022) Furthermore, these findings remain consistent when employing different measurement approaches and estimation methods, providing a compelling argument for policymakers to sustain their investments in climate finance. Moreover, The United Nations Framework Convention on Climate Change compels nations to contemplate environmentally friendly measures in order to reduce environmental pollution.

Nature-based solutions (NBS) have garnered increasing attention worldwide among both researchers and decision-makers. NBS is a broad term encompassing ecosystem-based adaptation, green infrastructure, natural climate solutions, and more. (Hagedoorn L. , Koetse, Beukering, & Brander, 2021) However, NBS for addressing climate change and environmental challenges often lack sufficient funding. Recent economic evaluations of NBS in developing countries have started to use people's time contributions, instead of money, as a way to measure the benefits. There are two primary definitions of NBS. The European Commission defines NBS as actions inspired by or derived from nature to help societies tackle various environmental, social, and economic challenges sustainably (European Commission, 2015). NBS is also defined as measures that aim to protect, sustainably manage, and restore ecosystems while addressing societal challenges and providing human well-being and biodiversity benefits. (Cohen-Shacham, et al.) In essence, NBS are measures rooted in nature intended to address sustainability challenges. However, implementing NBS encounters several obstacles, notably the difficulty of securing sufficient financial resources. A significant financial gap exists for the sustainable management of ecosystems and biodiversity. The findings by Hagerodorn, Koetse, Beukering, and Brander are valuable for those involved in NBS financing, awareness campaigns, and behavior change efforts, particularly in developing countries. (Hagedoorn L. , Koetse, Beukering, & Brander, 2021)

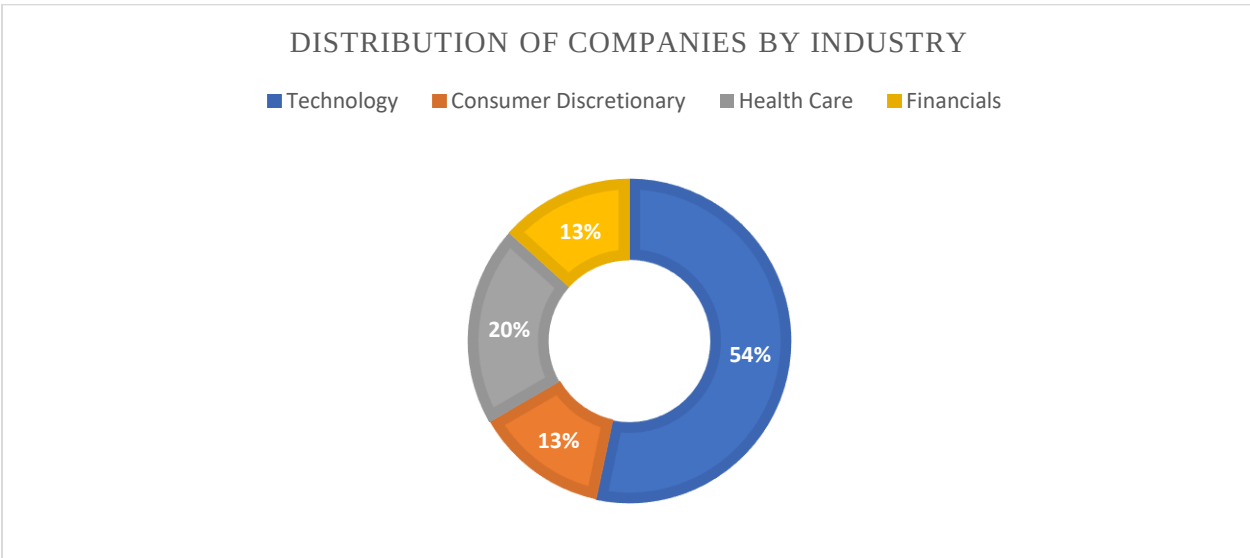
Company Overview and Contextual Analysis

For the research question, the study concentrated on 15 companies selected from the top 30 of the MSCI AC index. Information regarding their biodiversity commitment was collected from diverse sources, including annual reports, climate reports, sustainability reports, as well as other documents such as shareholder meetings and ESG releases. The analysis focused on any references to "biodiversity" within these documents to inform the assessment of each company's biodiversity commitment.

The graph below depicts the selected companies:



The graph below illustrates the companies in terms of industries:



Apple

Apple Inc. is an American company, founded in 1976. Apple is known for manufacturing personal computers, smartphones, tablets, and other accessories. The company's iconic products include iPhone, Mac, iPad, and services such as iCloud and Apple Music. Apple is renowned for its innovative approach, stylish design, and robust ecosystem seamlessly integrating hardware, software, and services.

In 2021, Apple joined forces with Conservation International and Goldman Sachs to launch the Restore Fund. This initiative, backed by over \$100 million, anticipates removing over one million metric tons of carbon starting in 2025. The unique aspect of the Restore Fund lies in its aim to shift carbon removal from a cost to a potentially profitable investment, encouraging global capital investment in carbon removal. In October 2022, Apple unveiled three new initiatives under the Restore Fund. The company invested in partnerships with three reputable forestry managers in Brazil and Paraguay, aiming to restore 150,000 acres of certified sustainable working forests while safeguarding approximately 100,000 acres of native ecosystems. (Apple's Environmental Progress Report, 2022) Additionally, Apple is collaborating with the MIT Climate & Sustainability Consortium, cooperatively funding research with PepsiCo and Cargill to enhance soil carbon measurement in nature-based carbon removal projects. For 2022, Apple utilized the following carbon offsets to offset its corporate emissions: The Alto Mayo Protected Forest (AMPF) in the Peruvian Amazon, spanning 182,000 hectares, is crucial for biodiversity conservation and watershed protection. (Apple's Environmental Progress Report, 2022) The region faces increased threats due to infrastructure projects leading to heightened deforestation and the loss of ecosystem services. As a reaction, Conservation International and local partners launched the Alto Mayo Conservation Initiative (AMCI) to advocate for sustainable management, backed by financial support from carbon financing. These efforts aim to conserve large forest areas, offering climate change mitigation benefits and fostering sustainable development for local communities. Apple collaborated with the sustainability non-profit RESOLVE to finance the Regeneration Project. This initiative centers on extracting and processing residual materials from historical mines to revive natural surroundings, facilitate rehabilitation, and promote biodiversity. Regeneration serves as an extension of the Salmon Gold project, which we sustained and expanded in partnership with Tiffany & Co. and RESOLVE throughout 2022. (People and Environment in Our Supply Chain, 2023) Apple utilizes credits from initiatives that adhere to globally recognized standards

like the Climate, Community & Biodiversity Standard, Verra, etc. These standards guarantee the legitimacy, additional value, and implementation of systems to prevent duplication and ensure performance for the projects generating credits. Additionally, Apple is FSC¹ and LEED² certificate holder.

According to Apple's environmental progress report 2023, the primary objective, as outlined in the 2030 Climate Roadmap, is to achieve a 75% reduction in emissions from 2015 levels. Additionally, The company aims to implement carbon removal strategies to address the remaining emissions that cannot be avoided. (People and Environment in Our Supply Chain, 2023) Nature-based carbon removal projects not only eliminate carbon but also provide ecological and social advantages, including biodiversity preservation, enhanced ecosystem resilience, and economic opportunities for local communities. Building on insights gained from these projects and recognizing the increasing global demand for more nature-based solutions, Apple revealed an expansion of the Restore Fund in 2023. (People and Environment in Our Supply Chain, 2023) The company pledged additional funds, up to \$200 million, to be overseen by Climate Asset Management, a collaboration between HSBC Asset Management and Pollination. This commitment aims to back a wider array of high-quality nature-based projects, aiming to amplify carbon removal efforts while striving for a financial return on investment. (Environmental Progress Report, 2023)

According to the CDP Climate Report 2023, Apple Inc. has executive management-level responsibility for biodiversity-related issues, with the Vice President of Environment, Social, and Policy Initiatives overseeing plans to minimize the company's environmental impact. Various Apple environmental programs, such as packaging specifications and closed-loop initiatives, contribute to biodiversity conservation. The Board of Directors is actively involved, reviewing updates on environmental matters, progress toward goals, and the environmental impact of products and operations. (CDP D. , 2023) In 2022, the Board officially established the Nominating

¹ FSC – Forest Stewardship Council is a certificate that ensures that products come from responsibly managed forests that provide environmental, social, and economic benefits.

² LEED - Leadership in Energy and Environmental Design, a globally recognized green building certification system, promoting the creation of buildings that are both environmentally friendly and cost-effective. It impacts biodiversity with 10% of its credits and aligns closely with the Sustainable Development Goals (SDGs) by improving energy efficiency, fostering water conservation, and cutting carbon emissions.

and Corporate Governance Committee's responsibility for supervising Apple's approaches, policies, and actions concerning environmental and social issues. The organization has publicly affirmed its commitment to and support initiatives concerning biodiversity, specifically committing to avoiding the conversion of High Conservation Value areas. Even though the company currently does not evaluate the effects of its value chain on biodiversity and there are no plans to do so within the next two years, it reports taking actions to advance biodiversity-related commitments, including activities related to land and water protection, awareness, and livelihood initiatives. Despite these efforts, the organization does not use biodiversity indicators to monitor its performance within its operations. (CDP D. , 2023)

Alphabet

Alphabet Inc., Google's parent company, is a diverse global conglomerate founded in 2015, in the USA. It oversees various technology-related businesses and subsidiaries, playing a significant role in Internet services, online advertising, artificial intelligence, and other innovative ventures. Key elements of Google Services comprise advertisements, hardware, Chrome, Android, Gmail, Google Maps, Google Photos, Google Drive, Google Play, and YouTube. These products and platforms enjoy widespread and increasing usage across the globe.

According to the company's CDP Climate Report, the organization has publicly committed to and supported initiatives related to biodiversity, specifically contributing to the development, restoration, and improvement of 600 acres of habitat for monarchs and pollinators in California, including areas on Google campuses. (CDP - Climate Change Response, 2023) Furthermore, the organization is actively carrying out measures to advance its commitments related to biodiversity, particularly in species management. It employs biodiversity indicators, encompassing state and benefit indicators, along with response indicators, to assess performance across its various activities. The organization collaborated with the International Union for the Conservation of Nature (IUCN) Urban Alliance, San Francisco Estuary Institute, and other partners in 2022 to release a "Making Nature's City" Toolkit, providing information on its response to biodiversity-related issues beyond the CDP response for the reporting year. Mapping tools in the cloud, like TerrAdapt, which was introduced to the public on World Wildlife Day in March 2022, provide support in prioritizing areas for conservation efforts. (CDP - Climate Change Response, 2023) These initiatives encompass activities such as habitat restoration, elevating protection status, and

implementing wildlife crossings. TerrAdapt employs satellite monitoring technology, powered by Google Cloud Platform and Google Earth Engine, to forecast habitat conditions considering expected climate and land-use scenarios. Carly Vynne, co-founder of TerrAdapt and Director of Biodiversity and Climate at RESOLVE, explains that TerrAdapt assists in maintaining the presence of animals in the environment. (Google Environmental Report, 2023)

As indicated in the Environmental Report 2023, the main sustainability strategy continuing its tradition of leading in sustainability by hastening the move towards a net-zero carbon future, fostering a circular economy, championing water stewardship, and safeguarding biodiversity. (Google Environmental Report, 2023) The aim is to enhance biodiversity by combining ambition and hope with the strength of facts and clever ideas to speed up big changes in the way systems work. Alphabet Inc. introduced SpatiaFi in collaboration with Climate Engine, aiming to assist the banking industry in utilizing geospatial analytics for climate finance. This tool enables banks to provide agriculture clients with personalized insights into drought and flood risks, as well as biodiversity, at the field-specific level using geospatial data. Google Cloud, in collaboration with NGIS, is aiding brands in gaining a more comprehensive insight into sustainable sourcing practices throughout their supplier networks. By Leveraging its cloud computing, geospatial analytics, and AI, up-to-date, reliable information is provided to companies at a local supplier level globally. For instance, the company assists Unilever in developing a deeper understanding of the forests, and biodiversity within its supply chain. Additionally, the company contributed to the launch of TraceMark, an enterprise-focused Sustainability Solution compatible with Google Cloud. Its purpose is to expedite the implementation of transparency and traceability within the worldwide supply networks of raw materials. (Google Environmental Report, 2023)

Introduced in 2010, Google Earth Engine represents Google's expansive platform for Earth science data and analytical processes. Over the past ten years, researchers and scientists have employed Earth Engine to identify alterations, chart patterns, and measure distinctions on the Earth's surface. In 2022, Earth Engine's data analytics and computational capabilities were routinely accessed by more than 90,000 users for research and educational endeavors. Additionally, various tools for global restoration and conservation have been developed utilizing this platform. For instance, Restor, established by Crowther Lab in Zurich and utilizing the capabilities of Google Cloud and Google Earth Engine, enables individuals to assess the restoration possibilities of any location on

Earth. By defining a specific area on the Restor map, users can access information on local biodiversity, the existing and potential solid carbon storage in the soil, and annual rainfall. With this data, the platform links practitioners, and fosters information exchange. (Google Environmental Report, 2023)

Since 2017, Google has actively participated as a key technology contributor in Wildlife Insights, a joint effort involving seven prominent conservation organizations. This collaboration aims to enhance biodiversity monitoring through the utilization of AI, addressing crucial data gaps to support data-driven decisions. The platform simplifies the process for conservationists and scientists to gather and assess data obtained from trail cameras. Contemporary farming practices have notable environmental consequences, including soil degradation and a decline in biodiversity caused by issues like weed growth, diseases, pests, and chemical overuse. For this reason, Mineral employs robotics, computer vision, and artificial intelligence to establish a more eco-friendly approach to food production.

Google operates in almost 60 nations globally as of the end of 2022. In these areas, the strategy involves fostering biodiversity within our office and campus constructions, along with preserving and increasing accessibility to nature in the neighboring communities where the company is present. For this reason, the company obtained LEED certification. One way of doing so is Creating technology to combat the decline in biodiversity. Google is designing open tools, platforms, and AI-powered solutions. These aim to boost nature's resilience to climate change and tackle the factors contributing to the loss of biodiversity. (Google Environmental Report, 2023) Google is actively involved in reintroducing nature to urban spaces, including the restoration of vital habitats such as oak woodlands across its Bay Area campuses. The firm prioritizes enhancing biodiversity directly at Google offices and campuses by incorporating ecological design principles and reintegrating nature into urban environments. Google has taken further steps to improve biodiversity, contributing to the restoration of the Charleston Retention Basin near Bay Area campuses. This includes the development of almost 6 acres of freshwater marsh, and riparian communities. Additionally, efforts in 2022 led to the creation of approximately 5 acres of new habitat on Google campuses, specifically designed for monarch butterflies and other pollinators. Google is also incorporating nature into urban spaces to enhance urban biodiversity and foster a connection between people and nature. An illustration of this is a Platform G building in London's

King's Cross area, featuring a biodiverse green roof and plant selection designed in collaboration with the London Wildlife Trust to support native wildlife. The firm's approach to nature conservation has co-benefits, with a focus on carbon sequestration, water stewardship, and circularity to reduce resource extraction and environmental degradation. However, challenges include navigating local complexities, ensuring collective action, responsibly feeding a global workforce, promoting agrobiodiversity, sourcing healthy materials, and effectively measuring nature and biodiversity impacts. (Google Environmental Report, 2023)

AMAZON.COM

Amazon, a multinational technology and e-commerce enterprise established in 1994, stands as a beacon in the realms of online retail, cloud computing, and diverse technological innovations. Renowned for its ubiquitous influence on global commerce and digital infrastructure, Amazon's diverse operations encompass a spectrum of services and products that have reshaped the modern consumer landscape. I intend to explore the company's corporate stance on biodiversity-related matters by delving into its sustainability and climate reports. These documents are expected to provide a comprehensive overview of the company's initiatives, commitments, and progress in the realm of biodiversity conservation.

Amazon has executive management-level responsibility for biodiversity-related issues. The company conducts quarterly business reviews to monitor advancements toward its commitment to biodiversity-related initiatives. The Senior Management Team ensures a strategic alignment with The Climate Pledge – a commitment to achieving net-zero carbon status by 2040. (Amazon.com CDP Report, 2023) The company has developed a company-wide carbon accounting model to track progress on decarbonization. In 2019, the company established the Right Now Climate Fund, a \$100 million fund dedicated to nature-based solutions for restoring and conserving forests, wetlands, and grasslands. Amazon has made commitments across various commodities, including palm oil, paper, beef, soy, cocoa, coffee, and tea. These commitments likely involve sustainable and environmentally responsible practices to address biodiversity concerns associated with these commodities. The organization is actively undertaking actions to advance its biodiversity-related commitments in the reporting year. These actions specifically involve land and water protection, as well as land and water management. Regarding the use of biodiversity indicators to monitor

performance across activities, the organization currently does not utilize indicators. However, there is a plan to incorporate them within the next two years. (Amazon.com CDP Report, 2023)

According to Amazon's sustainability report, the company achieved various biodiversity-related milestones, including funding nature projects in communities, enhancing biodiversity in the UK, restoring ecosystems in France, planting trees in Italy, and restoring coastal habitats in the U.S. (Amazon Sustainability Report, 2022)

Throughout 2022, Amazon sustained its support for nature projects in the communities where it operates, undertaking initiatives in various locations including the UK, Italy, and France. In October 2022, Amazon allocated £2.8 million towards supporting two programs in the United Kingdom: The Rewild London Fund under the guidance of the Mayor of London and the Woodland Trust's Emergency Tree Fund. (Amazon Sustainability Report, 2022) These initiatives share the common objectives of enriching biodiversity and enhancing access to nature through tree-planting activities, concurrently generating employment opportunities. Collectively, these programs aim to plant over 450,000 trees and provide backing for 22 crucial rewilding projects in London. (8-K, 2023)

In France, Amazon committed €3 million over a span of three years to support CDC Biodiversité's Fonds Nature 2050 program. The aim is to conserve and regenerate biodiversity, while also mitigating the impacts of climate change and enhancing the resilience of ecosystems. (Amazon Sustainability Report, 2022) Amazon has collaborated with environmental allies to promote initiatives that enhance marine biodiversity, benefiting the coastal communities where the company has a presence in the U.S. Since 2021, Amazon has contributed to three specific projects. These include financial support for the Puget Sound Restoration Fund, aimed at rejuvenating Olympia oyster habitats near the Port of Seattle. Additionally, a pilot project with the Bay Foundation for giant kelp reforestation near the Port of Los Angeles was initiated. Furthermore, the company is funding the restoration of a living shoreline in collaboration with the Port of Virginia, scheduled to commence in 2023. Additionally, Amazon planted over 6,000 trees within the Forestami Project in Italy. It is also worth mentioning that Amazon is a holder of both FSC and LEED certificates.

ASML Holding

ASML Holding NV is a Dutch company, operating since 1984, and is recognized as the dominant supplier of photolithography systems, which are crucial for the production of integrated circuits (ICs) and micro-chips. Semiconductor manufacturers across the globe utilize ASML's systems to fabricate sophisticated chips employed in a multitude of electronic devices.

During the General Meeting of Shareholders of ASML Holding N.V. on April 26, 2023, Mr. Veltman from the Dutch Association of Investors for Sustainable Development (VBDO) congratulated ASML on their achievements and posed three questions. Firstly, he inquired about ASML's determination that biodiversity is not a significant topic for the company, given the potential impact of mining activities on biodiversity and local emissions on plant life. Secondly, he asked if ASML utilizes or plans to use specific methods for sustainable chemical and materials management. Lastly, he questioned whether ASML intends to assess the alignment of its lobbying activities with its sustainability objectives in the coming year. Mr. Wennink responded to the biodiversity question by stating that ASML conducts annual assessments to identify material ESG Sustainability topics, including biodiversity. (Holding, 2023) Although biodiversity was recognized as increasingly important, it was not deemed a material topic based on ASML's operations and value chains. However, ASML remains committed to biodiversity preservation through initiatives like the 'green communities' pillar of its Community Partnership Program. In the company's annual report for 2023, it is emphasized the ASML's commitment to enhancing the sustainability of local communities through the promotion of green spaces and biodiversity. (Annual Sustainability Report, 2023) The primary focus within the green communities program is to increase the availability of green spaces and enhance their quality through collaboration with external partners. For this reason, the company was awarded LEED certification.

According to the CDP Climate Report 2023, ASML has both executive management and board-level oversight responsibility for biodiversity-related issues. Despite biodiversity not being recognized as a significant concern for ASML on a global scale through its annual materiality assessment, the company addresses its influence on biodiversity-related matters at a local level. (ASML Holding - CDP, 2022) It prioritizes green communities as part of its sustainability strategy, aiming for no net loss of biodiversity and no net deforestation. The Board of Management oversees the sustainability strategy's execution, including biodiversity concerns, with updates provided

quarterly. ASML has made public commitments to initiatives like No Net Loss and No Net Deforestation related to biodiversity conservation. The organization assesses the effects and interdependencies of its value chain on biodiversity confirms the implementation of tools and methods, with an indication that no significant risks have been identified currently through ecological assessments. In the reporting year, actions taken to advance biodiversity-related commitments include contributing to the development of new green spaces and enhancing biodiversity, as well as compensating for the loss of greenery attributed to the organization. Nevertheless, the organization does not employ biodiversity indicators to assess performance throughout its operations. (ASML Holding - CDP, 2022)

Broadcom Inc

Broadcom Inc. is a worldwide leader in the infrastructure technology industry that specializes in design and provides a wide range of software solutions. The main areas of expertise are telecommunications and networking. According to the company's sustainability reports or ESG releases, there is a noticeable lack of specific actions or plans concerning biodiversity-related issues. According to the recent Climate Report, the organization currently lacks board-level oversight or executive management-level responsibility for biodiversity issues. (Broadcom Inc. - CDP, 2023) Additionally, there is no present commitment to biodiversity-related issues and there are no intentions to undertake any biodiversity-related assessments within the following two years, and there are no biodiversity metrics employed to track the performance throughout the company's operations. However, the organization is actively addressing biodiversity-related goals through activities such as safeguarding water/land and awareness initiatives. Furthermore, information about the company's response to biodiversity issues during the reporting year is available in Environmental Sustainability Projects in Fort Collins. These initiatives, touching on biodiversity, include projects like redirecting industrial process rinse water to reduce fresh water usage. The Board of Directors is accountable for addressing any convergence between biodiversity and environmental sustainability matters.

Mastercard

Mastercard is a global financial technology company that provides payment processing solutions. It enables secure and convenient electronic transactions between merchants, consumers, banks, and governments worldwide. Mastercard provides services such as handling credit and debit card

transactions, enabling digital payments, and providing financial technology solutions to businesses and financial institutions.

The CDP Climate Report (2023) outlines Mastercard's climate-related engagement strategy with its customers, primarily through its Priceless Planet Coalition. This initiative offers all customers and their consumers the opportunity to support forest restoration projects aimed at mitigating global greenhouse gas emissions, promoting biodiversity, and benefiting local communities. In 2022, over 150 cause-related campaigns were launched to raise funds for tree and forest restoration. (Mastercard - CDP, 2023) The coalition partners with global environmental organizations like Conservation International and World Resources Institute to mobilize and coordinate restoration efforts. This collaboration involves local communities and stakeholders for long-term forest stewardship, employing science-based best practices. The impact of engagement is measured by the restoration of trees, with a target of 100 million trees. Mastercard is engaged in a large-scale conservation initiative aimed at promoting climate and biodiversity benefits while also supporting local communities for sustainable economic development. Partnering with Conservation International and the World Resources Institute, the project focuses on scientifically guided investments to restore ecosystems in socially responsible ways, ensuring positive impacts on climate, community, and biodiversity. (Mastercard - CDP, 2023) This involves planting suitable tree species in appropriate locations, employing consistent monitoring and maintenance practices, and utilizing ecologically and socially appropriate restoration methods without invasive or timber-harvesting species. Mastercard evaluates not just the quantity of trees regenerated and their carbon sequestration impact as projects develop, but also the positive effects its efforts have on local communities. Assessing the long-term vitality of forest landscapes and biodiversity is another key monitored aspect. The company's ongoing assessment involves various protocols for each project, including long-term, first-year and baseline evaluations, along with global analysis using advanced technologies like geospatial mapping, on-site sampling, and satellite imagery. Continuous statistical analysis ensures effectiveness and enhances precision, while control sites mirroring original conditions help determine the additional benefits of our interventions. In Australia, specifically in Victoria and New South Wales, the project aims to regenerate 430,000 trees, with a focus on natural regeneration. The project aims to restore degraded land into healthy ecosystems using diverse plantings, fostering habitat connectivity, and aiding in biodiversity. (Mastercard Sustainability Report, Doing Well by Doing Good, 2021) The initiative in Brazil aims

to plant 2,000,000 trees, with a focus on restoring forested areas using a variety of native species. This effort aims to create habitat corridors for endangered biodiversity in the Amazon and Atlantic Forests, while also enhancing ecosystem services and promoting local livelihoods to strengthen the relationship between communities and the natural environment.

As of 2022, funding has been secured to restore approximately 13 million trees, with 4 million trees already restored, and additional projects have been initiated across 19 countries. However, this is still short of the 2025 goal of restoring 100 million trees. (Mastercard Sustainability Report, Doing Well by Doing Good, 2022) Steps are being taken to speed up the progress, such as introducing tools to engage consumers, while also prioritizing top-quality restoration projects that have substantial impacts on climate, community, and biodiversity. The company is diligent in its approach to green building construction and the preservation of green spaces, which has resulted in it securing LEED certification.

Mastercard's Wildlife Impact Card initiative provides an opportunity for individuals who are enthusiastic about nature and environmental conservation to participate in safeguarding extremely threatened species and biodiversity. In association with Conservation International, the program aids in the preservation and rehabilitation of wildlife habitats across the globe. Starting in 2022, by teaming up with financial institutions like DSK Bank in Bulgaria, Mastercard broadens its outreach, presenting eco-friendly debit cards adorned with wildlife themes. With each card issuance, DSK Bank contributes \$1 to Conservation International, without any additional expense to cardholders. (Mastercard Sustainability Report, Sustainability Bond Report, 2023)

The organization has executive management responsibility for biodiversity issues, supervised by the Priceless Planet Coalition and monitored by the executive-level ESG Steering Committee to accomplish the objective of restoring 100 million trees by 2025. Furthermore, the executive team guarantees the allocation of suitable resources and prioritization of tasks associated with raising funds for restoration efforts. (Mastercard Sustainability Report, Doing Well by Doing Good, 2022) In addition, the organization has made public commitments to biodiversity initiatives, including a commitment to No Net Loss, Net Positive Gain, and the adoption of the mitigation hierarchy approach. They have also committed to respecting legally designated protected areas, respecting these areas, and avoiding adverse effects on endangered and protected species. The organization presently does not evaluate how its value chain affects biodiversity and has no plans to do so in

the next two years. Moreover, it has not initiated any actions in the past year to fulfill its biodiversity-related commitments and does not intend to take any such actions. Furthermore, the organization does not utilize biodiversity metrics to evaluate its performance across its operations.

Meta

Meta Platforms Inc. is a global conglomerate, operating in the technology industry. The company is responsible for managing Facebook, WhatsApp, Instagram, and Messenger, providing opportunities to communicate and engage with people.

According to the 2023 sustainability report, the company believes that it plays a crucial part in promoting the progress and availability of carbon removal solutions, encompassing both natural and technological approaches. Such projects are crucial for optimizing the immediate impact on climate while also endorsing essential solutions for future carbon removal needs. (Meta Sustainability Report, 2023) For instance, a project focused on restoring a forest, which generates carbon credits, could enhance the ecological well-being or biodiversity of a particular area. One of the projects is Cedro Creek Restoration which aims at improving the quality of water and biodiversity, decreasing erosion, and advancing baseflow duration. During the year 2021, beehives were set up at Meta's offices in Dublin, New York, and Seattle providing a home for more than 180,000 bees and supporting pollinators. (LimnoTech, 2022) The company continually assesses risks and opportunities related to climate to guide itself in implementing appropriate measures. Numerous initiatives addressing emissions, energy water, and biodiversity not only contribute to its commitment but also foster community climate resilience. Meta advocates for biodiverse habitats by minimizing their environmental impact, and considering efforts to safeguard sensitive or ecologically unique areas. For this reason, so far Meta has safeguarded and allocated over 3,400 acres of natural habitat across 20 data centers in North America, representing 58% of its existing data center footprint. (Meta, Our Path to Net Zero, 2023) These landscapes not only contribute to habitat preservation but also serve as economical carbon sinks, aid in soil stabilization, and offer water-efficient and climate-resilient solutions. Moreover, Meta is a FSC and LEED certificate holder.

Microsoft

Microsoft Corporation, based in Redmond, Washington, is a global technology company established in 1975 by Bill Gates and Paul Allen. It holds a prominent position in the software,

hardware, and technology services sector. Microsoft is well-known for its widely used operating system, Microsoft Windows, and a range of productivity software, such as Microsoft Office. In 2021, the company supported The Nature Conservancy (TNC) Belize Maya Forest Project (BMF) to safeguard an extra 236,000 acres within an area recognized as a hotspot for global biodiversity. (Microsoft, Microsoft and the United Nations Sustainable Development Goals Report, 2023) The above-mentioned was done by improving storage capacity, and water quality. The initiative is implementing a nature-based wastewater treatment system at the lake, employing a constructed wetland system. It is projected to handle 6,000-7,000 m³ of daily wastewater inflow into the lake, providing benefits to around 10,000 individuals. These measures will enhance groundwater recharge, create habitats for biodiversity, and contribute to flood control. (Microsoft, Environmental Sustainability Report , 2022) Additionally, the project aims to establish a waterfront area for recreational use by community members. In December 2021, the Belizean government placed these acres under a declaration of trust, resulting in the permanent protection of nine percent of Belize's land. Microsoft is employing biomimicry to assess the impact of its data centers and discover opportunities to improve the surrounding ecosystems. (Microsoft, The 2023 Impact Summary - Building a Responsible Future, 2023) In 2022, the company's pilot in North Holland involved researching resilient landscapes and implementing landscape solutions into the existing data center campus based on the findings. The initial phase included planting 150 native trees and 2,300 sq. meters of shrubs, grasses, and groundcovers around the campus. Subsequent phases will be measured for their impact on air quality, and biodiversity both on the direct campus and surroundings. (Microsoft, Environmental Sustainability Report , 2022) Additionally, Microsoft is initiating a range of ecological restoration projects aimed at aiding the recovery of ecosystems, enhancing the biodiversity of native species, and developing green spaces for everyone. For this reason, the company has obtained LEED certification. The company also employs the Last Chance Ecosystems Framework to prioritize the choice of land conservation projects and collaborates with the UN Biodiversity Lab to create tools for managing conservation.

Microsoft is also dedicated to providing digital technology that supports environmental decision-making for a diverse range of organizations worldwide. The Planetary Computer consolidates and archives spatiotemporal datasets, establishing a comprehensive indexed data repository for Earth's natural systems. (Microsoft, The 2023 Impact Summary - Building a Responsible Future, 2023) This data facilitates the development of predictive models to anticipate the impacts of climate

change. Illustrations include land use data for identifying alterations in urbanization or forest biomass, demographic exposure data indicating areas requiring climate adaptation, and biodiversity data for monitoring conservation effectiveness and promoting the sustainable utilization of natural resources.

According to Microsoft's CDP Climate Report, the company has both executive management-level and board-level oversight responsibility for biodiversity-related issues. Sustainability is deeply integrated into the company's governance structure, with the Board of Directors providing oversight on environmental and social matters. (CDP M. , 2023) The Environmental, Social, and Public Policy Committee focuses on key environmental issues, including climate change and environmental sustainability. Microsoft's commitment to protecting more land than it uses and building a Planetary Computer demonstrates its dedication to understanding and safeguarding biodiversity. The committee meets regularly to review updates on environmental sustainability commitments, and senior executives present on sustainability topics. The organization has publicly pledged and supported initiatives concerning biodiversity. However, it does not currently assess the effects of its value chain on biodiversity and has no plans to do so in the next two years. Despite this, actions have been taken in the reporting period to advance biodiversity-related commitments, including land and water protection. The organization utilizes biodiversity indicators, specifically response indicators, to monitor performance across its activities. (CDP M. , 2023)

NVIDIA

NVIDIA Corporation is an American multinational technology company, renowned for its graphics processing units, which are widely used in gaming, professional visualization, artificial intelligence, and high-performance computing applications. As stated in the Corporate Sustainability Report, the company is actively engaged in implementing UN Sustainable Development Goals, and, by all means, it considers sustainability improvement, especially in India. (NVIDIA, Corporate Responsibility Report, 2022) sThe company endorses initiatives aimed at constructing water-harvesting structures, planting indigenous trees, enhancing soil vitality, etc. It is also a Leed certification holder.

According to Climate Report 2023, there's a current absence of board-level oversight or executive management responsibility for biodiversity-related issues. Moreover, the company has no

dedication or support for initiatives related to biodiversity, and there are no intentions to do so in the next two years. (NVIDIA, CDP Climate Change Response , 2023) Additionally, there is no assessment of the impact of the organization's value chain on biodiversity, no actions taken to advance biodiversity-related commitments, and no utilization of biodiversity indicators to monitor performance.

[Novo Nordisk](#)

Novo Nordisk, which originated in Denmark, is a global healthcare company primarily focused on diabetes care. It operates in over 170 countries and specializes in developing and providing innovative treatments, including insulin, for diabetes and other chronic diseases.

Novo Nordisk aims for a completely neutral environmental footprint. The company is committed to initiating disclosures related to nature and biodiversity and is in the process of developing a strategy in this area. Additionally, Novo Nordisk is an early adopter of TNFD and has committed to report to TNFD by 2025. (TNFD, 2024)

During the Capital Market Day held on the 7th of March, 2024, it was highlighted that Novo Nordisk has initiated programs to address waste from its devices, such as the remit program, which is active in four countries for recycling plastic devices. The company has also invited competitors to join these efforts. (Nordisk, 2024) Additionally, there is a growing focus on biodiversity, which is seen as a significant societal challenge, potentially surpassing even CO2 emissions. Novo Nordisk aims to understand and mitigate its biodiversity impacts as part of its corporate responsibility efforts.

As outlined in the company's annual report, human health faces risks from biodiversity loss and climate change. Therefore, as a leading healthcare firm committed to global patient care, it acknowledges its vital role in addressing these challenges. (Novo Nordisk, Annual Report, 2023) In 2023, Novo Nordisk undertook its first comprehensive double materiality assessment to identify the key environmental, social, and governance (ESG) topics pertinent to the company. This evaluation encompasses the company's impact on society and the environment, as well as the influence of ESG factors on its operations. The assessment engaged internal experts, leaders, and external stakeholders like patient groups, suppliers, and investors to ensure a holistic understanding of material issues. The assessment is geared towards preparing for the rollout of

the Corporate Sustainability Reporting Directive (CSRD) in 2024. (Novo Nordisk, Annual Report, 2023) It encompasses all the areas specified in the CSRD, as well as other material ESG issues for Novo Nordisk. Among them, biodiversity stands out as a key focus area that will shape the company's ESG reporting strategy starting in 2024. The initial assessment highlights Novo Nordisk's environmental endeavors, focusing on carbon emissions reduction and circular economy initiatives like plastic recycling. Additionally, it underscores the company's acknowledgment of its reliance on natural resources, with an emphasis on biodiversity. (Novo Nordisk, Corporate Strategy Purpose and Sustainability, 2023)

The company aims to alleviate pressure on biodiversity by aligning with global initiatives such as the Convention on Biological Diversity and the UN Sustainable Development Goals, specifically targeting goals 14 and 15. Their support extends to the three main objectives of the convention: conserving biodiversity, sustainably utilizing it, and ensuring fair benefits from genetic resource use. (Novo Nordisk, Annual Report, 2023) They recognize biodiversity's significance as a global asset for current and future generations and endorse protocols like the Cartagena and Nagoya Protocols for safe handling of modified organisms and natural resource utilization frameworks. The company recognizes its impact on ecosystems due to resource consumption in pharmaceutical production and prioritizes sustainable resource usage. Adhering to local regulations, which commonly encompass biodiversity concerns, is the baseline standard, recognizing habitat loss as the foremost challenge to biodiversity. The company is actively engaged in projects to protect habitats and mitigate the impact of its operations on ecosystems. For instance, at its production site in Brazil, The NovoEco initiative seeks to rejuvenate green spaces through the planting of indigenous plant species. Additionally, over 65,000 square meters of land in Malov, Denmark, are dedicated to planting approximately 24,000 Nordic trees, preserving biodiversity. Furthermore, the company is phasing out pesticide use, converting over 90,000 square meters of lawns into diverse grass and flower areas, and incorporating biodiversity considerations into new facility planning. (Novo Nordisk, Our Position on Biodiversity , 2023) The company employs a method of treating sanitary wastewater to irrigate green spaces, promoting responsible water management practices. Furthermore, Novo Nordisk has committed to being an early adopter of the Task Force on Nature-related Financial Disclosures (TNFD), aiming to align its disclosures with TNFD standards by the financial year 2025. The company is diligent in its approach to green building

construction and the preservation of green spaces, which has resulted in it securing LEED certification.

According to the company's CDP Climate Report 2023, Currently, the organization does not have executive management accountability or board-level supervision for biodiversity-related matters but intends to establish both within the next two years. While it hasn't made explicit public pledges, it has supported initiatives like the CBD Global Biodiversity Framework and SDGs. (Novo Nordisk - CDP, 2023) The company evaluates how its value chain affects biodiversity using tools such as the ENCORE. To advance its biodiversity-related commitments, The organization prioritizes the sustainable utilization of natural resources and adheres to global responsible sourcing standards to mitigate negative environmental effects and safeguard natural resources.

Tesla

Tesla is a global American company that provides electric vehicles, known for renewable energy products and related goods and services.

Tesla has acknowledged potential risks common to automotive and technology industries, specifically identifying the risk to forests and biodiversity within the Salient Environmental Risks category. Tesla has been involved in a 2024 Shareholder Resolution addressing concerns about Deep Sea Mining (DSM). (Tesla, 2024 Shareholder Resolution, 2024) Unlike its counterparts, Tesla has not endorsed a DSM moratorium, causing shareholder apprehension regarding the company's handling of reputational and regulatory risks. The refusal to endorse a moratorium, coupled with uncertainties in incorporating deep sea-sourced minerals into the supply chain, raises concerns about the potential negative impact on biodiversity, contradicting the Kunming-Montreal Global Biodiversity Framework. In alignment with the company's investment objectives, nature protection is prioritized. (Tesla, 2024 Shareholder Resolution, 2024) The main focus is on influencing these areas through investments that aim to reduce greenhouse gas and decrease reliance on fossil fuels, ultimately playing a role in fulfilling NetZero by 2050. Moreover, it is a FSC (Forest Stewardship Certificate) and LEED certificate holder. However, Tesla falls short in providing sufficient disclosure on sustainable commitments and measurable targets. While electric vehicles (EVs) are environmentally friendly, the manufacturing process poses environmental challenges. (Tesla, Company ESG Report , 2022) To enhance transparency and accountability, specific targets should be established for climate, biodiversity, and social aspects, allowing

investors to measure the positive changes. While Tesla demonstrated satisfactory management of external environmental risks, there is room for improvement in addressing main social and governance issues. Enhanced transparency in disclosing efforts to mitigate biodiversity loss and climate change impacts is essential. The company collaborates directly with the mine, bypassing intermediaries, and asserts its commitment to tackling sustainability concerns like biodiversity impact, energy consumption, and human rights management by engaging with suppliers directly.

Taiwan Semiconductor Manufacturing Company

Taiwan Semiconductor Manufacturing Company (TSMC) was established in 1987, in Taiwan. Nowadays, it is the world's largest devoted independent semiconductor foundry. It specializes in manufacturing semiconductors for a wide range of customers, including fabless semiconductor companies, integrated device manufacturers (IDMs), and other electronics companies.

In 2021, TSMC released its inaugural Materiality Analysis Report to enhance expertise in ESG management. Materiality analysis is vital for creating the Sustainability Report, establishing long-term sustainability objectives, and engaging stakeholders. TSMC developed a methodology aligned with GRI Standards integrating stakeholder concerns and sustainable management requirements to identify significant ESG issues. (TSMC, Sustainability Report, 2021) TSMC shifted the frequency of materiality analysis from annually to once every three years starting in 2021. The next materiality analyses are scheduled for 2024. The latest materiality analysis concluded in late 2021, with active participation from 206 TSMC managers and colleagues, alongside 1,082 stakeholders. Revisions to significant matters from 2020 involve the incorporation of three additional issues: Business Continuity Management, Biodiversity, and Diversity & Inclusion. Biodiversity emerges as a possible significant concern for TSMC, and its related practices and achievements will be elaborated in the sustainability report. As already mentioned, TSMC remains attentive to evolving ESG trends and monitors advancement toward long-term sustainability objectives. (TSMC, Sustainability Report, 2021) When constructing new facilities, TSMC aims to minimize environmental impacts by planting trees, preserving existing vegetation, and relocating plants according to Taiwan's Environmental Impact Assessment (EIA) protocol. Since 2006, all new TSMC plants and offices have adhered to standards set by the U.S. Green Building Council and Taiwan Green Building Council. Additionally, TSMC has begun integrating biodiversity principles and practices, fostering eco-friendly environments through diverse green

landscapes. Beginning in 2006, the company adopted a proactive approach towards LEED certification. Following TSMC's initial LEED Gold certification in 2008, a total of 47 projects in Taiwan have successfully obtained LEED certification, with an additional 122 projects currently awaiting certification. These commitments align with TSMC's dedication to UN Sustainable Development Goal 15: Protect and sustainably manage terrestrial ecosystems, ensuring biodiversity. The company strongly believes that environmental awareness and education enhance sustainability. (TSMC, UN SDGs Action Report, 2021) In 2021, TSMC eco-volunteers engaged students and visitors in ecological tours and hands-on activities to promote biodiversity and awareness of nearby ecological areas. Moreover, they utilized their energy-saving and safety knowledge to assist rural schools in enhancing campus energy efficiency and designed educational games to teach students about energy and water conservation. (TSMC, Climate and TCFD Report, 2021)

Johnson & Johnson

Johnson & Johnson is a multinational healthcare company widely known for its vast range of products, including medical devices, health products, and pharmaceuticals. Ever since its foundation, it has grown into one of the largest and most diversified healthcare companies in the world, with a special commitment towards research & development and innovation.

In 2020, Johnson & Johnson, in collaboration with the World Wildlife Foundation (WWF), contributed to the 30 Hills project in Sumatra, Indonesia, aiming to protect 38,665 hectares of rainforest from being converted into agricultural lands such as rubber plantations or oil palm. (Johnson & Johnson, Health for Humanity Report, 2022) This initiative not only preserves a critical rainforest area adjacent to Bukit Tigapuluh National Park but also acts as a crucial area for the preservation of biodiversity and carbon reserves. The project is designed to prevent deforestation, reduce human-wildlife conflicts, and support sustainable livelihoods that decrease interactions between livestock and wildlife. (Johnson & Johnson - CDP, 2022)

Johnson & Johnson has a long-standing commitment to environmental stewardship, demonstrated through the establishment and reporting of public environmental goals, as well as the enforcement of rigorous Environmental Health and Safety (EH&S) Standards across all company sites, covering areas such as air emissions, water management, waste disposal, and biodiversity preservation. (Johnson & Johnson, Health for Humanity Report, 2022) Moreover, Most of Johnson & Johnson's

R&D facilities have obtained certification for complying with the ISO 14001 Environmental Management System. Johnson & Johnson supports the aims of CBD, which promotes the sustainable use and preservation of biodiversity. Additionally, Johnson & Johnson commits to complying with the Nagoya Protocol, which aims to ensure fairness in sharing the benefits derived from the use of bio-resources. (Johnson & Johnson, Position on Environmental Stewardship, 2024)

To mitigate any direct effects on biodiversity, Johnson & Johnson enforces measures such as assessing its site for risks to sensitive plant and animal species and creating conservation plans. The company also implements standards for suppliers, ensuring compliance with sustainability and environmental responsibility, particularly regarding natural products and derived ingredients, where suppliers must adhere to forest protection laws and integrate biodiversity conservation practices. (Johnson & Johnson, Position on Environmental Stewardship, 2024) Through collaboration with supply chain partners, to establish suitable standards, the company evaluates potential risks and impacts associated with procurement activities. (Johnson & Johnson, Health for Humanity Report, 2022)

In 2021, Johnson & Johnson took action to safeguard tropical rainforests associated with its supply chain through two forest partnerships, aiming to enhance biodiversity and support local communities. (Johnson & Johnson, Position on Climate Action, 2023) This involved contributing to a forest conservation project in Loreto, Peru, aimed at preserving 10,000 hectares of untouched Amazon rainforest, and backing forest restoration and protection endeavors in Sumatra, Indonesia, encompassing more than 38,000 hectares. The company is diligent in its approach to green building construction and the preservation of green spaces, which has resulted in it securing LEED certification. (Johnson & Johnson, Health for Humanity Report - Progress in Sustainability, 2021)

According to the company's 2022 CDP Climate Report, biodiversity matters are overseen at the executive management level, with the Executive Vice President & Chief Global Supply Chain Officer responsible for environmental sustainability, including biodiversity. This role encompasses the supervision of Environmental Health & Safety and Sustainability, with significant updates and potential risks regarding biodiversity initiatives being subject to review. (Johnson & Johnson - CDP, 2022) Furthermore, Johnson & Johnson has publicly supported initiatives aligned with the global biodiversity framework, highlighting its dedication to preserving biodiversity. The organization does not currently evaluate how its value chain affects biodiversity

or uses biodiversity indicators to monitor performance. However, there are plans to start assessing biodiversity-related impacts and take actions to advance biodiversity commitments within the next two years.

JP Morgan Chase

JPMorgan Chase, headquartered in New York City, is a leading multinational financial services firm. Renowned globally, it offers a diverse range of financial services, encompassing banking, asset management, and investment banking. Operating under the JPMorgan Chase brands, the company is distinguished for its significant presence in the global financial markets. Under the institution's approach to sustainable development target, JPMorgan Chase's green objective is designed to endorse both climate change and managing resources sustainably. (JPMorgan Chase & Co, Our Approach to Our Sustainable Development Target, 2023) These objectives can complement one another, as many impactful measures that tackle climate change also produce positive outcomes for biodiversity and the sustainable utilization of resources. These objectives consider preservation and biodiversity, encompassing the stewardship or enduring cultivation of land-based or marine life ecosystems and woodlands. The delayed COP15³ meeting in Montreal highlighted the economic, business, and societal dangers posed by biodiversity loss, as new laws aimed at conserving and reviving nature are being examined in regions such as Europe, America, and China. JP Morgan Chase is keeping a close eye on the progress of the Taskforce for Nature-related Financial Disclosures (TNFD), which will standardize how businesses assess and report financial risks and opportunities related to nature. (JPMorgan Asset Management, 2023) In its interactions with businesses, JP Morgan Chase aims to assess not only the reduction of environmental risks but also the exploration of new commercial opportunities. Sectors such as agriculture, ocean and land use, energy, construction, and mining, which are major contributors to 80% of biodiversity loss, are being encouraged to transition to less resource-intensive models. This shift could potentially unlock an estimated annual revenue of USD 10.1 trillion for these industries. To advance the shift towards a low-carbon economy and offer investments that are mindful of environmental, social, and governance (ESG) factors, focusing on climate, conservation, and

³ The 2022 UN Biodiversity Conference, part of the Convention on Biological Diversity and held in Montreal, Canada, resulted in a global pact to conserve 30% of the planet's land and oceans by 2030, along with the establishment of the Kunming-Montreal Global Biodiversity Framework.

biodiversity, J.P. Morgan Asset Management has purchased Campbell Global, LLC, a firm specializing in Forest Management and Timberland Investing. (JPMorgan Asset Management, 2023) Campbell Global operates long-established commercial forestry operations both in the United States and internationally. JPMAM is committed to responsible investing, emphasizing sustainable forestry practices that not only yield investment returns but also enhance the environment. The strategy includes replanting harvested trees, making forests accessible for recreational use, and providing detailed and transparent reports on these activities. Furthermore, JP Morgan Chase joined FAIRR, an industry initiative dedicated to addressing environmental, social, and governance (ESG) risks in the global food sector and advocating for sustainable food systems. (JPMorgan Asset Management, 2023) This decision was influenced by its collaboration with an advisory client emphasizing sustainable nutrition, along with our heightened attention to matters concerning natural capital and biodiversity. This commitment is underscored by the incorporation of the firm's new sixth Investment Stewardship Priority, focusing on ecosystems and natural capital. JP Morgan Chase is involved in several types of Carbon Projects. The projects encompass a diverse range of types within the evolving voluntary market and incorporate new emission-reduction technologies. Each project type offers distinct opportunities and challenges, necessitating careful consideration of various factors for transactions or investments. The project types are as follows:

- Better forest management and deforestation prevention with potential benefits of biodiversity preservation.
 - Better management of grassland and soil with potential benefits of biodiversity impacts.
- (JPMorgan Chase & Co, Carbon Market Principles, 2023)

JPMorgan Chase's GoGreen program, facilitated by employee volunteers globally, strives to cultivate a community of knowledgeable and engaged individuals dedicated to the company's sustainability goals. The program's objective is to raise employee awareness about JP Morgan Chase's sustainability initiatives and targets, offering them opportunities to get involved in sustainable activities both at work and in their personal lives. Throughout the first half of 2023, GoGreen team events and activities were organized to fulfill these objectives, including local biodiversity-themed ones to commemorate UN World Earth Day. (JPMorgan Chase & Co, Climate Report 2023)

Eli Lilly & Co

Eli Lilly and Company, commonly known as Lilly, is a multinational pharmaceutical corporation with its headquarters situated in the United States. Primarily the company focuses on developing and discovering products for the treatment of various medical conditions. Lilly invests significantly in research and development, with a focus on innovation and collaboration. The company also acknowledges its responsibility to minimize carbon emissions and address climate-related challenges, aligning with efforts to move towards a sustainable, low-carbon economy. The company's climate report questionnaire describes the approach utilized to outline expenditures and income that coincide with the company's climate transition objectives. (CDP E. L., 2023) This includes monitoring costs associated with KPIs like pollution prevention, sustainable water management, biodiversity preservation, etc. The methodology involves the collaboration between environmental and finance teams to monitor projects aligned with environmental sustainability indicators. Projects are identified yearly and reported in a Sustainability Allocation and Impact report.

Guided by its core values of integrity, excellence, and respect for people, Eli Lilly & Co aims to make a positive difference in communities while reducing its environmental footprint. The company's Environmental, Social, and Governance (ESG) strategy, shaped by its impact framework, prioritizes its purpose and encompasses five pillars that dictate the actions and societal contributions. (Eli Lilly & Co CDP, 2023) Sustainability has always been a cornerstone of Lilly, and it remains committed to ensuring that sustainability endeavors address significant concerns for the company, employees, and society. After consulting a wide range of stakeholders, Lilly identified 15 ESG areas crucial to both the company's enduring prosperity and stakeholders. These encompass environmental matters such as climate, water, waste, product stewardship, and biodiversity.

In September 2021, Lilly launched its first sustainability bond, raising around €596 million in net proceeds. These funds are dedicated to eligible projects outlined in Lilly's Sustainability Bond Framework, in alignment with the International Capital Market Association (ICMA) Sustainability Bond Guidelines 2021. (Eli Lilly & Co, Environmental, Social and Governance Report , 2021) The bond, with a 12-year term, carries an annual interest rate of 0.50% and matures on September 14th, 2033. Another environmentally eligible project is “Terrestrial and Aquatic Biodiversity Conservation” aimed at improving marine, coastal, and watershed ecosystems. This project falls

under SDG 14 and SDG 15 (Life Below Water, Life on Land). (Eli Lilly & Co, Sustainability Bond Allocation and Impact Report, 2022) In 2022, surveillance was carried out at eleven out of twenty-six sites to monitor phosphorus or active pharmaceutical ingredients. Phosphorus monitoring happens weekly or monthly via sampling or mass balance estimates, while daily batch records are employed to evaluate active pharmaceutical ingredient discharge. (Eli Lilly & Co CDP, 2023) Monitoring these elements is vital due to their potential impact on aquatic biodiversity and water system infrastructure. The organization's scenario analysis concerning water-related outcomes and its impact on business strategy highlights the assessment of long-term low-flow data of rivers and streams receiving wastewater from manufacturing sites to protect water quality during severe drought conditions. Additionally, they implement mixing zone restrictions for specific substances to safeguard water quality and biodiversity.

The CDP Climate Report 2023 reveals that the organization demonstrates a comprehensive approach to biodiversity-related issues. Firstly, there is dual oversight at both the executive management and board levels, ensuring that biodiversity concerns are integrated into the company's strategic decision-making processes. (CDP E. L., 2023) The Directors and Corporate Governance Committee oversee various social, environmental, and governance trends, while the full board is actively engaged in ESG oversight and approves long-term environmental goals. Examples include managing water in stressed areas and controlling pharmaceutical discharge in stressed areas, aligning with climate stress factors. Additionally, the organization has publicly pledged and supported initiatives related to biodiversity. These commitments include implementing water management strategies in regions facing water scarcity and guaranteeing that pharmaceutical facilities adhere to environmental safety regulations. These efforts reflect the organization's commitment to biodiversity conservation and environmental sustainability. (CDP E. L., 2023) The questionnaire responses indicate that the organization primarily concentrates on assessing the influence of its value chain on biodiversity, with a particular emphasis on the upstream section. In the reporting year 2023, efforts aimed at fulfilling biodiversity commitments encompass initiatives pertaining to the management of land and water resources.

Methodology

Based on the methodology outlined, this study conducted a contextual analysis of the top 15 companies listed on the MSCI All-Country Index, focusing on their biodiversity commitment. Utilizing Bloomberg's DS function and keyword searches such as "Biodiversity," a comprehensive review of documents including annual reports, sustainability reports, and climate reports was undertaken to extract relevant information. Each company's documentation was meticulously analyzed to understand its approach towards biodiversity. Therefore, in the scoring system, a set of 10 criteria was established to comprehensively assess the biodiversity commitment of the selected companies. The table below lists the criteria and their definitions:

Criteria	Definition
Biodiversity Integration	Assessing the extent to which companies incorporate biodiversity considerations into their operations, strategies, and reporting
Environmental Performance	Assessment of the company's environmental impact, including carbon footprint, waste management, and resource usage
Transparency and Disclosure	Evaluation of the company's transparency in reporting environmental practices, including the clarity and depth of information provided in sustainability reports and disclosures.
Sustainability Initiatives	Analysis of the company's efforts to implement sustainable practices.
Compliance and Regulatory Adherence	Review of the company's compliance with environmental regulations (TNFD) and certifications like FSC or LEED.
Stakeholder Engagement	Assessment of the company's engagement with stakeholders, including communities, environmental organizations, and shareholders.
Innovation and Adaptation	Examination of the company's innovation in developing and adopting new technologies or processes to mitigate environmental impacts.
Risk Management	Evaluation of the company's identification and mitigation of biodiversity risks
Supply Chain Sustainability	Analysis of the company's efforts to ensure sustainability across its supply chain.
Long-term Strategy	Assessment of the company's long-term environmental strategy, including goal setting, target alignment with global sustainability frameworks (e.g., UN Sustainable Development Goals), and commitment to continuous improvement.

Subsequently, a scoring system was developed, allocating a maximum of 5 points to each category. However, to reflect varying degrees of importance, the categories were weighted accordingly, with Biodiversity Integration and Long-term Strategy bearing the highest weights at 15% each. Assigning the highest weights to Biodiversity Integration and Long-term Strategy emphasizes their critical importance in sustainability efforts. Biodiversity Integration shows a company's commitment to embedding ecological considerations into its core operations, highlighting its role in preserving natural systems. Long-term Strategy reflects a strategic, future-focused vision that aligns business practices with global sustainability goals. Together, these criteria spotlight the necessity of immediate action and strategic planning in fostering genuine environmental stewardship. Transparency and Disclosure was weighted at 12%, Environmental Performance, Compliance and Regulatory Adherence, Risk Management, and Supply Chain Sustainability at 10%, Sustainability Initiatives at 8%, and Stakeholder Engagement and Innovation & Adaptation at 5%. After assigning a grade to each category, the total weighted score is calculated as follows: the score assigned to each category is divided by the maximum possible score for that category, and then multiplied by the corresponding weight assigned to that category. This process ensures that each category contributes proportionally to the overall weighted score, reflecting its predetermined importance in the assessment. Following personal assessment and grading of each category, a total weighted score ranging from 0 to 1 was derived for each company. These scores were then categorized into three distinct groups: Greenwasher, Risk Aware, and Action Taker, based on predefined intervals. Companies scoring between 0 and 0.4 were classified as Greenwasher, those scoring between 0.4 and 0.7 as Risk Aware, and those scoring between 0.7 and 1 as Action Taker.

This methodological approach offers a structured framework for evaluating and categorizing companies based on their biodiversity commitment, facilitating nuanced insights into their sustainability practices and performance.

The table below depicts the scoring system outcome for each of the 15 companies:

Company	Score	Group
Apple Inc.	0.812	Action-Taker
Alphabet Inc.	0.846	Action-Taker
Amazon.com	0.896	Action-Taker
ASML Holding	0.64	Risk-Aware
Broadcom Inc	0.396	Greenwasher
Mastercard	0.802	Action-Taker
Meta	0.662	Risk-Aware
Microsoft Corporation	0.772	Action-Taker
Nvidia	0.316	Greenwasher
Novo Nordisk	0.716	Action-Taker
Tesla	0.39	Greenwasher
Taiwan Semiconductor Manufacturing Company	0.62	Risk-Aware
Johnson & Johnson	0.746	Action-Taker
JP Morgan Chase & Co	0.666	Risk-Aware
Eli Lilly & Co	0.686	Risk-Aware

Following the implementation of my scoring system, the central inquiry revolves around the determination of whether the assessed companies truly exemplify sustainability leadership. This necessitates a comparative analysis between the rating scores generated by my system and those established by renowned rating agencies. In this context, I have opted to juxtapose my evaluations against Refinitiv ESG ratings, with a specific focus on the environmental section. Refinitiv's environmental section provides more detailed and specific insights into environmental practices and commitments, including those related to biodiversity, making it more relevant for the analysis. Such a comparison serves a critical academic purpose, allowing for an assessment of the efficacy and validity of my scoring methodology in identifying sustainable champions within the corporate landscape. By aligning my evaluations with established industry benchmarks such as Refinitiv ESG ratings, I aim to contribute to the scholarly discourse surrounding sustainability assessment frameworks, ultimately enriching our understanding of corporate sustainability practices and their implications for broader societal and environmental well-being.

Refinitiv ESG Scores assess companies' ESG performance using public data across three pillars and 10 ESG topics. They analyze over 630 ESG measures, selecting 186 relevant data points for

assessment based on materiality, data availability, and industry relevance. The environmental section focuses on resource use, emissions, and innovation. Refinitiv provides ESG Ratings ranging from 0 (representing the lowest) to 100 (the highest). Companies with higher ratings showcase robust ESG performance and exhibit reduced susceptibility to ESG-related risks. (Refinitiv, 2023) The ESG Combined Score offers a holistic assessment of a company's ESG performance, considering data from ESG pillars and global media sources to gauge controversies. Its primary aim is to adjust the ESG performance score in light of negative media coverage.

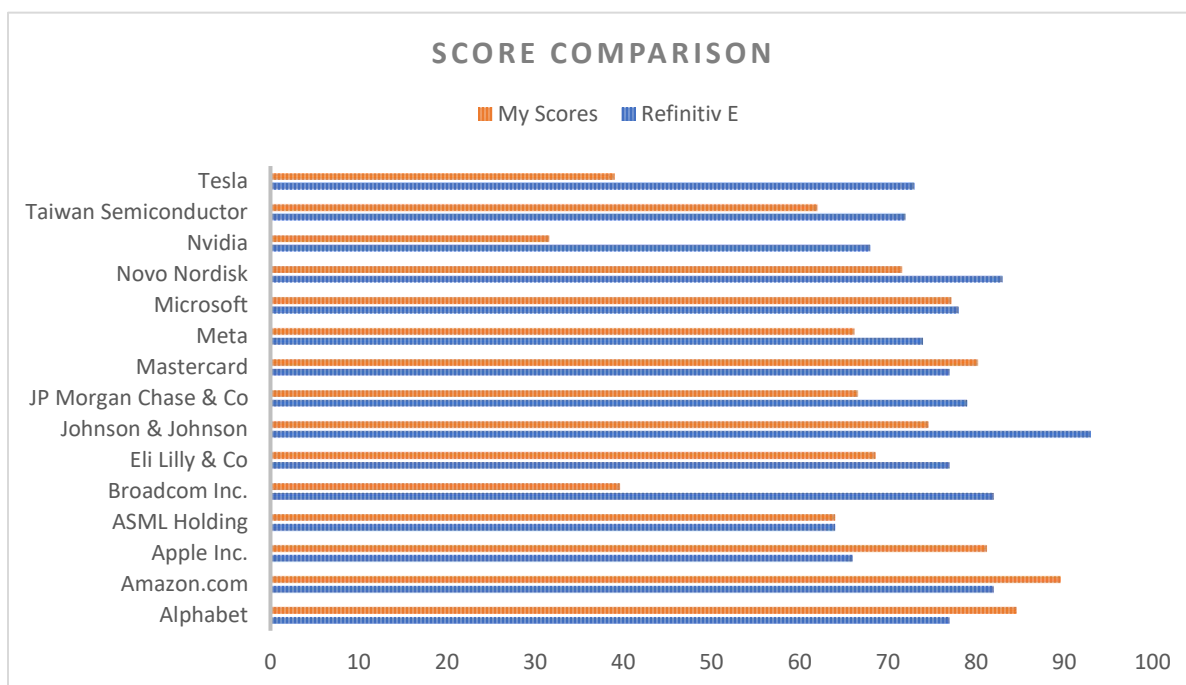
To ensure comparability, the process of normalizing scores from different scales is outlined. The used approach involves selecting a common scale, such as a range from 0 to 100, to which all scores will be mapped. This common scale serves as a standard reference point for comparison.

$$\text{Normalized Score} = \left(\frac{\text{Original Score} - \text{Min Original Score}}{\text{Max Original Score} - \text{Min Original Score}} \right) \times (\text{Max Common Scale} - \text{Min Common Scale}) + \text{Min Common Scale}$$

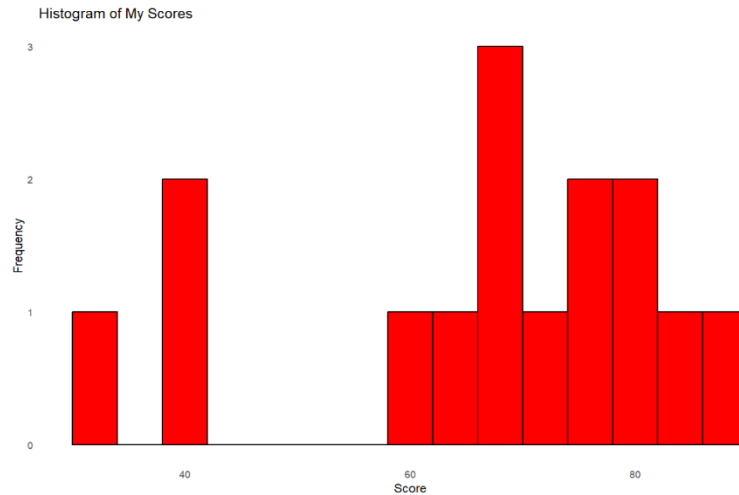
This formula adjusts for differences in scale ranges and ensures that all scores are mapped proportionally to the common scale.

Empirical Analysis

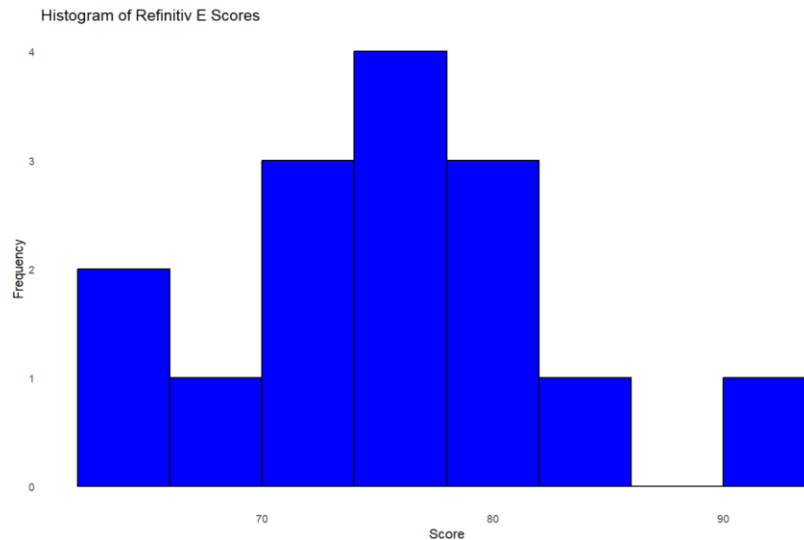
The empirical analysis section aims to compare the outcomes of the developed scoring system with the established "Refinitiv E" ratings, assessing the level of agreement or discrepancy between them in evaluating companies' biodiversity commitments. This comparison provides insights into the effectiveness, reliability, and validity of the scoring methodology.



The graph above depicts the scores from both the developed scoring system and the established "Refinitiv E" ratings for each company, offering a visual comparison to enhance clarity and comprehension. For some companies, like Amazon.com and, "My Scores" are significantly higher than the "Refinitiv E" scores. For others, like Tesla and Broadcom, the "Refinitiv E" scores are higher. There are also cases where the scores are quite close, as with ASML Holding and Mastercard. It seems that companies in the technology sector (like Apple Inc., Alphabet, and Nvidia) have varying degrees of environmental scores, both from Refinitiv and the individual. This variation could reflect the diverse approaches and commitments within the tech industry toward environmental issues. Companies that have lower scores in both methodologies might be targeted for improvement. They could benefit from policies or practices that boost their environmental performance.



The histogram above depicts the distribution of My scores. As visible, the distribution is not symmetrical; it is bimodal, which means there are two scores (or score ranges) that occur most frequently. The highest frequency is in the bin which includes a score of 70. The y-axis shows the frequency counts are low (maximum frequency appears to be 3).



The histogram below depicts the distribution of Refinitiv E scores. The distribution is roughly symmetrical around the middle score ranges, suggesting a normal-like distribution, though it's somewhat irregular and could be described as platykurtic, which means it has lighter tails and a flatter peak compared to a normal distribution. There's a notable frequency in the central bins, particularly around scores of 70 and 80, which have the highest frequency, the former peaking at

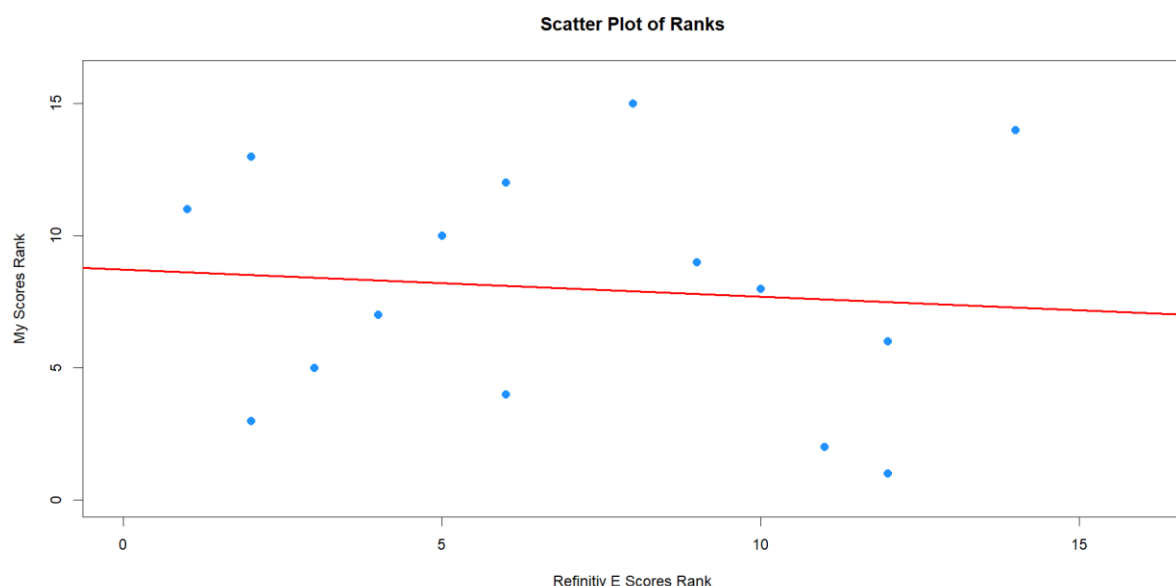
a frequency of 4. Given the symmetry, the mean and median of the scores would be around the score range that has the highest frequency, which appears to be between 70 and 80.

In order to quantitatively assess the discrepancies between the two biodiversity rating systems under investigation, namely 'My ratings' and the official 'Refinitiv E' ratings applied to a selected set of 15 companies, the study proposes the implementation of Spearman's rank correlation coefficient (ρ). It helps to uncover the degree of association between these two sets of data, despite potential differences in their statistical properties. (Surhone, Timplendon, & Marseken, 2010) Spearman's ρ offers a robust method for comparison by focusing on the ranks rather than the actual values, making it particularly suitable when the distributions of the scores vary or when outliers are present. By utilizing rank correlation, the analysis can effectively capture patterns, trends, and relationships that may not be apparent from a traditional correlation analysis.

The calculation involves several steps. First, each variable is assigned ranks based on their respective values, Next, the difference between the ranks of corresponding pairs of scores is calculated, followed by squaring these differences. The squared differences are then summed to obtain the sum of squared differences ($\sum d^2$). Subsequently, utilizing the formula for Spearman's ρ , which is

$$\rho = 1 - \frac{6 \sum d_i^2}{n(n^2 - 1)}$$

Where d_i^2 is the sum of squared differences, and n is the number of observations.



The scatterplot above depicts the ranks of companies according to My scoring system on the y-axis, while the x-axis represents the ranks of the same companies according to the Refinitiv Environmental (E) Scores. Each dot on the scatter plot represents a company. The position of the dot indicates the company's rank in both scoring systems. For example, a dot located at (10, 5) would mean that the company is ranked 10th according to Refinitiv E Scores and 5th according to My scores.

The table below depicts the corresponding scores for each company:

Company	Refinitiv E	Rank	My Scores	Rank	d	d²
Alphabet	77	7	84.6	2	5	25
Amazon.com	82	3	89.6	1	2	4
Apple Inc.	66	14	81.2	3	11	121
ASML Holding	64	15	64	11	4	16
Broadcom Inc.	82	3	39.6	13	-10	100
Eli Lilly & Co	77	7	68.6	8	-1	1
Johnson & Johnson	93	1	74.6	6	-5	25
JP Morgan Chase & Co	79	5	66.6	9	-4	16
Mastercard	77	7	80.2	4	3	9
Meta	74	10	66.2	10	0	0
Microsoft	78	6	77.2	5	1	1
Novo Nordisk	83	2	71.6	7	-5	25
Nvidia	68	13	31.6	15	-2	4
Taiwan Semiconductor	72	12	62	12	0	0
Tesla	73	11	39	14	-3	9
Total						356

According to the calculations, rho is equal to 0.36. A Spearman's rank correlation coefficient (ρ) of 0.36 indicates a moderate positive rank correlation between the Refinitiv E scores and My scores. This means that there is a tendency for companies with higher ranks in the Refinitiv E scores to also have higher ranks in the My scores, and vice versa. However, the correlation is not particularly strong, suggesting that while there is a discernible relationship between the two sets of scores, it is not highly pronounced.

Among the 15 companies assessed, notable divergences are observed in the scores of three companies (NVIDIA, Broadcom Inc, Tesla) indicating significant differences in their approaches to biodiversity commitments or their transparency in reporting them. However, for the remaining

companies, the scores tend to cluster relatively closely together. This suggests a degree of consistency or similarity in their reported biodiversity commitments or the manner in which they are disclosed. While variations may exist, the overall trends indicate a certain level of alignment or convergence in the reported performance of the majority of companies regarding biodiversity considerations. According to the provided table, Alphabet, Microsoft, and Mastercard emerge as similar performers in terms of scores across both scoring systems. These companies demonstrate a shared commitment to biodiversity conservation and environmental stewardship through the following common themes:

Corporate Commitment to Biodiversity: All three companies, Microsoft, Alphabet, and Mastercard, demonstrate a clear commitment to biodiversity conservation through various initiatives and partnerships.

Partnerships and Collaborations: Each company engages in partnerships and collaborations with external organizations, such as conservation groups and NGOs, to advance biodiversity conservation efforts globally.

Technology and Innovation: Technology and innovation play a significant role in the biodiversity initiatives of these companies. They leverage tools such as data analytics, cloud computing, and AI to support conservation projects, monitor ecosystems, and promote sustainable practices.

Stakeholder Engagement: Engaging with stakeholders, including local communities, governments, and conservation organizations, is a key aspect of their biodiversity conservation efforts. This ensures that projects are aligned with local needs and priorities.

Reforestation and Habitat Restoration: All three companies are actively involved in reforestation and habitat restoration projects, aiming to restore degraded ecosystems, enhance biodiversity, and mitigate climate change impacts.

Leadership and Governance: Each company demonstrates strong leadership and governance structures dedicated to environmental sustainability and biodiversity conservation. This includes executive oversight, board-level responsibility, and regular reporting on sustainability metrics.

From the table, it is visible that companies like Broadcom, Nvidia, and Tesla show significant negative differences, indicating much lower scores in "My Scores" compared to "Refinitiv E." This

discrepancy may arise due to Refinitiv E's quantitative methodology, which may prioritize certain metrics or data points that overshadow qualitative aspects captured in the textual analysis. Additionally, differences in reporting practices or interpretations of environmental commitments could contribute to the observed disparities.

All three companies - Broadcom, Tesla, and NVIDIA - exhibit characteristics indicative of greenwashing. Despite varying degrees of awareness and acknowledgment of biodiversity-related goals, such as mentioning biodiversity in sustainability reports or recognizing potential risks, there is a notable absence of specific actions or plans to address these issues effectively. Furthermore, the lack of board-level oversight or executive management responsibility for biodiversity issues across all three companies suggests a systemic gap in governance and a lack of genuine commitment to biodiversity conservation. Additionally, the failure to undertake concrete actions or advance biodiversity-related commitments underscores a pattern of superficial engagement with environmental concerns, reinforcing the impression of greenwashing across the board.

To further delve into the biodiversity implications of these companies, Robeco SDG scores are introduced in the analysis. These scores offer a nuanced view of how firms impact Sustainable Development Goals (SDGs) and provide deeper insights into each company's effectiveness in addressing biodiversity and ecological challenges. The Robeco SDG score is derived from a structured evaluation process involving three key stages:

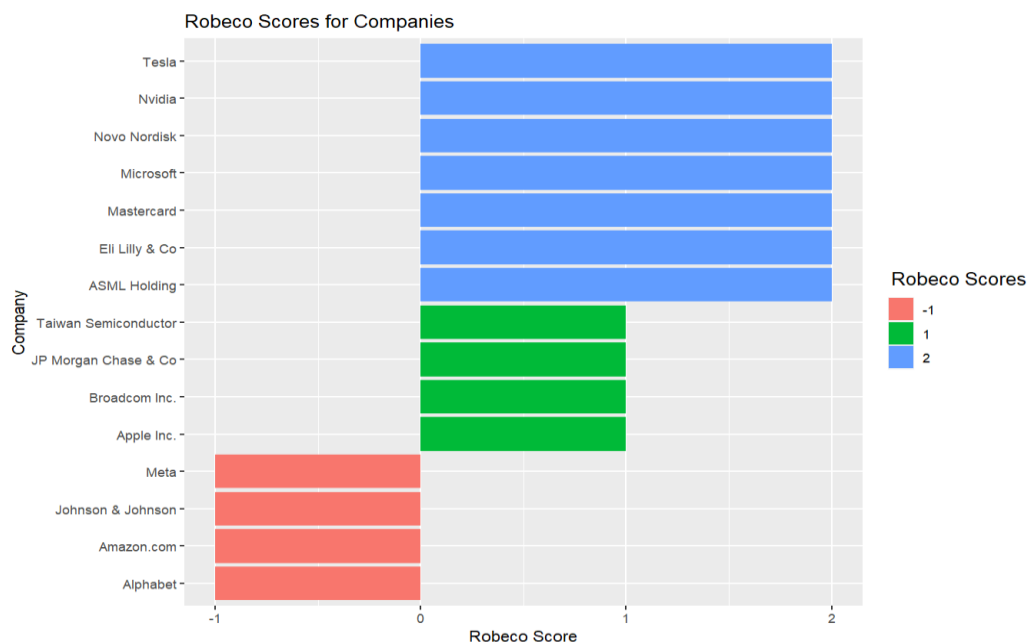
1. Initially, it scrutinizes the influence of companies' offerings on various Sustainable Development Goals (SDGs). Favorable impacts like the provision of clean energy or healthcare solutions yield higher ratings, while detrimental effects such as involvement in coal or weapon production incur lower scores.
2. Subsequently, it assesses companies' operational methodologies to gauge their alignment with SDGs. This encompasses evaluating overarching aspects such as gender equality alongside sector-specific considerations like ethical marketing or community engagement.
3. Lastly, it appraises companies' engagement in controversies, weighing the magnitude of their repercussions on society and the environment. This evaluation also accounts for the company's response and the probability of similar incidents in the future. (Zanten, et al., 2023)

Scores, ranging from -3 (significant negative impact) to +3 (substantial positive impact), are assigned across all 17 SDGs. An aggregate score is computed, with positive or neutral contributions elevating final ratings, while any negative impact results in the lowest score, irrespective of other positive contributions to SDGs.

The table above showcases the corresponding scores for each company.

Companies	Scores	SDGs
Apple Inc.	1	SDG 8 & 9 (1)
Alphabet	-1	SDG 12 & 16 (-1)
Amazon.com	-1	SDG 8 & 17 (-1)
ASML Holding	2	SDG 8 & 9 (2)
Broadcom Inc.	1	SDG 8 & 9 (1)
Mastercard	2	SDG 5 (2), SDG 8 & 9 (1)
Meta	-1	SDG 5 & 8 & 9 (1), SDG 12 & 16 (-1)
Microsoft	2	SDG 5 (1), SDG 8 & 9 (2)
Nvidia	2	SDG 8 & 9 (2)
Novo Nordisk	2	SDG 3 (2)
Tesla	2	SDG 11 & 13 (2)
Taiwan Semiconductor	1	SDG 8 & 9 (1)
Johnson & Johnson	-1	SDG 3 (-1)
JP Morgan Chase & Co	1	SDG 5 (1)
Eli Lilly & Co	2	SDG 3 (2)

For a clearer visual representation, please refer to the graph below.



According to the table above, apart from the Refinitiv E score of 82 and My score of 39.6, Broadcom Inc. received a Robeco score of 1. This indicates a substantial divergence in how biodiversity performance and broader sustainable impacts are perceived across these different frameworks. Despite a high Refinitiv E score suggesting strong environmental practices, my scoring and the moderate Robeco score suggest room for improvement, especially in areas covered by the SDGs. Moreover, Broadcom Inc has a score of 1 and NVIDIA has a score of 2 Because of making substantial positive impacts on certain SDGs, precisely SDG 8 (Decent Work and Economic Growth) and SDG 9 (Industry, Innovation and Infrastructure). However, they do not explicitly include biodiversity-related goals. The situation is similar with Tesla. The focus is on SDG 11 (Sustainable Cities and Communities) and SDG 13 (Climate Action).

In the analysis, I've integrated data obtained from ENCORE⁴, which provides insights into dependencies and impacts within various economic sectors. These data showcase how economic activities rely on ecosystem services and natural capital (dependencies) and how they influence these resources (impacts).

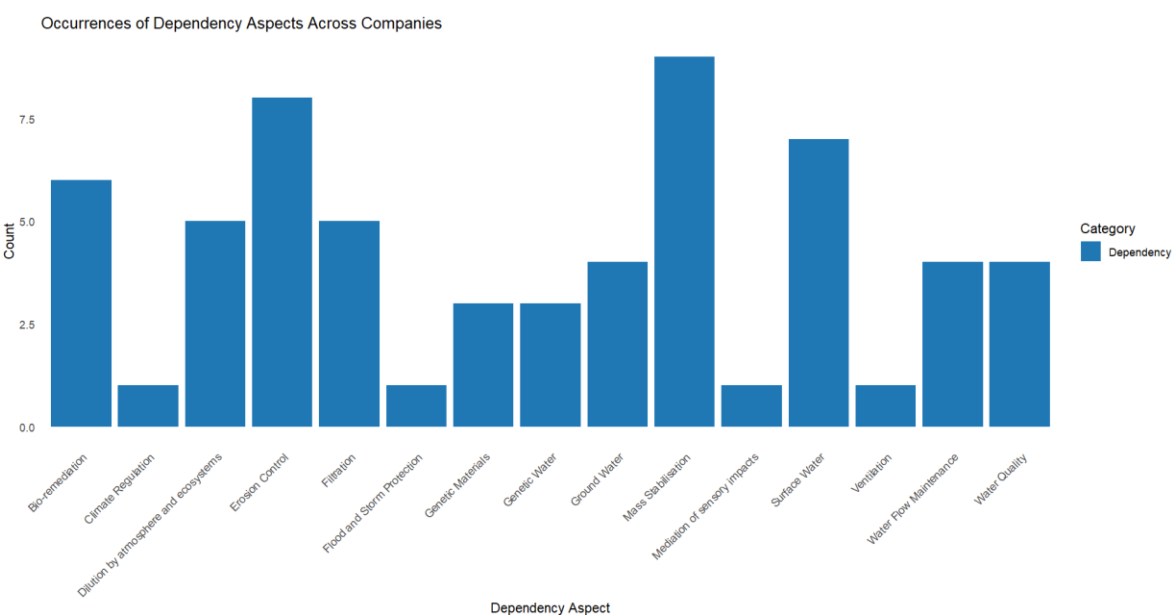
The table below displays the corresponding ENCORE sectors of the selected companies:

Company	Industry
Alphabet	Technology
Amazon.com	Consumer Discretionary
Apple Inc.	Technology
ASML Holding	Technology
Broadcom Inc.	Technology
Eli Lilly & Co	Health Care
Johnson & Johnson	Health Care
JP Morgan Chase & Co	Financials
Mastercard	Financials
Meta	Technology
Microsoft	Technology
Novo Nordisk	Health Care
Nvidia	Technology
Taiwan Semiconductor	Technology
Tesla	Consumer Discretionary

⁴ ENCORE provides insights into how the economy relies on and affects nature, enabling financial institutions to identify and manage nature-related risks in their lending, underwriting, and investments, fostering more sustainable financial practices.

To gain a deeper understanding of the dependencies and impacts, visual representations are provided below, showcasing the occurrence of each dependency and impact across the companies.

Graph 1: Occurrences of Dependency Aspects Across Companies

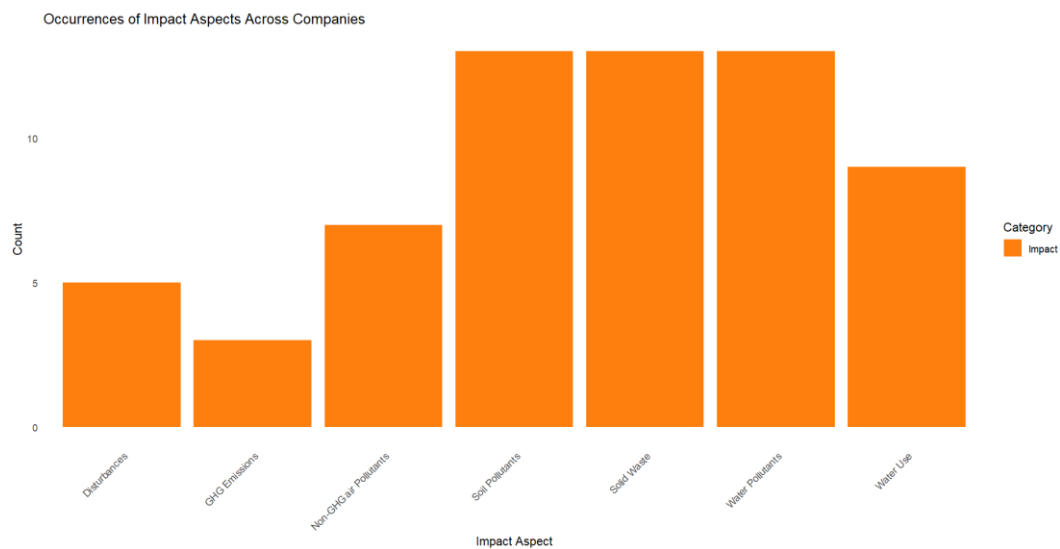


The first bar chart shows the dependency aspects across the selected set of companies. As visible from the graph, Climate Regulation & Erosion Control show higher occurrences, indicating many of the companies depend on the climate and land stability for their activities. The same situation is with Freshwater Regulation & Ground Water, which is crucial for operations. However, Biomaterials & Genetic Material have moderate occurrences, implying that a small number of companies rely on biological or genetic materials for their operations.

Graph 2: Occurrences of Impact Aspects Across Companies

This bar chart represents the frequency of various impact aspects across the companies you selected. It is visible that Disturbances have the least occurrences among the impact aspects listed, indicating it may be a less common or recognized impact among the selected companies. Additionally, GHG Emissions are relatively low in occurrence compared to other impacts, which might suggest either a lower priority for these companies or effective mitigation strategies in place. However, Soil & Water impacts have the highest occurrences, which could indicate that these aspects are common concerns across the companies, possibly due to direct usage or pollution of these resources. While significant, water use has a slightly lower occurrence compared to soil and

water impacts, which could suggest differentiated impact or dependency levels, or it could be due to some overlap between the categories.



Overall, the graphs indicate that soil and water issues are the most significant in terms of impact, while climate regulation and water-related dependencies are critical for the functioning of the companies studied. The lesser emphasis on disturbances and GHG emissions could reflect specific industry practices or regulatory focus.

Conclusion

Biodiversity has gained some serious attention in recent years due to its crucial role in sustaining ecosystems and supporting human well-being. Biodiversity preservation has become a global concern as habitats continue to degrade and species face extinction. Therefore, prioritizing conservation efforts and integrating them into business practices come in handy. By conducting a thorough investigation of the biodiversity commitments of companies considered sustainable champions, the thesis assessed the level of transparency and engagement in managing biodiversity impacts. The analysis revolved around 15 companies within the MSCI All-Country top 30 indices. The outcome after analyzing and screening the corporate reports mentioning “biodiversity” was indeed interesting. The results indicate a wide range of responses from companies, with some showing strong transparency and dedication to conserving biodiversity, while others are just beginning to address these issues. Some companies have tried to reduce biodiversity loss, however others haven't fully understood their impact or made clear promises yet. For example, Amazon.com, Alphabet, and Apple showed relatively high commitments towards biodiversity, by investing in many projects assessing biodiversity impacts, while companies such as NVIDIA, Tesla, and Broadcom Inc. showed lower awareness and dedication toward biodiversity conservation. Overall, 7 companies fall under the “Action-Taker” category, 5 fall under “Risk-Aware” and 3 fall under the “Greenwasher” category. Taking into consideration Refinitiv E scores, it is also evident that there are several gaps between these two scores. It is worth mentioning that there are limitations to the methodology used to derive my scores as the analysis is fully subjective, relying on the qualitative assessment of "biodiversity" mentions within corporate reports. These factors suggest that the conclusions drawn should be viewed as indicative rather than definitive, emphasizing the need for further research that incorporates more standardized, quantitative measures and explores the evolution of corporate biodiversity commitments over time.

Furthermore, the findings also highlight the importance of reporting on biodiversity efforts across different industries consistently. It is essential to have standardized frameworks that can precisely show what companies are doing to protect biodiversity. Especially, the Task Force on Nature-related Financial Disclosures (TNFD), which is not yet adopted by many companies. Finally, by showing the efforts and commitments to biodiversity, this research might push policymakers to ask for more detailed environmental reports from businesses.

As many researchers highlighted, there is a significant lack of available scientific papers related to biodiversity commitments and how companies are assessing the impacts. Therefore, this thesis is a small drop into the ocean. It's crucial for companies, especially those leading in sustainability, to pay more attention and take action on this environmental issue.

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Appendix

To develop a scoring system for categorizing companies as Greenwashers, risk-aware, or action-takers based on their assessments, the following categories are considered:

1. **Biodiversity integration:** Assessing the extent to which companies incorporate biodiversity considerations into their operations, strategies, and reporting.
2. **Environmental performance:** Assessment of the company's environmental impact, including carbon footprint, waste management, and resource usage.
3. **Transparency and disclosure:** Evaluation of the company's transparency in reporting environmental practices, including the clarity and depth of information provided in sustainability reports and disclosures.
4. **Sustainability initiatives:** Analysis of the company's efforts to implement sustainable practices.
5. **Compliance and regulatory adherence:** Review of the company's compliance with environmental regulations (TNFD) and certifications like FSC or LEED.
6. **Stakeholder engagement:** Assessment of the company's engagement with stakeholders, including communities, environmental organizations, and shareholders.
7. **Innovation and adaptation:** Examination of the company's innovation in developing and adopting new technologies or processes to mitigate environmental impacts.
8. **Risk management:** Evaluation of the company's identification and mitigation of environmental risks
9. **Supply chain sustainability:** Analysis of the company's efforts to ensure sustainability across its supply chain.
10. **Long-term strategy:** Assessment of the company's long-term environmental strategy, including goal setting, target alignment with global sustainability frameworks (e.g., UN Sustainable Development Goals), and commitment to continuous improvement.

Amazon

Biodiversity Integration: Amazon demonstrates a high level of commitment to biodiversity conservation, with executive management-level responsibility for biodiversity-related issues and quarterly business reviews to monitor progress. The company has established the Right Now Climate Fund and made commitments across various commodities to address biodiversity

concerns. However, the current lack of utilization of biodiversity indicators may indicate room for improvement. **Score: 4/5.**

Environmental Performance: Amazon's environmental performance is commendable, evidenced by its commitment to achieving net-zero carbon status by 2040 and the establishment of the Right Now Climate Fund. The company has also undertaken various biodiversity-related initiatives globally, including funding nature projects, enhancing biodiversity, and restoring ecosystems. **Score: 5/5.**

Transparency and Disclosure: Amazon provides comprehensive disclosures regarding its sustainability efforts and biodiversity-related initiatives in its sustainability reports. However, the current lack of utilization of biodiversity indicators may impact the depth of information provided. **Score: 4/5.**

Sustainability Initiatives: Amazon has implemented numerous sustainability initiatives, including funding nature projects, restoring ecosystems, and planting trees. The company's commitments across various commodities also demonstrate a proactive stance towards sustainability. **Score: 5/5.**

Compliance and Regulatory Adherence: Amazon's adherence to the TNFD framework and possession of an FSC certificate demonstrate a high level of compliance with environmental regulations and industry standards. This strengthens the company's commitment to biodiversity-related issues and enhances its regulatory adherence score. **Score: 5/5.**

Stakeholder Engagement: Amazon engages with stakeholders through various initiatives, including funding nature projects and collaborating with environmental allies. The company's commitment to community engagement and biodiversity enhancement is evident through its global initiatives. **Score: 5/5.**

Innovation and Adaptation: Amazon demonstrates innovation through its nature-based solutions, such as the Right Now Climate Fund and collaborations with environmental organizations. The company continuously seeks new ways to address biodiversity concerns and adapt its strategies accordingly. **Score: 4/5.**

Risk Management: Amazon effectively identifies and mitigates environmental risks through its quarterly business reviews and strategic alignment with The Climate Pledge. However, the lack of utilization of biodiversity indicators may impact the depth of risk assessment. **Score: 4/5.**

Supply Chain Sustainability: With the FSC certificate and alignment with the TNFD framework, Amazon's supply chain sustainability efforts are likely more robust than initially assessed. These certifications indicate a commitment to responsible sourcing and environmental stewardship throughout the supply chain. **Score: 4/5.**

Long-term Strategy: Amazon's long-term environmental strategy is robust, with clear goals and commitments to biodiversity conservation. The company's quarterly business reviews and financial commitments to nature-based solutions indicate a commitment to continuous improvement. **Score: 5/5.**

Meta

Biodiversity Integration: Meta demonstrates a commitment to biodiversity through initiatives such as the Cedro Creek Restoration project and setting up beehives at its offices to support pollinators. The company also safeguards natural habitats across its data centers, contributing to habitat preservation and biodiversity enhancement. **Score: 4/5.**

Environmental Performance: Meta's initiatives, such as the Cedro Creek Restoration project, setting up beehives to support pollinators, and safeguarding natural habitats across its data centers, demonstrate a proactive approach to improving environmental performance. These efforts contribute to enhancing biodiversity, improving water quality, decreasing erosion, and advancing ecosystem resilience. **Score: 4/5.**

Transparency and Disclosure: Meta's non-adoption of the TNFD framework may impact the depth of its reporting on biodiversity-related issues and transparency in sustainability efforts. While the company demonstrates a commitment to sustainability initiatives, the lack of alignment with emerging standards like TNFD could affect transparency and comparability of disclosures. **Score: 2/5.**

Sustainability Initiatives: Meta's sustainability initiatives, including the Cedro Creek Restoration project, setting up beehives, and safeguarding natural habitats, demonstrate a proactive approach

to addressing environmental challenges. These initiatives contribute to biodiversity conservation, pollinator support, and habitat preservation, reflecting the company's commitment to sustainability. **Score: 4/5.**

Compliance and Regulatory Adherence: As an FSC certificate holder, Meta demonstrates adherence to industry standards, which includes commitments to sustainable forestry practices. The company's initiatives align with regulatory requirements and industry standards. **Score: 4/5.**

Stakeholder Engagement: Meta engages stakeholders through its sustainability initiatives, including community climate resilience efforts and habitat preservation projects. The company's actions demonstrate a commitment to engaging with and supporting local communities. **Score: 4/5.**

Innovation and Adaptation: Meta demonstrates innovation and adaptability through its focus on promoting carbon removal solutions and continual assessment of risks and opportunities related to climate. For example, Meta's project to restore a forest, which generates carbon credits, showcases innovation in utilizing nature-based solutions for carbon sequestration while enhancing ecological well-being. Additionally, the company's initiatives to safeguard natural habitats across its data centers illustrate adaptability by integrating sustainable practices into its operations to mitigate environmental impacts. While Meta exhibits innovation and adaptability in addressing environmental challenges, further details on the development and adoption of new technologies or approaches would enhance the assessment in this category. **Score: 4/5.**

Risk Management: Meta's continual assessment of risks and opportunities related to climate and its efforts to minimize environmental impact demonstrate effective risk management practices. However, considering the non-adoption of TNFD and potential areas of improvement in risk assessment and disclosure, the score for this category may be adjusted. **Score: 4/5.**

Supply Chain Sustainability: Information about Meta's supply chain sustainability efforts is not provided in the given context. Additional information would be needed to assess this category accurately. **1/5**

Long-term Strategy: Meta's focus on promoting carbon removal solutions and safeguarding natural habitats demonstrates a long-term commitment to environmental sustainability. However, specific long-term goals and targets would enhance the assessment. **Score: 3/5.**

Broadcom Inc.

Biodiversity Integration: Broadcom lacks specific actions or plans concerning biodiversity-related issues and does not employ biodiversity metrics to track performance. The company is addressing biodiversity-related goals through activities such as safeguarding water/land and awareness initiatives. The availability of information about the company's response to biodiversity issues in Environmental Sustainability Projects in Fort Collins further suggests efforts towards biodiversity conservation. **Score: 3/5.**

Environmental Performance: Broadcom demonstrates some efforts in addressing biodiversity-related goals through activities such as safeguarding water/land and awareness initiatives. However, the lack of specific actions or plans related to biodiversity indicates room for improvement in environmental performance. **Score: 3/5.**

Transparency and Disclosure: Broadcom's sustainability reports and ESG releases indicate a notable absence of specific actions or plans related to biodiversity, suggesting potential shortcomings in transparency and disclosure regarding biodiversity-related issues. **Score: 2/5.**

Sustainability Initiatives: While Broadcom is actively addressing biodiversity-related goals through activities such as safeguarding water/land, and awareness initiatives, the absence of specific actions or plans related to biodiversity limits the scope of its sustainability initiatives, even though The availability of information about the company's response to biodiversity issues in Environmental Sustainability Projects in Fort Collins further suggests efforts towards biodiversity conservation. **Score: 3/5.**

Compliance and Regulatory Adherence: Information provided does not indicate non-compliance with environmental regulations. However, the absence of specific actions or plans related to biodiversity may pose regulatory risks in the future. **Score: 3/5.**

Stakeholder Engagement: The information provided does not indicate significant stakeholder engagement specifically related to biodiversity. **Score: 1/5.**

Innovation and Adaptation: Broadcom lacks innovation and adaptation in addressing biodiversity-related issues, as evidenced by the absence of specific actions or plans concerning biodiversity. **Score: 1/5.**

Risk Management: Broadcom's lack of board-level oversight or executive management-level responsibility for biodiversity issues, along with no present commitment to biodiversity-related issues, suggests gaps in risk management related to biodiversity. **Score: 1/5.**

Supply Chain Sustainability: The information provided does not address supply chain sustainability specifically related to biodiversity. **Score: 1/5.**

Long-term Strategy: Broadcom lacks a long-term strategy for addressing biodiversity-related issues, as evidenced by the absence of intentions to undertake biodiversity-related assessments in the next two years. **Score: 1/5.**

NVIDIA

Biodiversity integration: NVIDIA lacks board-level oversight or executive management responsibility for biodiversity-related issues. There's no dedication or support for biodiversity initiatives and no intentions for improvement in the near future. Additionally, there's a lack of assessment of the organization's impact on biodiversity and no actions taken to advance biodiversity-related commitments. **Score: 1/5**

Environmental performance: NVIDIA is actively engaged in sustainability efforts, including implementing UN Sustainable Development Goals and endorsing initiatives for water harvesting, tree planting, and soil vitality improvement, especially in India. This demonstrates a commitment to environmental sustainability. **Score: 4/5**

Transparency and disclosure: The summary does not provide explicit information on NVIDIA's transparency and disclosure practices regarding environmental efforts. However, since they have a Corporate Sustainability Report and Climate Report, it implies a certain level of transparency. **Score: 2/5**

Sustainability initiatives: NVIDIA actively participates in sustainability initiatives, including supporting UN Sustainable Development Goals and endorsing projects for environmental improvement, particularly in India. **Score: 3/5**

Compliance and regulatory adherence: The summary doesn't mention specific compliance efforts or adherence to environmental regulations. **Score: 1/5**

Stakeholder engagement: There's no explicit mention of stakeholder engagement initiatives in the summary provided. Score: **1/5**

Innovation and adaptation: NVIDIA is known for its innovative technology solutions, including graphics processing units used in various applications, however, the summary does not provide specific information on innovation for environmental sustainability. Score: **1/5**

Risk management: There's no mention of specific risk management strategies related to environmental issues in the summary provided. The company is also not yet among TNFD early adopters. Score: **1/5**

Supply chain sustainability: The summary does not provide explicit information on NVIDIA's efforts toward supply chain sustainability. Score: **1/5**

Long-term strategy: While NVIDIA demonstrates commitment to sustainability, including support for UN Sustainable Development Goals, the lack of focus on biodiversity and specific long-term strategies related to environmental improvement. Score: **1/5**

Tesla

Biodiversity integration: Tesla acknowledges potential risks to forests and biodiversity but falls short in endorsing a Deep Sea Mining (DSM) moratorium, raising concerns about negative impacts on biodiversity. While nature protection is prioritized in alignment with investment objectives, there's room for improvement in disclosing efforts to mitigate biodiversity loss. Score: **2/5**

Environmental performance: Tesla prioritizes reducing greenhouse gas emissions and decreasing reliance on fossil fuels, aligning with NetZero objectives. The FSC certificate further signifies a commitment to environmental sustainability. However, there are environmental challenges in the manufacturing process of electric vehicles (EVs). While satisfactory in managing external environmental risks, enhanced transparency in disclosing efforts is needed. Score: **3/5**

Transparency and disclosure: Tesla falls short in providing sufficient disclosure on sustainable commitments and measurable targets. Specific targets should be established for climate, biodiversity, and social aspects to enhance transparency and accountability. Score: **2/5**

Sustainability initiatives: Tesla prioritizes nature protection and reducing greenhouse gas emissions, aligning with NetZero objectives. However, there's room for improvement in

addressing social and governance issues and establishing specific targets for sustainability efforts.
Score: 2/5

Compliance and regulatory adherence: Tesla's FSC certification indicates compliance with responsible forestry practices. However, further details are needed regarding compliance with other environmental regulations. Score: 2/5

Stakeholder engagement: Tesla engages directly with suppliers to address sustainability concerns like biodiversity impact, energy consumption, and human rights management. However, the summary does not provide extensive information on stakeholder engagement efforts. Score: 2/5

Innovation and adaptation: Tesla is known for its innovative approach to sustainable transportation, particularly in electric vehicle technology. However, the summary does not provide specific information on innovation and adaptation efforts related to environmental sustainability.
Score: 1/5

Risk management: Tesla acknowledges potential risks to forests and biodiversity and manages external environmental risks satisfactorily. However, Tesla is not also a TNFD early adopter therefore, there's room for improvement in addressing social and governance risks and enhancing transparency in risk management efforts. Score: 2/5

Supply chain sustainability: Tesla collaborates directly with suppliers to address sustainability concerns. However, there's a need for enhanced transparency in disclosing efforts to mitigate biodiversity loss and climate change impacts within the supply chain. Score: 1/5

Long-term strategy: Tesla aims to reduce greenhouse gas emissions and decrease reliance on fossil fuels, aligning with NetZero objectives. However, there's a need for specific targets and enhanced transparency in disclosing efforts to address climate, biodiversity, and social aspects.
Score: 2/5

Apple Inc.

Biodiversity integration: Apple demonstrates a commitment to biodiversity conservation through initiatives like the Restore Fund, which invests in projects to restore forests and enhance ecosystem resilience. Apple's partnerships and initiatives positively impact biodiversity integration by actively working towards restoring ecosystems, conserving biodiversity, and mitigating

environmental degradation. However, there's room for improvement in evaluating the effects of its value chain on biodiversity and utilizing biodiversity indicators to monitor performance. Score: **4/5**

Environmental performance: Apple aims to achieve a 75% reduction in emissions from 2015 levels by 2030 and implements carbon removal strategies to address remaining emissions. The company invests in nature-based carbon removal projects and utilizes credits from initiatives adhering to recognized standards like the Climate, Community & Biodiversity Standard. Score: **5/5**

Transparency and disclosure: Apple provides detailed information on its environmental initiatives, including the Restore Fund and carbon offset projects. The company's environmental progress report outlines clear objectives and strategies for emissions reduction. However, there is room for improvement, especially if we take into consideration the fact that apple has not yet adopted TNFD. Score: **3/5**

Sustainability initiatives: Apple's initiatives, such as the Restore Fund and investments in nature-based carbon removal projects, demonstrate a strong commitment to sustainability. The company pledges additional funds to back high-quality nature-based projects, aiming to amplify carbon removal efforts. Apple collaborated with the sustainability non-profit RESOLVE to finance the Regeneration Project, and within AMPF utilized carbon offsets. Score: **5/5**

Compliance and regulatory adherence: Apple demonstrates compliance with environmental regulations and standards, as evidenced by its adherence to recognized standards like the Climate, Community & Biodiversity Standard. However, no further information is available regarding TNFD or FSC. Score: **4/5**

Stakeholder engagement: Apple engages with various stakeholders through collaborations with organizations like the MIT Climate & Sustainability Consortium, PepsiCo, Cargill, and the sustainability non-profit RESOLVE. These partnerships. Score: **5/5**

Innovation and adaptation: Apple's innovative approach to sustainability, is demonstrated through initiatives like the Restore Fund and investments in nature-based carbon removal projects (AMPF, AMCI, RESOLVE). Score: **4/5**

Risk management: Collaborations with organizations like the MIT Climate & Sustainability Consortium and RESOLVE contribute to Apple's proactive approach to risk management by fostering research and initiatives to enhance soil carbon measurement and promote regeneration projects. Additionally, Apple's participation in the 2030 Climate Roadmap and collaboration with HSBC indicates a commitment to addressing climate risks and opportunities. Score: **4/5**

Supply chain sustainability: While the summary doesn't provide explicit information on Apple's supply chain sustainability efforts, the company's investments in nature-based carbon removal projects indirectly contribute to supply chain sustainability by addressing emissions. Score: **5/5**

Long-term strategy: Apple's long-term strategy, as outlined in its environmental progress report and the 2030 Climate Roadmap, demonstrates a clear commitment to emissions reduction and carbon removal strategies. The company's pledge to invest additional funds in nature-based projects further underscores its long-term sustainability objectives. Score: **3/5**

Microsoft

Biodiversity integration: Microsoft demonstrates a strong commitment to biodiversity conservation through initiatives like supporting The Nature Conservancy Belize Maya Forest Project, employing biomimicry to assess data center impacts, and initiating ecological restoration projects. These efforts contribute to enhancing habitats, improving ecosystems, and protecting biodiversity. Score: **5/5**

Environmental performance: Microsoft's initiatives, such as the Planetary Computer and supporting environmental projects, demonstrate a commitment to environmental sustainability. The company actively integrates sustainability into its operations and governance structure, with oversight from executive management and the Board of Directors. Score: **5/5**

Transparency and disclosure: Microsoft provides detailed information on its environmental initiatives and governance structure, as evidenced by its CDP Climate Report. The company's commitment to transparency is reflected in its regular meetings to review sustainability commitments and updates. However, the company is not among the TNFD early adopters, leaving room for improvement. Score: **3/5**

Sustainability initiatives: Microsoft's sustainability initiatives, including supporting environmental projects, employing biomimicry, and developing the Planetary Computer, demonstrate a comprehensive approach to sustainability. These efforts contribute to addressing climate change, protecting biodiversity, and promoting environmental stewardship. Score: 5/5

Compliance and regulatory adherence: Microsoft's governance structure ensures compliance with environmental regulations and standards, with oversight from executive management and the Board of Directors. The company's commitment to environmental sustainability is deeply integrated into its governance practices. Score: 4/5

Stakeholder engagement: The company collaborates with organizations like The Nature Conservancy and the UN Biodiversity Lab to address environmental challenges. Score: 4/5

Innovation and adaptation: Microsoft demonstrates innovation through initiatives like employing biomimicry to assess data center impacts and developing the Planetary Computer. Additionally, Microsoft is initiating a range of ecological restoration projects aimed at aiding the recovery of ecosystems. These innovative approaches contribute to understanding and addressing environmental challenges effectively. Also, Microsoft collaborates with the UN Biodiversity Lab to create tools for managing conservation. Score: 4/5

Risk management: Microsoft's governance structure ensures proactive risk management by addressing environmental risks and opportunities. The company's commitment to protecting more land than it uses and utilizing biodiversity indicators for performance monitoring reflects a thorough approach to risk management. Score: 4/5

Supply chain sustainability: While the summary doesn't provide explicit information on Microsoft's supply chain sustainability efforts, the company's commitment to biodiversity conservation indirectly contributes to supply chain sustainability by addressing environmental impacts. Score: 2/5

Long-term strategy: Microsoft's long-term strategy, as demonstrated by its environmental initiatives and governance structure, reflects a commitment to sustainability and environmental stewardship. The company's focus on biodiversity conservation and innovation underscores its long-term sustainability objectives. Score: 3/5

JP Morgan Chase & Co

Biodiversity integration: JP Morgan Chase demonstrates a commitment to biodiversity preservation through various initiatives, including joining FAIRR, investing in sustainable forestry practices through Campbell Global, and participating in carbon projects with potential benefits for biodiversity preservation. Score: 4/5

Environmental performance: JP Morgan Chase's initiatives, such as focusing on climate, conservation, and biodiversity in investment strategies, purchasing Campbell Global for sustainable forestry practices, and participating in carbon projects, indicate a commitment to environmental sustainability. Score: 4/5

Transparency and disclosure: While JP Morgan Chase demonstrates transparency in disclosing its sustainability initiatives, including joining FAIRR and participating in carbon projects, more detailed reporting on the environmental performance of its operations would further enhance transparency. Moreover, JP Morgan Chase is keeping a close eye on the progress of the Taskforce for Nature-related Financial Disclosures (TNFD). Score: 3/5

Sustainability initiatives: JP Morgan Chase's sustainability initiatives, such as investing in sustainable forestry practices through Campbell Global, joining FAIRR, and participating in carbon projects, demonstrate a commitment to addressing environmental challenges. Score: 4/5

Compliance and regulatory adherence: JP Morgan Chase demonstrates compliance with regulations and standards related to environmental sustainability, however further actions are needed, especially submitting CDP Climate reports and adopting TNFD. Score: 3/5

Stakeholder engagement: JP Morgan Chase engages with stakeholders through initiatives like the GoGreen program, which aims to raise employee awareness about sustainability initiatives. Score: 4/5

Innovation and adaptation: While JP Morgan Chase demonstrates innovation through initiatives like investing in sustainable forestry practices and participating in carbon projects, more emphasis on innovative approaches specifically targeting biodiversity conservation could be highlighted. Score: 3/5

Risk management: JP Morgan Chase addresses environmental risks through initiatives like focusing on climate, conservation, and biodiversity in investment strategies and participating in carbon projects. However, more detailed information on risk management practices related to biodiversity conservation would enhance transparency. Score: **3/5**

Supply chain sustainability: The summary does not provide explicit information on JP Morgan Chase's supply chain sustainability efforts. Score: **1/5**

Long-term strategy: JP Morgan Chase's long-term strategy includes initiatives like investing in sustainable forestry practices through Campbell Global and participating in carbon projects, demonstrating a commitment to addressing environmental challenges. However, more detailed information on long-term strategies specifically targeting biodiversity conservation would enhance transparency. Score: **4/5**

Alphabet

Biodiversity Integration: Alphabet demonstrates a strong commitment to biodiversity through its initiatives like habitat restoration for monarchs and pollinators, collaboration with IUCN Urban Alliance, and the development of TerraAdapt for conservation efforts. Moreover, introducing SpatiaFi also assists insights into biodiversity. These efforts show a comprehensive approach to incorporating biodiversity into their operations and strategies. Score: **5/5**

Environmental Performance: Alphabet's commitment to a net-zero carbon future, fostering a circular economy, championing water stewardship, and safeguarding biodiversity illustrates a strong environmental performance. The use of Google Cloud and AI technologies for environmental insights further supports their performance, although detailed metrics on impact reduction would strengthen this assessment. Score: **4/5**

Transparency and Disclosure: The company provides detailed reporting on its sustainability strategies, environmental impact, and biodiversity efforts, as seen in its Environmental Report and collaborations for transparency in supply chains. However, further disclosure is needed. Score: **4/5**

Sustainability Initiatives: Alphabet's range of initiatives, from the development of platforms like Google Earth Engine for Earth science data analysis to collaborations aimed at enhancing biodiversity and sustainability in agriculture through Mineral, implementing Cloud Google aids

gaining more comprehensive insights into sustainable sourcing, showcasing a proactive and comprehensive approach to sustainability. Score: 5/5

Compliance and Regulatory Adherence: While Alphabet's extensive initiatives suggest a commitment to environmental regulations and standards, specifics on compliance with certifications like FSC or LEED are not detailed. Their overall sustainability efforts, however, imply a strong adherence to the regulatory framework. Score: 4/5

Stakeholder Engagement: Alphabet engages with various stakeholders, including conservation organizations, communities, and technology partners, to advance its sustainability and biodiversity goals. Details on stakeholder engagement processes are implicit in their collaborative projects and contributions to biodiversity conservation. Score: 5/5

Innovation and Adaptation: Alphabet stands out in innovation, particularly in developing technologies like TerrAdapt, TraceMark, and Google Earth Engine to mitigate environmental impacts and support conservation efforts. Their approach to using AI and technology for environmental sustainability represents a high level of adaptation and innovation. Score: 5/5

Risk Management: The company's efforts in developing tools and platforms for environmental and biodiversity risk assessment indicate a strategic approach to risk management. However, more detailed information on their overall environmental risk management strategies would provide a clearer picture. Score: 3/5

Supply Chain Sustainability: Alphabet's initiatives, such as collaborating with NGIS and Unilever for sustainable sourcing and developing TraceMark for transparency in supply chains, reflect efforts to ensure sustainability. Score: 4/5

Long-term Strategy: Alphabet's long-term environmental strategy, including its commitment to net-zero carbon, circular economy, water stewardship, and biodiversity, aligns with global sustainability frameworks. Their continuous investment in sustainability innovations and improvements shows a strong commitment to long-term environmental goals. Score: 4/5

Eli Lilly & Co

Biodiversity integration: Eli Lilly & Co demonstrates a comprehensive approach to biodiversity conservation, including the implementation of initiatives such as terrestrial and aquatic biodiversity conservation projects. The company monitors phosphorus and active pharmaceutical ingredient discharge to assess their impact on aquatic biodiversity. Efforts to protect water quality during drought conditions and the implementation of mixing zone restrictions further showcase biodiversity preservation efforts. Score: 4/5

Environmental performance: The company's environmental performance is highlighted through its initiatives to minimize carbon emissions, manage water resources in stressed areas, and control pharmaceutical discharge. The launch of a sustainability bond dedicated to eligible projects, including biodiversity conservation, also demonstrates a commitment to environmental sustainability. Score: 4/5

Transparency and disclosure: Eli Lilly & Co demonstrates transparency in reporting its sustainability initiatives, including the launch of a sustainability bond and efforts to monitor and mitigate the environmental impact of its operations. The company's comprehensive approach to biodiversity-related issues is outlined in the CDP Climate Report, reflecting transparency in addressing environmental challenges. Score: 3/5

Sustainability initiatives: The company's sustainability initiatives encompass a wide range of areas, including biodiversity conservation, climate action, water management, and waste reduction. Efforts such as launching a sustainability bond and implementing projects to monitor and mitigate environmental impacts demonstrate a commitment to sustainability across various aspects of operations. Score: 4/5

Compliance and regulatory adherence: Eli Lilly & Co demonstrates compliance with environmental regulations and standards, including those related to water management and pharmaceutical discharge. However, no further information is available regarding compliance, including TNFD. Score: 3/5

Stakeholder engagement: The company engages with stakeholders through initiatives such as consulting a wide range of stakeholders to identify ESG areas crucial to the company's prosperity and stakeholders. Score: 3/5

Innovation and adaptation: While Eli Lilly & Co demonstrates innovation in addressing environmental challenges through initiatives such as sustainability bonds and biodiversity conservation projects, more emphasis on innovative approaches specifically targeting environmental sustainability could be highlighted. **3/5**

Risk management: The company's approach to risk management includes assessing the influence of its value chain on biodiversity, monitoring Phosphorus weekly or monthly, and implementing initiatives to manage land and water resources. No further information is available regarding risk management, including TNFD. Score: **3/5**

Supply chain sustainability: The summary does not provide explicit information on Eli Lilly & Co's supply chain sustainability efforts. Score: **1/5**

Long-term strategy: Long-term strategy encompasses initiatives such as biodiversity conservation, climate action, and water management, demonstrating a commitment to addressing environmental challenges. The launch of a sustainability bond dedicated to eligible projects aligns with long-term sustainability goals. Moreover, SDGs 14 and 15 also showcase dedication to long-term strategy. Score: **5/5**

Taiwan Semiconductor Manufacturing Company

Biodiversity integration: TSMC has demonstrated a commitment to biodiversity by incorporating it as a significant issue in its materiality analysis and sustainability report. The company aims to minimize environmental impacts during facility construction by preserving vegetation and adhering to green building standards. Additionally, TSMC is integrating biodiversity principles and practices into its operations, fostering eco-friendly environments through green landscapes. Engagement with stakeholders, including students and visitors, through ecological tours and educational activities further underscores its commitment to biodiversity. Score: **5/5**

Environmental performance: TSMC's efforts to minimize environmental impacts during facility construction and adherence to green building standards demonstrate a commitment to environmental sustainability. Score: **4/5**

Transparency and disclosure: TSMC's release of its Materiality Analysis Report and commitment to publishing Sustainability Reports indicate transparency in reporting ESG practices. However, no FSC or TNFD is incorporated. Score: **3/5**

Sustainability initiatives: TSMC's initiatives, such as minimizing environmental impacts during facility construction, integrating biodiversity principles and practices, and engaging stakeholders in ecological tours and educational activities, demonstrate a commitment to sustainability. The company acts according to Taiwan's Environmental Impact Assessment (EIA) protocol. Score: **3/5**

Compliance and regulatory adherence: The information provided does not explicitly mention TSMC's compliance with environmental regulations or certifications related to biodiversity conservation. Score: **2/5**

Stakeholder engagement: TSMC's engagement with 1,082 stakeholders, including students and visitors, through ecological tours and educational activities Score: **4/5**

Innovation and adaptation: TSMC's integration of biodiversity principles and practices into its operations and engagement with stakeholders through ecological tours and educational activities demonstrate innovation in promoting biodiversity conservation. Score: **3/5**

Risk management: The information provided does not explicitly mention TSMC's identification and mitigation of environmental risks related to biodiversity conservation. Score: **1/5**

Supply chain sustainability: The information provided does not explicitly mention TSMC's efforts to ensure sustainability across its supply chain. Score: **1/5**

Long-term strategy: TSMC's commitment to integrating biodiversity principles and practices into its operations, integrated SDG 14 and 15 goals, and regularly monitoring advancement toward long-term sustainability objectives showcases its dedication towards long-term strategies. **4/5**

ASML Holding

Biodiversity integration: ASML conducts annual assessments to identify material ESG sustainability topics, including biodiversity. While biodiversity was not deemed a material topic based on its operations and value chains, ASML remains committed to biodiversity preservation through initiatives like the 'green communities' pillar of its Community Partnership Program. The company aims for no net loss of biodiversity and no net deforestation. Score: **4/5**

Environmental performance: ASML demonstrates a commitment to enhancing the sustainability of local communities through the promotion of green spaces and biodiversity. The primary focus within the green communities program is to increase the availability of green spaces and enhance their quality through collaboration with external partners. Score: **4/5**

Transparency and disclosure: ASML provides detailed information on its approach to biodiversity conservation, including its board-level oversight responsibility, quarterly updates on sustainability strategy execution, and public commitments to initiatives like No Net Loss and No Net Deforestation. However, the organization does not employ biodiversity indicators to assess performance throughout its operations. Score: **4/5**

Sustainability initiatives: ASML has made public commitments to initiatives like No Net Loss and No Net Deforestation related to biodiversity conservation. The organization contributes to the development of new green spaces and enhances biodiversity, as well as compensates for the loss of greenery attributed to the organization. Score: **4/5**

Compliance and regulatory adherence: The information provided does not explicitly mention ASML's compliance with environmental regulations or certifications related to biodiversity conservation. Score: **1/5**

Stakeholder engagement: ASML engages with stakeholders through its Community Partnership Program, focusing on promoting green spaces and biodiversity. Score: **4/5**

Innovation and adaptation: While ASML demonstrates commitment and action towards biodiversity conservation, the information does not highlight specific innovative approaches or technologies employed in this regard. Score: **2/5**

Risk management: ASML confirms the implementation of tools and methods to assess the effects and interdependencies of its value chain on biodiversity, indicating that no significant risks have been identified currently through ecological assessments. Score: **3/5**

Supply chain sustainability: The information provided does not explicitly mention ASML's efforts to ensure sustainability across its supply chain in relation to biodiversity conservation. Score: **1/5**

Long-term strategy: ASML aims for no net loss of biodiversity and no net deforestation as part of its sustainability strategy. The organization's board of management oversees the execution of sustainability strategy, including biodiversity concerns, with updates provided quarterly. Score: 4/5

Novo Nordisk

Biodiversity integration: Novo Nordisk demonstrates a commitment to biodiversity preservation by acknowledging its importance and initiating programs to understand and mitigate its biodiversity impacts, such as aligning with CBD and UN goals. However, it lacks executive management accountability and board-level supervision for biodiversity-related matters, although it intends to establish both within the next two years. Score: 3/5

Environmental performance: Novo Nordisk shows a strong commitment to environmental sustainability, with initiatives focusing on reducing carbon emissions, circular economy efforts like plastic recycling, and biodiversity preservation. The company acknowledges its reliance on natural resources and aims to alleviate pressure on biodiversity through alignment with global initiatives. Score: 4/5

Transparency and disclosure: Novo Nordisk is preparing for the rollout of the Corporate Sustainability Reporting Directive (CSRD) in 2024 and aims to include biodiversity as a key focus area in its ESG reporting strategy. While it lacks executive management accountability and board-level supervision for biodiversity-related matters currently, it intends to establish both within the next two years. However, Score: 3/5

Sustainability initiatives: Novo Nordisk demonstrates strong sustainability initiatives, including programs to address waste from its devices, such as the remit program for recycling plastic devices, and a growing focus on biodiversity preservation. The company aligns with global initiatives such as the Convention on Biological Diversity and supports the three main objectives of the convention. Score: 4/5

Compliance and regulatory adherence: Novo Nordisk adheres to local regulations concerning biodiversity concerns and prioritizes sustainable resource usage. It engages in projects to protect habitats and mitigate the impact of its operations on ecosystems, such as the NovoEco initiative in Brazil and tree planting in Denmark. Moreover, Novo Nordisk has committed to being an early

adopter of the Task Force on Nature-related Financial Disclosures (TNFD), aiming to align its disclosures with TNFD standards by the financial year 2025. Score: **5/5**

Stakeholder engagement: Novo Nordisk conducts comprehensive double materiality assessments involving internal experts, leaders, and external stakeholders to understand key environmental, social, and governance (ESG) topics pertinent to the company. However, it lacks explicit public pledges and board-level supervision for biodiversity-related matters. Score: **4/5**

Innovation and adaptation: Novo Nordisk innovates in environmental sustainability through initiatives like waste recycling programs and biodiversity preservation efforts. It prioritizes the sustainable utilization of natural resources and adheres to global responsible sourcing standards to mitigate negative environmental effects. Score: **4/5**

Risk management: Novo Nordisk acknowledges the risks posed by biodiversity loss and climate change to human health and recognizes its vital role in addressing these challenges. The company aims to establish executive management accountability and board-level supervision for biodiversity-related matters within the next two years. Score: **3/5**

Supply chain sustainability: The summary does not provide explicit information on Novo Nordisk's supply chain sustainability efforts. Score: **1/5**

Long-term strategy: Novo Nordisk's long-term strategy includes initiatives to understand and mitigate its biodiversity impacts, aligning with global initiatives and protocols for biodiversity conservation. It aims to accomplish UN SDGs: 14 and 15 and acknowledges biodiversity and its endorsement of international protocols like the Cartagena and Nagoya Protocols as part of their long-term strategy. Score: **5/5**

Mastercard

Biodiversity integration: Mastercard demonstrates a significant commitment to biodiversity preservation through its Priceless Planet Coalition and various initiatives aimed at tree restoration and habitat preservation. The company partners with global environmental organizations and implements science-based best practices. Score: **5/5**

Environmental performance: While the focus is more on biodiversity conservation rather than overall environmental performance, Mastercard's efforts in tree restoration and habitat preservation contribute positively to environmental sustainability. Score: **4/5**

Transparency and disclosure: The company is transparent about its initiatives, partnerships, and goals related to biodiversity conservation. Score: **3/5**

Sustainability initiatives: Mastercard has launched several sustainability initiatives, including the Priceless Planet Coalition and the Wildlife Impact Card initiative, demonstrating a strong commitment to environmental and biodiversity conservation. Score: **5/5**

Compliance and regulatory adherence: The company commits to respecting legally designated protected areas and avoiding adverse effects on endangered species, aligning with regulatory requirements and international standards. The company is not among TNFD early adopters, nor FSC certificate holder. Score: **4/5**

Stakeholder engagement: Mastercard engages stakeholders through its partnerships with environmental organizations, financial institutions, and consumers, involving them in biodiversity conservation efforts. Score: **5/5**

Innovation and adaptation: The company shows innovation in its sustainability initiatives, such as introducing eco-friendly debit cards and engaging consumers in tree restoration projects. However, there could be more emphasis on developing innovative solutions for biodiversity conservation. Score: **4/5**

Risk management: Mastercard identifies biodiversity as a significant concern and takes proactive steps to address it through its initiatives. However, there may be opportunities to improve risk management practices related to biodiversity conservation. Score: **4/5**

Supply chain sustainability: The information provided does not explicitly mention Mastercard's efforts to ensure sustainability across its supply chain. Score: **1/5**

Long-term strategy: The company has set ambitious goals, such as restoring 100 million trees by 2025, and has made public commitments to biodiversity initiatives, demonstrating a long-term strategy for biodiversity conservation. Score: **5/5**

Johnson & Johnson

Biodiversity integration: Johnson & Johnson demonstrates a strong commitment to biodiversity preservation through partnerships and initiatives such as the 30 Hills project in Sumatra and forest conservation projects in Loreto, Peru. Additionally, the company enforces measures to assess and mitigate risks to sensitive plant and animal species and integrates biodiversity conservation practices into its supply chain standards. Score: **4/5**

Environmental performance: Johnson & Johnson has established public environmental goals, enforces rigorous EH&S standards across its sites, and ensures compliance with ISO 14001 Environmental Management System. Moreover, the company supports global initiatives like the CBD and complies with the Nagoya Protocol. Score: **4/5**

Transparency and disclosure: While Johnson & Johnson demonstrates transparency in its environmental goals and commitments, including biodiversity preservation, providing more detailed reporting on specific initiatives and their outcomes would further enhance transparency. Score: **3/5**

Sustainability initiatives: The company's participation in forest conservation projects, adherence to EH&S standards, and integration of biodiversity conservation practices into its supply chain standards demonstrate a commitment to sustainability. Score **4/5**

Compliance and regulatory adherence: Johnson & Johnson complies with ISO 14001 Environmental Management System and supports global initiatives like the CBD and Nagoya Protocol. Moreover, the company enforces sustainability and environmental responsibility standards for its suppliers. However, the company is neither among TNFD adopters nor FSC holders, therefore there is room for improvement. Score: **4/5**

Stakeholder engagement: The company engages in partnerships and collaborations with organizations like the World Wildlife Foundation and local communities to support biodiversity conservation. Score: **4/5**

Innovation and adaptation: While Johnson & Johnson demonstrates innovation through its forest conservation partnerships and integration of biodiversity conservation practices into its supply chain standards, more emphasis on innovative approaches specifically targeting biodiversity conservation could be highlighted. Score: **3/5**

Risk management: Johnson & Johnson enforces measures to assess and mitigate risks to biodiversity, including evaluating potential risks and impacts associated with procurement activities. Score: **3/5**

Supply chain sustainability: The company integrates biodiversity conservation practices into its supply chain standards and evaluates potential risks and impacts associated with procurement activities. Score: **4/5**

Long-term strategy: Johnson & Johnson demonstrates a long-term commitment to biodiversity preservation through partnerships and initiatives, as well as plans to assess biodiversity-related impacts and advance biodiversity commitments within the next two years. Score **4/5**