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Corporate Nature Risk Perceptions

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January 2026

Snorre Gjerde
Norges Bank Investment Management

Zacharias Sautner
University of Zurich, Swiss Finance Institute and ECGI

Alexander F. Wagner
University of Zurich, Swiss Finance Institute, CEPR and ECGI

Alexis Wegerich
Norges Bank Investment Management

ECGI Working Paper Series in Finance

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Abstract

We survey companies worldwide to explore the evolving landscape of nature risks. Nearly half of all companies (48%) view nature risks as financially material, and 43% of those perceive nature-related physical risks, and 27% transition risks, as having financial effects already today. In line with these materiality perceptions, three-quarters of companies experiencing nature-related investor engagement view these interactions as value-generating. Nonetheless, according to the respondents, investor attention remains limited in key respects: while 40% report that investors consider nature risks, fewer than 25% believe investors assess how these risks affect cashflows or costs of capital. Half of the respondents believe investors will prioritize climate over nature; however, many think both topics are so intertwined that they cannot be separated. Our findings underscore the growing recognition of nature risks as financially relevant, while also pointing to challenges and opportunities for their integration into financial analysis and investor engagement.

Keywords: Nature risk, biodiversity risk, shareholder engagement, nature capital

JEL Classifications: G12, G30, Q57

Snorre Gjerde
Lead Investment Stewardship Manager
Norges Bank Investment Management
Bankplassen 2
Oslo, NO-0107, Norway
e-mail: sge@nbim.no

Zacharias Sautner*
Professor of Sustainable Finance
University of Zurich
Plattenstrasse 14
CH-8032 Zurich, Switzerland
e-mail: zacharias.sautner@bf.uzh.ch

Alexander F. Wagner
Professor of Finance
University of Zurich
Plattenstr. 14
CH-8032 Zürich, Switzerland
phone: +41 446 343 963
e-mail: alexander.wagner@bf.uzh.ch

Alexis Wegerich
Head of ESG Analytics
Norges Bank Investment Management
Bankplassen 2
Oslo, NO-0107, Norway
e-mail: awg@nbim.no

*Corresponding Author

s:fi
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Snorre Gjerde
Norges Bank Investment Management

Zacharias Sautner
University of Zurich, Swiss Finance Institute, ECGI, and CEPR

Alexander F. Wagner
University of Zurich, Swiss Finance Institute, ECGI, and CEPR

Alexis Wegerich
Norges Bank Investment Management

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Snorre Gjerde[1], Zacharias Sautner[2,3], Alexander F. Wagner[2,3*], Alexis Wegerich[1]

[1] Norges Bank Investment Management, Oslo, Norway
[2] University of Zurich and Swiss Finance Institute, Zurich, Switzerland
[3] ECGI and CEPR

* Corresponding author: Department of Finance, University of Zurich, Plattenstrasse 14, 8032 Zurich, Switzerland.
Email: alexander.wagner@df.uzh.ch

Abstract

We survey portfolio companies of a large asset owner to explore the evolving landscape of nature risks. Nearly half of all companies (48%) view nature risks as financially material, and 43% of those perceive nature-related physical risks, and 27% transition risks, as having financial effects already today. Three-quarters of companies experiencing nature-related investor engagement view these interactions as value-generating. Nonetheless, according to the respondents, investor attention remains limited in key respects: while 40% report that investors consider nature risks, fewer than 25% believe investors assess how these risks affect cashflows or costs of capital. Half of the respondents believe investors will prioritize climate over nature; however, many think both topics are so intertwined that they cannot be separated. Our findings underscore the growing recognition of nature risks as financially relevant, while also pointing to challenges and opportunities for their integration into financial analysis and investor engagement.

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1. Introduction

The loss of natural capital, biodiversity, and ecosystem services is one of the major crises facing humanity (Rockström et al. 2009; Steffen et al. 2015). Nature loss has far-reaching economic implications as it jeopardizes the goods and services humans obtain from ecosystems. It can affect companies either directly in their operations or indirectly through their supply chains. The risks through which companies may be affected are either physical or transition-related. Physical risk results from dependencies of economic activity on nature and the consequent vulnerability to nature degradation, including changes in ecosystem functioning (e.g., soil quality decline or shifts in species composition) and loss of ecosystem services (e.g., pollination, flood protection, or food provision). Transition risk results from changes in regulation, technology, investor sentiment, or consumer preferences, or—more generally—from a misalignment of companies with actions aimed at restoring or reducing negative impacts on nature. Jointly, risks related to nature dependencies and impacts have been termed "nature risks" by the Taskforce on Nature-related Financial Disclosures (TNFD).[1]

With growing attention to nature topics in finance, the question is how exposed companies respond to a novel, potentially large-scale financial risk and how they engage with investors around it. That nature loss constitutes an *emerging* risk is corroborated by the finding that equity investors only recently started to price biodiversity transition risk (Garel et al. 2024). Though there is no systematic evidence yet, it is plausible that investors have also only recently begun to consider the pricing of nature physical risk. At the same time, market participants do not consider the current pricing of biodiversity risks in equity markets to be adequate (Giglio et al. 2024).

[1] TNFD defines nature risks as potential threats posed to an organization that arise from its and wider society's dependencies and impacts on nature. Similar definitions are used by European Central Bank (2023a, 2023b), Financial Stability Board (2024), Network for Greening the Financial System (2023), or OECD (2023). While the words "nature" and "biodiversity" are often used interchangeably, they are distinct concepts. "Nature" refers to the natural world and includes living organisms and non-living features (e.g., water). "Biodiversity" instead refers to the variability among living organisms, though it is heavily influenced by the diversity of non-living features.

In comparison, *climate* risks received substantial attention over the last 15 years, with research concluding that climate transition risk is priced *at least* since the Paris Agreement in 2015 (e.g., Bolton and Kacperczyk 2021, 2023), and climate physical risks possibly for even longer (e.g., Kruttli, Roth Tran, and Watugala 2025). This makes it difficult to go back in time and learn perceptions of corporate managers when climate risks were beginning to emerge as something relevant to companies and their investors. Nature risks, by contrast, offer an opportunity to gain fundamental insights into how companies approach new risks.

The emerging pricing of nature transition risk in Garel et al. (2024) is driven by marginal and typically well-informed investors. Little is known, however, about how companies consider nature risks and the management and pricing thereof, and whether they regard their investors as being sufficiently interested in the risks to warrant action. Understanding corporate risk perceptions is important. For example, research on feedback effects suggests that corporate managers use stock prices as information for their own decision-making (Bond, Edmans, and Goldstein 2012; Goldstein 2023). Hence, a widespread perception—on the part of companies—that investors do not attach importance to nature risks, or a misalignment of companies' and investors' time horizons when the risks materialize, could lead to corporate decisions that fail to adequately address these risks. This asymmetry between companies and investors may, in turn, impede the efficient incorporation of nature risks into market prices.

In this paper, we shed light on these issues using a global survey among the investee companies of Norges Bank Investment Management (NBIM), one of the world's largest asset owners. We refer to NBIM in what follows as "the investor." Focusing on the perceptions of the investor's portfolio companies, we offer an early view on nature risks that we organize along three topics: (i) corporate nature risk exposures; (ii) nature risk management; and (iii) investor interest in nature risk, including investor engagement. We sent the survey to about 7,000 companies in the investor's listed equity portfolio using two distribution channels: 90% of the companies received the invitation email directly from an email account of the investor,

and 10% received it from an account of University of Zurich (UZH).[2] After applying standard filters, we obtained a sample of 385 respondent companies, with 374 originating from the investor channel and 11 from the UZH channel. The sample is likely tilted toward companies with relatively higher awareness of nature risks, and stronger credentials in addressing them, because such companies should be more disposed to participate in a survey on nature risks. While it is important to keep this sample feature in mind when extrapolating from the responses, we consider this a strength. Understanding the views and actions of such companies is particularly instructive, especially to get an early view on an emerging topic.

Results on the first topic centre around the financial materiality of nature risks. Risks are "financially material" to a company if they have the potential to substantially impact its financial position, performance, or prospects in a way that would influence the decisions of investors (IFRS 2024); we refer to such companies as "exposed companies." Overall, 48% of companies state that they are exposed to nature risks, 39% assert that they are not, and 13% are uncertain. When we asked which type of nature risks are financially material, slightly more companies stated physical risks than transition risks. Our respondents share a broad belief that both risks are *not* a topic of the distant future: 43% (27%) of exposed companies believe that physical risks (transition risks) already have financially material effects on their companies today. There is a high degree of heterogeneity in the ways in which exposed companies perceive themselves to be affected by nature, with effects originating from various sources, along the entire supply/value chain, and across multiple locations. Hence, while climate risk assessment has benefited from greenhouse gas emissions as one standardized, cross-sectoral metric for transition risk exposure, nature risk assessment currently lacks comparable widely accepted indicators that capture its multidimensional character.

Turning to the second topic, we evaluate *how* companies gauge financial materiality of nature risks. One possibility, proposed by TNFD, is to conduct methodical assessments of

[2] We executed the survey anonymously to mitigate concerns over untruthful or strategic responses, and in the UZH version, we erased all references to the investor. Nevertheless, we are mindful of potential acquiescence bias and conduct several tests to evaluate whether responses are affected by the cooperation with the investor.

whether major investments have negative impacts on nature or are at risk because of nature dependencies. Impact assessments have become relatively common, with 50% of companies conducting or planning to conduct them for major investments. Corresponding numbers are smaller for dependency assessments (33%). The widespread financial materiality of nature risks raises the question of *what measures* companies consider to manage nature risks. Almost twice as many respondents (82%) report current or planned actions to *mitigate* any negative impacts on nature, relative to actions aimed at *offsetting* such impacts (43%).[3] Though companies started to act on nature risks, perceived challenges in addressing nature risks are widespread, mostly related to a lack of data and cost concerns. If nature risks are financially material to companies, one would expect them to provide disclosures on such risks. Historically, standardized guidance for nature-related disclosures has been limited, though the landscape is changing with the launch of frameworks like the TNFD recommendations in 2023. Until recently, nature-related disclosures in Forms 10-K (Giglio et al. 2024) or earnings calls (Garel et al. 2024) were scant, but disclosure practices appear to be evolving: 74% of companies indicate that they now provide or plan to provide disclosures on nature risks.

Turning to the last topic, most companies believe that investor attention to nature topics has increased in recent years, driven primarily by policy or regulatory changes and growing public awareness. Disagreement exists on the extent to which investors incorporate nature risks into investment decisions. Many companies that believe investors consider nature risks think, at the same time, that investors do not assess the implications of these risks for standard determinants of company valuations (cashflows and discount rates). Borrowing the words of Metrick and Weitzman (1998), who pointed out a similar issue for the economics of biodiversity protection, a key issue of nature finance seems to be *"the fuzziness of the objective function."* Almost half of all respondents perceive nature-related engagement by

[3] This pattern reflects the principles of the "mitigation hierarchy," which emphasizes that companies should focus on avoiding and minimizing impacts before considering offsetting for unavoidable residual impacts. The lower adoption of offsetting may indicate that many companies prioritize impact reduction at the source, though it could also suggest that offsetting mechanisms and markets are less developed or accessible than direct mitigation approaches.

investors as value-generating, and the percentage is even larger among those that experienced engagement. The main perceived benefits of engagement are that it provides advice and raises internal focus on nature topics. Further, one-third of respondents say that nature engagement influenced their strategies or operations. Companies that reported engagement influencing their practices show a higher tendency to undertake nature-related actions (e.g., mitigation or disclosures). These findings support the existence of causal effects of ESG engagement, which has proven hard to document with archival data. Finally, only one in four companies believes that investors prioritize climate topics over nature topics and also view this as the appropriate priority. These views line up with the emphasis of natural scientists that the biodiversity and climate crises are coupled.[4]

We contribute to a nascent finance literature on biodiversity and nature risks. Giglio et al. (2024) study biodiversity risk perceptions by finance academics, financial professionals, and policymakers. About 70% of their respondents consider physical and transition risks as moderately or very important. Thus, their respondents perceive a somewhat higher materiality of biodiversity risk than ours of nature risk. Conversely, while in their survey, only 20% consider biodiversity risks to be materializing today, in our sample that number is 43% for nature physical risks and 27% for transition risks. Besides these differences, our survey provides detailed information on corporate actions, sources of nature risks, investor engagement, and the relation to climate risk. Garel et al. (2024) show that a transition risk premium started to emerge after the Kunming Declaration. Coqueret, Giroux, and Zerbib (2025) find for sectors with high exposure to both physical and transition risks that firms with larger biodiversity footprints earn higher expected returns. Focusing on physical risks, Garel et al. (2025) create measures of nature dependence and relate them to downside risk and investor engagement, Hoepner et al. (2023) study nature dependence among infrastructure companies, and Canipek et al. (2025) and Nguyen et al. (2025) relate nature dependence to

[4] See, for example, the discussion of feedback loops and amplification mechanisms between nature loss and climate change in Steffen et al. (2015) or the review of the results of a joint meeting of members of the International Panels on Climate Change and Biodiversity and Ecosystem Services in Pörtner et al. (2023). See Giglio et al. (2025a) for an implementation of this idea in an economic model.

loan spreads. Giglio et al. (2025b) show that news about biodiversity loss increases CDS spreads more for countries with more depleted ecosystems. Arlt et al. (2024) provide a stress test of the financial sector's resilience to transition risk and Deng and Lin (2025) examine banks' biodiversity risks. Chen et al. (2024) and Lewis and Rizzi (2025) examine how municipal bond pricing relates to nature conservation and dependence on ecosystem services.

2. Methodology and survey design

2.1 Survey development, delivery, and design

We used an iterative process for developing our survey to incorporate feedback from academics, the investor, and companies.[5] We received written confirmation from the investor that we can publish results independent of the conclusions established from the responses. The investor did not see any company-specific responses. The survey is provided in Supplementary Appendix A. We distributed an online version of the survey on February 3, 2025 to 6,335 companies for which the investor had relevant contact details and that were included in its listed equity portfolio as of June 2024.[6] Our primary distribution channel involved sending the survey to 5,728 investee companies (or about 90%) from an email account of the investor. As a secondary channel, we sent the survey to the remaining 607 (or about 10%) companies from an email account of University of Zurich (UZH), after erasing any references to the investor. We separated companies randomly (see Supplementary Appendix B). We use the UZH survey responses to address acquiescence bias—where responses are skewed toward answers that respondents believe align with investors' views—by contrasting key responses between the two channels. The investor sent additional email invitations to 280

[5] Survey instruments are widely used in the ESG literature, covering topics such as investor activism (McCahery, Sautner, and Starks 2016), climate risks (Krueger, Sautner, and Starks 2020; Stroebel and Wurgler 2021; Ilhan et al. 2023), biodiversity risks (Giglio et al. 2024), or investor relations (Karolyi, Kim, and Liao 2020).

[6] The investor uses the FTSE Global All Cap as a benchmark. By the end of 2024, the investor held shares in 8,738 companies. The companies receiving our survey make up around 75% of the portfolio value of the investor. We sent a reminder about two weeks later.

further companies on February 18, 2025 (out of 431 companies added to its portfolio after June 2024).

After applying data filters, we obtained a final sample of 385 company responses—374 from the investor's channel and 11 from the UZH channel.[7] From going over the responses, especially the open text answers, we are confident that the vast majority of companies provided high-quality responses. This is supported by relatively high completion rates and times (see Table 1). We believe our cooperation with the investor helped to significantly increase the number of responses (this is also evidenced by how response rates differ across the two distribution channels). That the response rate is still not higher than 6% might be due to the novelty of the topic and a fatigue regarding ESG surveys.[8] That we framed the survey as an independent study rather than a request for information by its shareholder might have also led to fewer—but potentially less biased—responses

As the survey covers an emerging topic, we provided definitions of basic concepts in an introductory text. We were mindful that these definitions do not bias subsequent responses, for example, by imposing some importance of nature risks. To clarify what we understand under nature risks, we provided widely agreed upon definitions of these risks based on TNFD terminology. We explained that nature risks are *"the potential threats posed to an organization linked to its, and other organizations', dependencies on nature and nature impacts."* We then explained that nature risks are physical or transition-based and included examples. After the introductory text, we covered the three themes of the survey (Parts A to C), collected basic company characteristics (Part D), and allowed respondents to voluntarily

[7] We deleted from the sample (i) companies where respondents did not proceed to the question on financial materiality of nature risks (Question A.1); (ii) companies where respondents plausibly did not read the explanatory introductory text (response times below 60 seconds); (iii) responses that were clearly duplicate responses from the same company. We are confident that in most cases we retain only one response per company, because only 11 cases showed overlapping characteristics for country, industry, and company sales bins. Even for these cases, the survey responses are sufficiently different to discount with a high degree of confidence the possibility of coinciding companies.

[8] One company responded by email to our survey invitation, explaining that they *"[…] are inundated with these types of requests and are not able to respond to all of them individually."*

reveal their corporate functions and companies (Part E); the last part was also used to collect further information on some of the earlier questions. Due to space constraints, we analyse most but not all survey questions in this paper.

2.2 Information about the investor and acquiescence bias

The investor has been an early mover on addressing nature risks and has a long-standing history of engaging portfolio companies on these risks (NBIM 2024). It uses a wide spectrum of nature-related engagement forms, ranging from dialogue in private meetings to voting against the re-election of board members. In 2021, the investor launched an investor expectation document on biodiversity and ecosystems (NBIM 2021) and joined TNFD to contribute to the development of a framework for companies to report on nature risks. The investor is one of the first institutions that published "Nature risk disclosures" based on the TNFD recommendations as part of its 2023 reporting (NBIM 2024). By 2024, it had assets under management worth about $1.7 trillion.

As in any survey, we face the question of whether respondents answered truthfully. This concern is amplified given that our investor is not only a shareholder in the surveyed companies but additionally engages in nature-related stewardship activities (we emphasized that the survey is not part of the investor's ownership activities). Therefore, we conducted the survey anonymously, not asking respondents to reveal their names or employers.[9]

2.3 Respondent characteristics

Table 1 documents that the largest number of respondents work as sustainability officers in their companies (52%), followed by investor relations (36%), other functions (11%), and strategy (1%).[10] That sustainability and investor relations experts responded for most

[9] It is less likely that companies provide untruthful responses in an anonymous survey. While this was the default setting, we offered respondents the possibility to reveal the identities of their companies using an opt-in option. For such cases, we emphasized that responses are treated confidentially by the research team. We are not using information on company identities for analyses as the number of companies revealing their names was small.
[10] In many cases, respondents specified in the open text response of the "Other functions" category that they work both in investor relations and sustainability.

companies is indicative of the high quality of the responses; they should be knowledgeable about the role of nature risks for their companies and about investor concerns. The sample includes 17% of companies with more than $10 billion in sales. Our sample is not overly skewed towards one specific sector. Company headquarters are mostly in Europe (52%), Asia (22%), and North America (16%). Those that provided information on financial performance report median past 3-year ROEs of 12% (the question follows Graham et al. 2022). A total of 36% of respondents indicated that they have a committee or task force for nature risks. For the responses in this and subsequent tables, the number of observations can fall below 385 because respondents did not progress through the entire survey, skipped some questions, or were not asked to respond as the question was conditional on a specific prior answer.

We use formal chi-square goodness-of-fit tests to evaluate whether our respondents differ in terms of company size, industry, and world region from the population of companies the survey was sent to. The underlying distributions are plotted in Supplementary Appendix Figure E.1. For the categories reflecting company size, a test comparing respondents to the population indicates a marginally significant difference overall (p-value = 0.049), with some modest deviations arising especially among the smallest (underrepresented in our sample) and largest (overrepresented) firms. For industry, the chi-square test is highly statistically significant (p-value < 0.01), though most categories align closely with the population distribution; differences are concentrated in few sectors such as “Real estate,” “Financials,” or “Consumer discretionary.” A test considering headquarters regions is also significant (p-value < 0.01), primarily due to an overrepresentation of European companies and an underrepresentation of companies from Asia and North America.

3. Financial materiality of corporate nature risks

3.1 Anatomy of nature-related physical and transition risks

A fundamental question is whether nature risks are financially material for companies, and over what horizons these risks materialize. Risks are “financially material” if they have the

potential to substantially impact a company's financial performance condition or prospects in a way that would influence the economic decisions of investors (IFRS 2024). Information on the prevalence of financially material nature risks is critical for investors evaluating whether these risks are priced in financial markets, for standard-setters considering whether to design disclosure requirements, as is currently being researched by the ISSB (2024), and for regulators considering whether to mandate such requirements. If most companies believe that nature topics are not financially material to them, then—provided the assessments are correct—it is unlikely that nature risks affect asset prices or financial stability on a broad basis. This also has implications for disclosure standards which focus on financial materiality.

Table 2, Panel A, shows that 48% of sample companies consider nature risks financially material to their business (i.e., they self-identify as having "risk exposure"). As mentioned before, this number may reflect that our respondent group is biased towards those with higher exposure to (or awareness of) nature risks. That 39% of respondents do *not* consider nature risks to be financially material shows that we also surveyed companies without perceived risk exposures.[11] This supports analyses that contrast companies with and without risk exposures. A further 13% stated that they do not know if nature risks are financially material for their companies. Supplementary Appendix Table E.1 shows that the reported frequency of nature risk exposure is not significantly higher for respondents in sustainability functions.

More companies have exposure to financially-material physical risks (42%) than to transition risks (36%). Transition and physical risk exposures frequently coincide, with many respondents being exposed to both (correlation of 71%). Specifically, among those who considered at least one type of nature-related risk to be financially material, almost three-quarters (72%) indicated that both physical and transition risks were financially material.

[11] In Supplementary Appendix C, we connect the survey-based measure of nature risk exposure to nature-related risk metrics provided by ESG data vendors and other research teams.

These figures imply that both risks should be integrated jointly into risk management or financial stability frameworks.[12]

Table 2, Panel A, also reports the time horizons over which the financial effects of the risks are expected to materialize for a company, conditional on risk exposure. We find that 43% of respondents believe that physical risk, and 27% believe that transition risks, have financially material effects for them "already today." One can contrast these numbers with corresponding statistics in a survey among institutional investors on climate risks. According to Krueger, Sautner, and Starks (2020), 34% of investors surveyed in 2019 stated that climate physical risks already materialize today, and 55% indicated the same for transition risks. Hence, though respondent groups are different, the perceived urgencies for nature and climate risks at the time of surveying are similar.[13]

In the same panel, we contrast the company responses on nature risk horizons with responses to corresponding questions on when—in the opinion of the companies—*investors* expect nature risks to materialize. Our responses indicate a horizon gap: companies believe that investors expect the risks to materialize later compared to their own expectations. The gap is smaller when we consider only responses by exposed companies, possibly because they interact more with investors that also see an urgency for the topic. Yet, any gap can be a source of conflicts in company-investor interactions (e.g., the gap may lead to differing views on the urgency of investing resources to address nature risks).

[12] An example is a company that produces bottled water. The company faces potential transition risk if a negative impact of water sourcing on ground water levels is restricted (or taxed) by regulation, and it faces physical risk if ecosystem services related to water purification deteriorate substantially.

[13] Possible explanations for the difference between our numbers and those in Krueger, Sautner, and Starks (2020) on when physical versus transition risks start materializing could be the relative maturity of climate policy frameworks, more tangible/visible operational impacts from ecosystem service disruptions, or the time lag between our studies, with physical effects being perceived as more pronounced today.

3.2 Sources of nature risks

In Table 2, Panel B, we report views on the channels through which financial effects of transition and physical risks materialize, conditional on a company being exposed to the risks. We report the percentage of respondents that ranked a given channel in the top 2. For companies with transition risk exposure, the most important sources of nature-related financial effects are their own products and services (66% rank this channel in the top 2), followed by nature effects on their own operations (59%), effects from supply chains (35%), reputational effects or a loss of the "license to operate" (20%), and effects from changes in investor demand (15%).[14] These dispersed responses reflect a large degree of heterogeneity in how companies are affected by nature transition risks, with effects originating from various stakeholders (suppliers, investors, the public) and along the entire value chain. An implication is that it is challenging to capture transition risk exposure in a single one-size-fits-all metric. This is different for *climate* transition risks, where carbon emissions emerged as a dominant metric (Bolton and Kacperczyk 2021, 2023). Our conclusions are amplified based on responses to the question on whether transition risks are concentrated. Table 2, Panel B, shows that for 41% of exposed companies, transition risks are scattered and originate from multiple sources, corroborating high levels of complexity in measuring and managing these risks.

A driver of transition risk realizations could be changes to nature-related regulation. Such shocks affect a company's products or services, operations, and supply chains, all of which were named as channels through which financial effects of nature risks propagate. At the moment, however, it is unclear how likely such changes are. We used the survey to ask companies whether they expect, over the next 3 to 5 years, regulation related to nature impacts to change in their main markets. The responses, displayed in Figure 1, show that 50% of respondents expect stricter regulations, 33% perceive mixed or no significant changes, 9% see less strict regulations, and 8% do not know. Hence, while most expect stricter regulation, there is also notable disagreement about this majority view. Documenting such disagreement

[14] Numbers in Table 2, Panel A, are similar for physical nature risks.

is useful, as uncertainty about regulatory changes is a driver of the pricing of transition risk related to a company's impact on biodiversity (Garel et al. 2024).

We also asked respondents about business areas in which they perceive nature-related *opportunities*. Figure 2 shows that 82% of respondents indicated opportunities related to resource efficiency and management, 62% related to eco-friendly products and innovations, 31% in biodiversity/ecosystem services enhancement, and 13% in other areas. These responses support Flammer, Giroux, and Heal (2025)'s finding of growing investability of nature-related opportunities.

3.3 Nature risks across industries and world regions

In Table 2, Panel C, we document that nature risk exposures locate in multiple sectors and across world regions. The three sectors with the highest frequency of exposed companies—as sampled by our survey—are "Consumer staples," "Industrials," and "Basic materials." When we consider transition and physical risks separately, "Consumer staples" is the top-ranked sector for both risks. This is plausible as the sector includes companies producing food and beverages, which have a large corporate biodiversity footprint (Garel et al. 2024) and high levels of nature dependence (Garel et al. 2025). Consistent with our earlier observations that transition and physical risks often coincide, there is not a large wedge between the two risks for most sectors. Apart from the "Rest of world" category, companies from Asia have the highest overall risk exposure, followed by companies from North America and Europe. Asian and North American companies have relatively more exposures to physical risks than to transition risks.[15] These numbers suggest that nature risk awareness and concern is global: companies across diverse geographies recognize nature risks as financially material, though the specific risk types prioritized vary somewhat by region.

[15] These perceptions are plausible given the currently high prevalence of physical risks in Asia/North America (e.g., wildfires, water scarcity, extreme weather).

4. Corporate nature risk management

4.1 Impact and dependency assessments

One way for companies to gauge the financial materiality of nature risks is to conduct structural assessments that inform decision-makers on whether major investments have negative impacts on nature or, alternatively, are at risk because of nature dependencies. Table 3, Panel A, illustrates that nature impact assessments started to become frequent, with 50% of companies undertaking or planning to undertake them for major investments. The numbers are smaller for nature dependency assessments (33%), possibly because relatively fewer tools and metrics exist to measure and assess nature dependence (Finance for Biodiversity 2022, Garel et al. 2025).

We used a follow-up open question to shed light on how companies conduct these assessments. One company responds that *"when undertaking major investments, we carefully assess nature-related impact risks and incorporate them as factors in our IRR model. We proceed with major investments only after confirming that the nature-related impacts are within manageable and acceptable limits."* For dependency assessments, a respondent explained that *"conducting assessments allows us to understand how our operations and supply chains depend on essential ecosystem services such as water supply, soil fertility and pollination. By understanding these dependencies, we can make informed decisions to ensure the resilience of our activities and reduce risks associated with environmental degradation.*" These answers indicate relatively sophisticated approaches for those that disclose the details.

4.2 Approaches to nature risk management

The widespread financial materiality of nature risks raises the question of what measures companies implement or plan to implement with the goal of managing nature risks. Table 3,

Panel B, tabulates answers to these questions.[16] The most frequent approach is to mitigate any negative impacts on nature caused by a company's business activities (82% indicated this action). Less frequent are nature risk stress tests and/or scenario analysis (64%), technological innovations or solutions to mitigate nature risks (59%), and adaptation activities to nature dependencies (57%). Comparatively fewer companies, 43%, opt for measures to offset the negative impacts on nature caused by business activities, and 22% consider hedging through financial instruments.

Beyond understanding the *status quo* of nature risk management, the numbers speak to the question of whether companies' roles lie primarily in *mitigating* (avoiding or minimising) nature impacts or, alternatively, in actively contributing to *restoring* it (e.g., by using offsets).[17] According to our survey, mitigation is more widespread, being almost twice as frequent as offsetting actions. This pattern aligns with the "mitigation hierarchy approach," under which companies should first exhaust opportunities to avoid and minimize impacts, before turning to offsetting unavoidable residual impacts. The apparent gap between mitigation and restoration/offsetting activities highlights a potential imbalance between impact reduction and nature restoration efforts, particularly noteworthy in the context of accelerating global nature loss.

We tabulate in Supplementary Appendix Table E.3 classifications of open text evaluating which specific nature risk approaches companies have chosen.[18] For example, with

[16] We asked about approaches that include the supply and value chain, as prior evidence indicates that many companies have indirect nature risk exposure (Scope 3), rather than only exposures through their direct operational (Scope 1) activities (Garel et al. 2024). We report the percentage of companies that responded with "yes" and rank the approaches by frequency. We asked this question to all respondents, irrespective of whether nature risks are financially material, as some companies may undertake efforts because of a double materiality perspective, that is, to address their impact company impact on nature even if the risks associated with their impacts are not financially material to them. We treat do not know responses as missing for the table.

[17] In Supplementary Appendix Table E.2, we report the distribution of mitigation and restoration efforts across sectors and world regions.

[18] For each question, we classified the text responses into distinct "areas" using ChatGPT and report the frequency of each area. We did not include open text fields for stress tests/scenario analysis and did not classify the responses for hedging due to only 31 responses. The prompt is reported in Supplementary Appendix D. For hedging, respondents frequently mentioned insurance coverage, while some companies also mentioned carbon credits or sustainability-linked debt.

respect to actions aimed at mitigating negative impacts, 36% of companies use broader environmental practices in their operations (e.g., waste management or procurement policy), 25% undertake direct mitigation of nature-related risks, 22% actions related to physical infrastructure, energy use, water conservation, and material efficiency, and 16% have enterprise-level sustainability initiatives. To offset negative impacts, companies use a set of options, including carbon offsets and credits (36%), offsetting via ecosystem or partner projects (30%), or nature-based projects (17%).

In Figure 3, we document that 57% of respondents believe that their approaches to addressing nature risks are similarly developed as their peers'. A further 25% indicate more or much more advanced approaches; this may indeed be the case if respondents with more advanced approaches self-select into the survey. An interpretation of the response distribution is that the state of risk management is sampled reasonably well, as the oversampling of companies with a self-perceived more advanced approach is not very pronounced.

Our results indicate that companies have started to take a targeted approach aimed at addressing financially material nature risks. To better understand these actions, we directly asked for the main drivers or motivations for *why* companies address nature risks. Displayed in Table 3, Panel C, various motives are present among our sample companies, with the most common drivers being transition risks from regulation (83%) and physical risk considerations or degradation of nature (74%). Further motives relate to competitive advantages (58%), transition risks from consumer pressure (57%), and investment opportunities (39%). Interesting are some drivers stated in the "others" category (9%), with one company referring to employee pressure/interest, and several others to pressure by clients or investors.

4.3 Challenges to nature risk management

We used our survey to elicit, using an open-ended question, the challenges that companies face when addressing nature risks. Self-categorized responses are reported in Figure 4. The

two primary challenges relate to data/measurement constraints (37%) and concerns over costs (31%). Illustrating the data challenge, a respondent stated that *"there are inherent challenges in modelling due to limitations in data quality and availability, given the short history of assessments within the financial services industry. Data coverage is often lacking, where a subset of assets may not have the appropriate information publicly disclosed."*[19] A further statement, reflecting the source of the data challenge, was: *"[…] nature risks need to be addressed at a local/regional level."* Indeed, currently, localized data are widely unavailable though there is work by researchers and data vendors on using biodiversity-related spatial data matched with information on plant locations. For the cost side, a voiced concern was *"high cost in implementing the equipments/devices that help reduce nature risks, which won't be able to pass on to customers."* Further issues relate to implementation and management issues or nature-related complexities (27%), regulatory and political issues (20%), and a lack of standardization, for example for reporting standards (15%). A response in the latter category was that a *"lack of standardization of ESG guidelines and reporting standards"* exists.

4.4 Corporate disclosures on nature risks

If nature risks are financially material to companies, one would expect them to disclose these risks to investors. While standardised guidance on nature-related disclosures has historically been limited, this landscape is evolving and practices and requirements are expected to change.[20] To provide early insights into these developments, we asked companies about their current and planned approaches with respect to nature-related disclosures. As tabulated in Table 3, Panel D, 74% of companies provide or plan to provide public disclosure on nature risks. Only 17% do not plan to undertake nature risk reporting and 9% do not know yet. For

[19] The respondent highlights some further critical data challenges regarding the nature risk modelling and scenario analysis: "*While high data granularity is desirable to model client specific features, the balances between high data granularity and the additional insights provided must be investigated to assess the appropriate level of modelling. […] Nature scenario and outcomes are more uncertain than climate-equivalents, in part driven by the absence of publicly available scenarios, such as the IEA or NGFS in climate.*"

[20] Recent evidence from Giglio et al. (2024) and Garel et al. (2024) suggests that disclosures in Forms 10-K or earnings calls are scant.

the set of companies that consider disclosures, we asked about the frameworks that they are planning to follow. Most companies follow or plan to follow the CDP framework (48%), the European Sustainability Reporting Standards (ESRS) (40%), and the Global Reporting Initiative (GRI) guidelines (35%), followed by the TNFD (27%) or TCFD (11%) recommendations. Hence, no single dominant framework has emerged, and companies consider disclosure according to multiple frameworks. Companies may use multiple disclosure frameworks for various reasons, such as serving different stakeholder needs or meeting different reporting requirements across jurisdictions. The larger share of companies disclosing nature risks, compared to the share of companies exposed to nature risks, likely reflects that some companies consider for their disclosure decisions information demands by other stakeholders (double materiality disclosures). Consistent with this conjecture is our finding that many companies disclosing or planning to disclose on nature risks intend to do so through CDP reporting or under the ESRS, both of which feature double materiality disclosures.

The majority—but not all—respondents, likely refer to *planned* disclosures in answering our question. While more mature frameworks like GRI (established 1997) and CDP (established 2000) more likely indicate current practice, TNFD (launched 2023) is a more recent framework, so responses mentioning this framework more likely reflect planned future disclosures. For ESRS, implementation was just beginning for large EU companies during our survey, so companies could be referencing either current preparation to report on their fiscal year 2024 (for large EU companies) or future plans (for smaller or non-EU companies).[21]

4.5 Financial materiality and nature risk actions and disclosures

[21] For some companies that voluntarily disclosed their names, we could link their disclosure responses in the survey to their current disclosure practices. For a crop science company, which reported current or planned nature-related disclosures according to CDP and the ESRS, we could verify such disclosures in its responses to the CDP survey and in its 2024 annual report. In its annual report, the company describes, for example, that material risks can arise because of the biodiversity impacts caused by pesticides it produces. Similarly, for a fashion company which reported in the survey nature-related disclosures according to the ESRS, we found such disclosures already in its 2024 annual report. The company stated that it developed a strategy to reduce risks related to nature dependences in its supply chain. Hence, the survey responses we collected also reflect some degree of current disclosure practices, though probably not in the majority of cases.

In Table 3, Panel E, we report regressions that explain the (planned) existence of nature impact or dependency assessments, the presence of nature risk management actions, and nature risk disclosures. The explanatory variables of interest are *Transition risk*s *exposure* or *Physical risk exposure*, which indicate whether a company reports exposure to financially material transition or physical nature risks, respectively. We control for fixed effects related to company size bins, industry, world region, the respondents' corporate function, and distribution channels. For both types of risks, companies with material exposures are significantly more likely to undertake corporate actions aimed at evaluating, addressing, or disclosing the risks. In Column 1, companies with transition risk exposure are 22 percentage points (pp) more likely to conduct nature impact assessments (36% relative to the mean) or in Column 2 they are 30pp more likely to mitigate or reduce the negative impact they generate on nature (37% of the mean). Estimates are similar for most of the other nature risk actions in Columns 4 to 7, and we also find a higher propensity to disclose on nature risks for companies with transition risk exposures in Column 8. We obtain broadly similar evidence when considering physical risk exposure. There is some heterogeneity across risk types when it comes to hedging, with physical—not transition—risk exposure predicting more hedging with financial instruments. This may reflect that financial instruments for hedging physical risks, such as weather/commodity futures or insurance products, are more established than instruments for transition risks.

5. Perceptions of investor interest in nature topics

5.1 Investor attention to nature topics and motives

Through our survey, we address corporate perceptions of nature-related investor interest and preferences. According to 68% of our respondents, investor attention to nature topics has increased over the past 3 to 5 years (Question C.1), as is displayed in Table 4, Panel A. When we asked companies what they believe is driving this development, the responses do not highlight a single dominant driver. While 82% state that they believe attention rose due to policy or regulatory changes, a similar percentage, 80%, believe that attention increased

because of a growing public awareness of nature topics. Beyond these drivers, 65% believe that the shift in attention results from major negative nature events, and 44% state that it is in response to investor reassessments of nature risks. Finally, 40% name changes in consumer preferences, and 30% technological developments, as drivers. Overall, using the terminology of Starks (2023), both value (e.g., negative nature events) and values (e.g., public attention) motives cause the shift in investor attention to the surveyed companies.

We asked companies whether stakeholder groups other than investors engaged them on nature risks (Figure 5). Only 19% of companies state that investors are the sole parties engaging on the topic. In the remaining companies, it is typically a mix of multiple other stakeholder groups that also engaged with companies, including regulators (at 59% of companies), customers (46%), civil society (37%), employees (35%), and suppliers (32%). As indicated above, this may explain why relatively many companies—also some without financially material nature risks—consider reporting on nature issues.[22]

5.2 Nature risk and investment decisions

On the role of shareholders, Table 4, Panel B, tabulates the degree to which companies believe that investors consider a company's impact on nature or nature dependence when making investment decisions. While slightly more than half of companies believe that investors consider these risks never or rarely, there are also about 40% of companies stating that investors sometimes, often, or always consider nature risks when making investments. For respondents that state that investors currently consider these risks never or rarely, we also elicit corporate perceptions of whether investors will consider both risks significantly more in the future. We continue to observe high levels of disagreement, with neither "yes" nor "no" responses dominating.

[22] Other stakeholder groups may care about nature risks from a double materiality or sustainability impact perspective, rather than the investor focused financial materiality perspective.

The disagreement indicates a potential source of why corporate actions on nature risks differ across respondents in our survey. However, it may also reflect that nature risks are not financially material for some companies, leading them to believe that investors do not consider the risks when screening or monitoring investments. In Table 4, Panel C, we consider this possibility by using a company's exposure to nature risks to explain corporate perceptions of whether investors consider these risks. We find that companies with nature risk exposures hold a stronger belief that investors incorporate these risks for investment decision-making. However, risk exposure only partly explains the previously observed disagreement, as evidenced by the low R-squared.

Furthermore, we asked whether companies believe that nature impacts or dependencies are relevant factors for investors in assessing corporate cashflows or the cost of capital (and in which direction). To ensure responses are informative, we offered the question only to companies that stated that investors consider nature risks when investing (we conditioned on the responses being at least "rarely"). The answers in Table 4, Panel D, are striking: less than 25% of companies hold the belief that investors assess how nature topics affect cashflows and the cost of capital.[23] Between 37% and 47% of companies do not know whether investors consider these factors (depending on the risk), and a further 34% to 40% believe that investors do *not* consider cashflow and cost of capital effects at all. These findings are noteworthy when considered alongside our earlier result that approximately 40% of companies believe investors factor nature risks into investment decisions. It suggests that while companies perceive investor interest in nature risks, many do not see this interest translating into traditional financial analysis frameworks.[24] This apparent disconnect may

[23] Even among them there is disagreement about the sign. It is possible, for example, that some companies believe that investors expect that nature impact mitigation is costly and negatively impacts cashflows, whereas others think that such mitigation is a prudent idea that will pay off with lower regulatory or litigation costs. The observed disconnect might also reflect the belief that sustainability engagement teams and portfolio managers to do not interact much in terms of quantifying the effects of nature risks.

[24] A partial explanation may be that a substantial share of investors engaging on nature issues are passive investors. For such institutions, when engaging on nature topics, there is less of a direct mechanism on how takeaways from the engagement process inform their investment decisions, because their investments are not actively managed.

reflect the nascent stage of the nature risk topic, where investor attention precedes the development of robust quantitative models for incorporating these risks into valuation frameworks. A conclusion is that more work is needed to model cashflow and discount rate effects of nature risks. Work in this direction (at the aggregate level) is provided by Giglio et al. (2025b).[25]

5.3 Shareholder engagement on nature

Despite decades of work on investor engagement, we have little academic evidence on whether companies value such engagements, particularly for emerging engagement topics such as nature risks.[26] Likewise, important unresolved questions are whether companies respond to engagement, and what costs and benefits they associate with engagement. Whether investor engagement causes a corporate response is hard to observe using archival data because investor-company interactions typically take place in private. Further, any company actions could be a response not to shareholder engagement, but instead coincide with it; establishing causality has therefore proven challenging. Similarly, assessments of the costs and benefits of engagement are hard to obtain from public sources. However, insights into these questions are valuable to researchers who want to model or quantify trade-offs in nature-related engagements, and for investors who want to ensure their engagement efforts are value-additive.[27]

To shed light on these questions, we first asked whether investors raised questions or expressed opinions about corporate nature risks during past shareholder engagements or investor meetings. Table 5, Panel A, shows that many companies, 40%, experienced some form of nature-related interactions with their investor base. As expected, the percentage of companies that experienced engagement is higher, at 61%, among companies with nature risk

[25] It seems unlikely that the companies that did not cite cashflows or cost of capital motives did so because they believe that investors focus on *values*—especially since we essentially asked about "typical" investors.
[26] Instead, the evidence that *investors* value engagement is rather clear (see Brav, Jing, and Kim 2015 for a review on hedge fund activism and Dimson et al. 2015 and Dimson et al. 2025 specifically on ESG engagement).
[27] Gantchev (2013) uses structural estimation to estimate the costs of shareholder engagement.

exposure. Next, we asked whether companies perceive engagement on nature topics as value-generating or beneficial to their business. We asked all respondents, as companies that did not directly experience investor engagement may still have perceptions of its value through interactions with peers. Depending on the response, we asked companies to elaborate on their respective views. The responses show that 48% of respondents believe that investor engagement is value-generating, and the percentage is even larger among companies that experienced engagement directly (Supplementary Appendix Figure E.3 reports responses by sector/region). We are mindful that these responses are particularly subject to acquiescence bias concerns given our survey distribution, and we address the issue below.[28]

To understand the assessments of nature engagement, we asked in *what ways* investor engagement is value-generating, or why it is not.[29] For those stating that engagement is value-generating, the two top reasons are that it provides advice and generates ideas (33% give this reason) and that it creates nature awareness inside the company or internal attention (28%). With respect to the first reasons, one company stated that investor engagement *"assists in determining material issues, identifying potential blind spots and best practice […]"*, and regarding the second reason, one respondent said "*it brings to the forefront the need to assess and act on nature impacts and risks. Gives leverage to internally promote investments/ actions*." A further 17% explained that the dialogue associated with investor engagement helped them better understand investors' nature preferences, and 12% said it allowed them to better explain to investors the company's approach towards the topic. One respondent stated that engagement allows the company to explain its strategy "*[…] in a broader sense than only financial returns […]*". The primary reason (46%) why engagement is *not* perceived as value-generating is the belief that nature risks are not financially material to a company whereas investors hold the opposite belief.

[28] In Supplementary Appendix Table E.1, we show that the views of respondents working in investor relations functions do not differ from those working in other roles. The same holds for the question on whether engagement influenced corporate actions (discussed below).

[29] We initially used ChatGPT for analyzing these responses, but a human audit of the classification of responses indicated a poor quality. We therefore manually classified the text as good as possible.

Finally, we asked whether engagement influenced a company's strategic decisions or operational practice, to gauge whether nature engagement has causal effects on corporate actions. We included in the question the possibility of actions *in anticipation* of engagement, as also unengaged companies may adjust behaviour due to spillover effects (Gantchev, Gredil, and Jotikasthira 2019). Overall, 35% state that engagement influenced their strategies or operations, and the number rises to 56% among those that actively experienced engagement. For companies whose actions were influenced by engagement, we asked for the ways through which this happened. As we found it difficult to classify the diverging text responses, we provide some statements that we found insightful. One company explained that *"investor engagement was one of the reasons behind our journey [to] establish a sustainability strategy,"* and another respondent shared that engagement *"[…] helped us adopt various practices (industry best practices) and align our approach and disclosure to peers."*

The widespread response to nature-related engagement raises the question of what companies perceive as the motivations for investors to conduct such stewardship activities. The responses in Table 5, Panel B, show that two motives are perceived widely, namely risk considerations (85% rank it as top 2 motive) and reputation concerns (50%).

To understand through which specific channels nature actions are affected by engagement, we estimate regressions that explain the (planned) existence of a nature risk action. The explanatory variable of interest is whether nature-related engagement influenced a company's strategic decisions or operational practice.[30] Table 5, Panel C, provides no evidence that the propensity to conduct impact assessments is related to investor engagement. However, we find effects for dependency assessments, risk management, and disclosure. The probability of undertaking actions along these dimensions is about 20 to 30pp

[30] Companies integrating nature topics into their strategies may create unique resources and capabilities (Barney 1991; Wernerfelt 1984), leading to competitive advantages and value generation from engagement. The assumption is the investors have information that managers do not yet have themselves (e.g., on nature practices at peers), which seems plausible on a new topic. However, if companies integrate nature considerations primarily to gain short-term legitimacy or deflect criticism, without seeing any genuine value generation, one should not observe effects of investor engagement.

higher for companies that state that engagement influenced their actions; large numbers relative to the variables' unconditional probabilities. In Supplementary Appendix Table E.4, we find similar results if we consider the views on whether investor engagement is considered value-generating.

5.4 Climate and nature nexus

Issues related to climate change and nature are heavily intertwined, yet some major investors argue that the fight against climate change should be prioritized over other ESG themes (e.g., Shead 2021). Similarly, the Financial Stability Board (2024) reports that some financial authorities prioritize climate risks. Our survey provides new insights into this evolving discussion. In Table 6, we tabulate corporate perceptions of prioritisation between climate change and nature topics in their investment and/or engagement strategies. Depending on the responses, the panel displays whether companies believe a given priority is appropriate. We find that 50% of companies believe that investors prioritize climate topics, while only 3% perceive a nature prioritization. A further 31% believe that investors see both topics as so intertwined that one cannot prioritize, and 16% do not know. Notably, among the 50% of respondents who believe investors prioritize climate, half of them consider this prioritization inappropriate because they view nature and climate as highly intertwined. This means that only one in four companies (25%) both perceive and agree with a climate-first approach by investors. The widespread perception that climate and nature are interconnected aligns with the model by Giglio et al. (2025a), which highlights economic feedback loops and amplification mechanisms between nature loss and climate change.

6. Evaluating survey bias

A concern is that responding companies are biased toward positive answers or toward indicating awareness and actions related to nature risks to satisfy or please the investor, being aware that it is a major shareholder. Two tests in Supplementary Appendix Table E.5 evaluate such acquiescence bias. Panel A provides regressions relating responses to questions that are

particularly susceptible to the bias to an indicator of whether a state or sovereign wealth fund is among the top-5 shareholders. If this indicator equals one, there is a high probability that our investor is this top-5 shareholder.[31] The regressions offer little systematic evidence of more positive responses by companies where the investor plausibly ranks among the top-5 shareholders (if at all, the opposite). Panel B uses *t*-tests to contrast responses to the same questions across the two distribution channels. This comparison also provides little evidence that the responses collected through the investor channel are systematically biased towards positive responses. Overall, this evidence, together with the assurance of anonymity in the survey, reduces concerns about a systematic overstatement of actions originating from the investor distribution channel. Nevertheless, we cannot entirely rule out this possibility.

Respondents more interested in nature topics may be more likely to participate in our survey, and this may bias the responses. To evaluate the role of personal response bias, we follow Stroebel and Wurgler (2021) and correlate key survey responses with respondent-level variables reflecting either personal experience of nature risk realizations (62% of those that answered the question had experienced them) or personal concerns about biodiversity loss (92% are concerned). Supplementary Appendix Table E.6 provides only modest (and no systematic) evidence for personal response bias: there is no link between most of the tabulated survey responses and whether individuals experienced risk realizations or are concerned about biodiversity loss. An exception is that those with personal nature experience/biodiversity concerns perceive nature-related shareholder engagement as more value-generating.

7. Conclusion

Using a global survey instrument, we document how companies perceive and address nature risks, and how they interact over these risks with their investors. A benefit of our survey is that it provides an early view of corporate perceptions and of current as well as future

[31] The indicator equals one in 32% of the responses (N=164). As the investor is the world's largest state or sovereign wealth fund, it is likely that it ranks among the funds indicated in the category.

actions related to an emerging risk type. This allows us to shed light on questions that are difficult to answer with archival data, given that corporate disclosures on nature risks remain limited and that few firm-level nature-related datasets exist (those that do are typically backward-looking). The anonymity of our survey also enables us to elicit perceptions or actions that companies might not disclose publicly.

In total, 48% of the surveyed companies consider nature risks financially material to them, 39% do not, and 13% do not know. Nature restoration efforts are less widespread than nature mitigation efforts. Most respondents who experienced nature-related shareholder engagement believe such engagement is value-generating. Several survey results highlight challenges for researchers, practitioners, and policymakers. First, 43% (27%) of exposed companies believe that physical (transition) risks have financial effects for them already today. Thus, nature risks are perceived as urgent by many. Second, the effects originate from various stakeholders, along the entire value chain, and from dispersed sources, highlighting the difficulties of capturing nature risks in a single metric. Third, around 40% of companies state that investors consider nature risks in their investment decisions. However, less than 25% think that investors assess either cashflow or cost of capital effects. This discrepancy poses a challenge for theorists modelling nature risk in corporate finance or asset pricing. Finally, 50% believe that investors prioritize climate topics, but half of these respondents believe that nature and climate are so intertwined that investors should not prioritize. Overall, nature risks emerge as a financially relevant topic, evolving rapidly. We summarize key findings and their implications in Table 7.

While our survey results enhance our understanding of companies' nature risk perceptions, they also highlight the need for further research. Examples include theoretical work to better understand through which financial (cashflow and risk) and non-financial channels nature risks affect companies, the implementation and integration of metrics that reflect the complexity of nature risk into corporate risk management and reporting standards, and the incorporation of nature risk features into asset pricing and valuation models. More

empirical work is also needed on the role of investor engagement in contributing to better identification, assessment, and management of financially material nature risks.

From an applied perspective, with the corporate sector and regulation still at an early stage in addressing nature risks, we are likely to see substantial learning, evolution, and changes in measurement and implementation over the next decade. Our findings provide a baseline against which these developments can be measured, offering insights into an emerging risk category at an early stage of recognition and measurement.

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Data availability

The data underlying this article cannot be shared publicly due to the privacy of companies and individuals that participated in the study. An anonymized pseudo-dataset is publicly available and illustrates the format of the files read by the code.

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Appendix A: Definition of variables used in regression analyses

Variable name	Definition	Survey question
Nature risk exposure	Equals 1 if nature risks are financially material for a company, and 0 if they are not financially material. Do not know responses coded as missing.	A.1
Transition risk exposures	Equals 1 if nature-related transition risks are financially material for a company, and 0 if they are not financially material. Do not know responses coded as missing.	A.1, A.1.1
Physical risk exposure	Equals 1 if nature-related physical risks are financially material for a company, and 0 if they are not financially material. Do not know responses coded as missing.	A.1, A.1.1
Nature impact assessments	Equals 1 if a company (plans to) conduct nature impact assessments when undertaking major investments, and 0 if not. Do not know responses coded as missing.	A.2
Nature dependency assessments	Equals 1 if a company (plans to) conduct nature dependency assessments when undertaking major investments, and 0 if not. Do not know responses coded as missing.	A.2
Mitigate negative impact	Equals 1 if a company (plans to) mitigate/reduce any negative impacts on nature caused by operational, upstream supply chain or downstream value chain activities, and 0 if not. Do not know responses coded as missing.	B.1.1
Offset negative impact	Equals 1 if a company (plans to) offset any negative impacts on nature caused by operational, upstream supply chain or downstream value chain activities, and 0 if not. Do not know responses coded as missing.	B.1.2
Adapt to dependencies	Equals 1 if a company (plans to) manage/adapt to any dependencies on nature of operational, upstream supply chain or downstream value chain activities, and 0 if not. Do not know responses coded as missing.	B.1.3
Hedge	Equals 1 if a company (plans to) hedge through financial instruments the risks associated with nature impacts and dependencies of operational, upstream supply chain or downstream value chain activities, and 0 if not. Do not know responses coded as missing.	B.1.4
Carry out stress tests/scenario analysis	Equals 1 if a company (plans to) carry out nature risk stress tests and/or scenario analysis, and 0 if not. Do not know responses coded as missing.	B.1.5
Provide disclosure	Equals 1 if a company (plans to) provide public disclosure on its nature risks, and 0 if not. Do not know responses coded as missing.	B.1.6
Implement technological innovations	Equals 1 if a company (plans to) implement technological innovations or solutions to manage or mitigate its nature risks, and 0 if not. Do not know responses coded as missing.	B.1.7
Investors consider transition risks	Takes values between 1 and 5, with larger values indicating a stronger belief that investors consider a company's impact on nature (transition risks) when making investment decisions (1=Never; 2=Rarely; 3=Sometimes; 4=Often; 5=Always). Do not know responses coded as missing.	C.2.2
Investors consider physical risks	Takes values between 1 and 5, with larger values indicating a stronger belief that investors consider a company's dependence on	C.2.1

	nature (physical risks) when making investment decisions (1=Never; 2=Rarely; 3=Sometimes; 4 =Often; 5=Always). Do not know responses coded as missing.	
Engagement influenced company	Equals 1 if nature-related engagements by investors (or the anticipation of such engagements) influenced strategic decisions or operational practice at the company, and 0 if not. Do not know responses coded as missing.	C.6
Engagement is value-generating	Equals 1 if a company perceives engagement by investors on nature-related issues as value-generating / beneficial to the business, and 0 if not. Do not know responses coded as missing.	C.5
Sustainability function	Equals 1 if a respondent works in a sustainability function, and 0 if not.	D.7
Investor relations function	Equals 1 if a respondent works in a investor relations function, and 0 if not.	D.7
NBIM potentially top-5 investor	Equals 1 if a company has a state/sovereign wealth fund among the top-5 investors in the company, and 0 if not.	D.10
Personally experienced nature risks	Equals 1 if a respondent personally experienced realizations of physical nature risks that affected their beliefs about the importance of nature risks, and 0 if not. Prefer not to answer responses coded as missing.	E.4
Personally concerned about biodiversity loss	Equals 1 if a respondent is personally concerned about biodiversity loss, and 0 if not. Prefer not to answer responses coded as missing.	E.5

Table 1. Survey and respondent characteristics.

Survey responses	
Respondents	385
Investor distribution	374
UZH distribution	11
Response characteristics (N=385)	
Completion rate (mean)	69%
Completion time in minutes (median)	31
Respondent function (N=204)	
Sustainability	52%
Investor relations	36%
Other	11%
Strategy	1%
Company sales (N=175)	
<$25m	5%
$25m-$99m	5%
$100m-$499m	20%
$500m-$999m	14%
$1-$4.9bn	30%
$5-$9.9bn	9%
>$10bn	17%
ROE in % (N=97) (median)	12

Industry (N=206)	
Basic material	5%
Consumer discretionary	4%
Consumer staples	4%
Energy	4%
Financials	16%
Health care	8%
Industrials	11%
Real estate	13%
Technology	12%
Telecommunications	3%
Utilities	4%
Other	16%
World region (N=187)	
Europe	52%
Asia	22%
North America	16%
Rest of world	6%
Australia	4%
Taskforce on nature risks (N=196)	
Yes	36%
No	64%

Note: This table provides summary statistics on the characteristics of the 385 companies that participated in our survey. As not all respondents provided information on all characteristics, the number of observations in the different parts of the table can fall below 385. We report data on the number of respondents, the distribution channels, their completion rates and times, the function (or position) of the responding individuals (Question D.7), company sales bins (Question D.2), past 3-year ROE (Question D.3), industry sector (Question D.1), world region (Question D.5), and whether companies have a taskforce on nature risks (Question D.8).

Table 2. Financial materiality of nature risks.

Panel A. Descriptive evidence on nature risks

	Financial materiality (N=300)		
	Yes	No	Do not know
Nature risks	48%	39%	13%
Nature transition risks	36%	51%	13%
Nature physical risks	42%	45%	13%
Other nature risks	1%	86%	13%

Correlation: rho=71% (excl. Do not know category)		Nature transition risks financially material (N=300)		
		Yes	No	Do not know
Nature physical risks financially material (N=300)	Yes	33%	9%	0%
	No	4%	41%	0%
	Do not know	0%	0%	13%

	If "Yes" to "Financial materiality"		Perceived investors' horizon on financial materiality (all respondents)		Perceived investors' horizon on financial materiality (if "Yes" to "Financial materiality")	
	Nature transition risks	Nature physical risks	Nature transition risks	Nature physical risks	Nature transition risks	Nature physical risks
Risk horizon	(N=91)	(N=103)	(N=171)	(N=173)	(N=72)	(N=80)
Already today	27%	43%	18%	20%	28%	34%
Over the next 5 years	38%	14%	22%	17%	26%	20%
In 5 to 10 years	26%	31%	20%	17%	24%	19%
In 10 to 25 years	8%	11%	9%	11%	7%	11%
In 25+ years	0%	2%	4%	5%	4%	4%
Never	n/a	n/a	5%	6%	0%	0%
Do not know	n/a	n/a	20%	24%	11%	13%

Table 2. (continued)

Panel B. Channels of financial materiality

	If "Yes" to "Financial materiality"	
	Nature transition risks (N=95)	Nature physical risks (N=102)
Risk channel	Ranked channel as top 2	Ranked channel as top 2
Effects on own products/services	66%	70%
Effects on own operations	59%	69%
Effects on supply chains	35%	39%
Reputation effects/Loss of "license to operate"	20%	7%
Investor demand	15%	9%
Other effects	5%	6%

	Nature transition risks (N=51)	Nature physical risks (N=49)
Concentrated risk		
Yes	41%	39%
No	39%	39%
Do not know	20%	22%

Table 2. (continued)

Panel C. Industry and world regional distribution

	Nature risks financially material (N=205)	Nature transition risks financially material (N=205)	Nature physical risks financially material (N=205)	
	Yes	Yes	Yes	N
Basic material	73%	64%	64%	11
Consumer discretionary	33%	22%	33%	9
Consumer staples	88%	88%	88%	8
Energy	38%	13%	38%	8
Financials	33%	27%	33%	33
Health care	35%	35%	29%	17
Industrials	59%	41%	41%	22
Real estate	42%	35%	42%	26
Technology	25%	25%	21%	24
Telecommunications	67%	17%	50%	6
Utilities	50%	38%	50%	8
Other	52%	42%	48%	33

	Nature risks financially material (N=187)	Nature transition risks financially material (N=187)	Nature physical risks financially material (N=187)	
	Yes	Yes	Yes	N
Europe	43%	36%	38%	97
Asia	60%	45%	50%	42
North America	41%	28%	41%	29
Rest of world	58%	50%	58%	12
Australia	0%	0%	0%	7

Note: Panel A tabulates whether (and which) nature risks are financially material (Questions A.1, A.1.1) and cross-tabulates the presence of financially material nature-related transition and physical risks. The panel also reports the time horizons over which the financial effects of transition and physical risks are expected to materialize (Questions A.1.3a, A.1.3b), conditional on the respective risks being financially material to a company. The panel contrasts these responses with responses to corresponding questions on when—in the opinion of the respondents—*investors* expect these risks to start materializing (Questions C.2.1.c, C.2.2.c). Panel B reports economic channels through which the financial effects of transition and physical risks materialize (Questions A.1.2a, A.1.2b), conditional on the respective risks being financially material to a company. We report the percentage of respondents that ranked a given channel as a top-2 channel. We also report whether risks are concentrated (Questions E.2a, E.2b), conditional on the risks being financially material to a company. Panel C reports evidence by industry (FTSE Industry Classification Benchmark 11 Industries level) and world region on whether (and which) nature risks are financially material (Questions A.1, A.1.1).

Table 3. Nature risk management and disclosure approaches.

Panel A. Impact and dependency assessments

	Yes	No	Do not know
Nature impact assessments (N=252)	50%	32%	18%
Nature dependence assessments (N=249)	33%	43%	25%

Panel B. Frequency of risk management approaches

	Approach	All respondents		
		Took this measure	N	Significant difference in mean response versus rows
(1)	Mitigate negative impact	82%	207	2-6
(2)	Carry out stress tests/scenario analysis	64%	188	1, 5-6
(3)	Implement technological innovations	59%	165	1, 5-6
(4)	Adapt to dependencies	57%	162	1, 5-6
(5)	Offset negative impact	43%	178	1-4, 6
(6)	Hedge	22%	169	1-5

Panel C. Drivers for addressing nature risks

		Provided this driver	N	Significant difference in mean response versus rows
(1)	Transition risks from regulation	83%	222	2-6
(2)	Physical risk considerations/degradation of nature	74%	222	1, 2-5
(3)	Competitive advantages	58%	222	1-2, 5-6
(4)	Transition risks from consumer pressure	57%	222	1-2, 5-6
(5)	Investment opportunities	39%	222	1-4, 6
(6)	Others	9%	222	1-5

Panel D. Nature risk disclosure

	Yes	No	Do not know
Provide disclosure (N=229)	74%	17%	9%
If “Yes”, which disclosure framework (N=149)			
CDP	48%		
ESRS	40%		
GRI	35%		
TNFD	27%		
TCFD	11%		
ISSB	5%		
SASB	4%		
Other	22%		

Table 3. (continued)

Panel E. Role of financial materiality

	Nature impact assessments	*Mitigate negative impact*	*Offset negative impact*	*Adapt to dependencies*	*Hedge*	*Carry out stress tests/scenario analysis*	*Implement technological innovations*	*Provide disclosure*
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Transition risk exposure	0.22**	0.30***	0.31***	0.41***	0.04	0.14	0.33***	0.22***
	(2.51)	(4.57)	(3.22)	(4.45)	(0.42)	(1.38)	(3.40)	(3.53)
Size bin fixed effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry fixed effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
World region fixed effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Respondent function fixed effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Distribution fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	135	142	126	114	127	132	123	147
adj. R^2	0.148	0.176	0.082	0.324	0.045	0.015	0.139	0.124

	Nature dependence assessments	*Mitigate negative impact*	*Offset negative impact*	*Adapt to dependencies*	*Hedge*	*Carry out stress tests/scenario analysis*	*Implement technological innovations*	*Provide disclosure*
	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
Physical risk exposure	0.19*	0.18***	0.38***	0.36***	0.18**	0.27***	0.26***	0.20***
	(1.93)	(2.69)	(4.30)	(3.68)	(2.15)	(3.04)	(2.63)	(3.02)
Size bin fixed effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry fixed effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
World region fixed effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Respondent function fixed effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Distribution fixed effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	125	142	126	114	127	132	123	147
adj. R^2	0.197	0.097	0.133	0.287	0.090	0.077	0.093	0.112

Note: Panel A tabulates whether companies perform nature impact and dependency assessments (Question A.2). Panel B tabulates whether companies (plan to) undertake a certain nature risk management approach (Questions B.1.1-B.1.5, B.1.7). We report the percentage of respondents that responded with "yes" to a question. Do not know responses are coded as missing for the table. The number of responses differs as not all companies responded to all questions. We also report the results of a *t*-test of the null hypothesis that the percentage for a given approach is equal to the percentage for each of the other approaches, where differences significant at the 10% level are reported. Panel C tabulates what respondents see as the main drivers/motivations for why companies may want to address nature risks. We report the percentage of respondents that provided a given driver/motivation. We also report the results of a *t*-test of the null hypothesis that the percentage for a given driver is equal to the percentage for each of the other drivers, where only differences significant at the 10% level are reported. Panel D tabulates whether companies (plan to) provide public disclosures to its nature risks (Question B.1.6). For those that plan to do so, we also tabulate the disclosure frameworks (if an answer was provided). We classified the open-text responses ourselves. Multiple responses were possible. Panel E reports OLS regressions relating the (planned) existence of a nature risk approach to the financial materiality of nature risks (transition or physical risk exposure). Do not know responses are treated as missing values. Regression variables are defined in Appendix A. *t*-statistics (reported in parentheses) are based on robust standard errors. *, **, *** represent significance levels of 0.10, 0.05, and 0.01, respectively.

Table 4. Corporate perceptions of investor interest in nature risk.

Panel A. Investor attention and motives

Increase in investor attention (N=221)	
Yes	68%
No	26%
Do not know	6%

	Motive	Saw this motive	N	Significant difference in mean response versus rows
(1)	Policy/regulatory changes	82%	149	3-7
(2)	Growing public awareness	80%	149	3-7
(3)	Major negative nature events	65%	149	1-2, 4-7
(4)	Reassessment of nature risks	44%	149	1-3, 6-7
(5)	Changing consumer preferences	40%	149	1-3, 6-7
(6)	Technological developments	30%	149	1-5, 7
(7)	Others	7%	149	1-6

Panel B. Perceptions of investors' risk assessments

Do investors consider risks?	Transition risks (N=215)	Physical risks (N=220)
Never	11%	14%
Rarely	38%	41%
Sometimes	28%	27%
Often	12%	10%
Always	1%	3%
Do not know	9%	5%
If "Never" or "Rarely": In the future?	Transition risks (N=105)	Physical risks (N=118)
Yes	38%	40%
No	32%	36%
Do not know	30%	24%

Table 4. (continued)

Panel C. Financial materiality and perceptions of investors' risk assessments

	Investors consider transition risks	*Investors consider physical risks*
	(1)	(2)
Transition risk exposure	0.64***	
	(4.36)	
Physical risk exposure		0.52***
		(2.89)
Size bin fixed effect	Yes	Yes
Industry fixed effect	Yes	Yes
World region fixed effect	Yes	Yes
Respondent function effect	Yes	Yes
Distribution fixed effect	Yes	Yes
N	143	149
adj. R^2	0.202	0.077

Panel D. Perceptions of investors' views of discount rate and cashflow effects

	Effects of transition risks		Effects of physical risks	
	Forecasted cashflows (N=169)	Cost of capital (N=170)	Forecasted cashflows (N=173)	Cost of capital (N=174)
No effect	34%	35%	40%	38%
Reduce	15%	3%	12%	6%
Increase	4%	20%	7%	19%
Do not know	47%	42%	41%	37%

Note: Panel A tabulates whether companies believe that investor attention to nature-related topics has increased in the past 3 to 5 years (Question C.1). The panel also reports perceptions of what drives any increase in investor attention, conditional on the perception that attention increased (Question C.1.1). We also report the results of a *t*-test of the null hypothesis that the percentage for a given motive is equal to the percentage for each of the other motives, where differences significant at the 10% level are reported. Panel B tabulates to what extent companies believe that investors consider a company's impact on nature (transition risk) or dependency on nature (physical risk) when making investment decisions (Question C.2.2, C.2.1). The panel also tabulates corporate perceptions of whether investors consider transition and physical risks significantly more in the future, conditional on the response to the previous questions being "never" or "rarely" (Questions C.2.1d, C.2.1d). Panel C reports OLS regressions relating corporate perceptions on whether investors consider transition and physical risks to the financial materiality of nature risks to a company. Do not know responses are treated as missing values. Regression variables are defined in Appendix A. *t*-statistics (reported in parentheses) are based on robust standard errors. *, **, *** represent significance levels of 0.10, 0.05, and 0.01, respectively. Panel D tabulates corporate perceptions of whether investors consider a company's negative impact on nature or a company's dependency on nature when assessing a company's cashflows or the cost of capital (Questions C.2.2.a, C.2.2b, C.2.1.a, C.2.1b).

Table 5. Corporate perceptions of investor engagement on nature.

Panel A. Experience with nature-related investor engagement

	Yes	No	Do not know
Nature risk engagement by investors (N=209)	40%	52%	8%
If "Yes" to "Financially materiality" (N=95)	61%	32%	7%

	Yes	No	Do not know
Nature risk engagement is value-generating (N=210)	48%	27%	25%
If "Yes" to "Nature risk engagement by investors" (N=84)	73%	10%	18%
If "Yes" to "Engagement value-generating":			
Reasons/channels (N=83):			
Provides advice, generation of ideas	33%		
Creates nature awareness, internal attention	28%		
Understanding investor preferences	17%		
Helps explain the company	12%		
Others	28%		
If "No" to "Engagement value-generating":			
Reasons/channels (N=41):			
Nature risks not financially material	46%		
Costly, distracting, burdensome	5%		
Others	49%		

	Yes	No	Do not know
Nature risk engagement influenced strategy or operations (N=209)	35%	57%	8%
If "Yes" to "Nature risk engagement by investors" (N=84)	56%	33%	11%
If "No" to "Engagement influenced company": In 5 years? (N=118):	32%	25%	42%
Correlation (*Engagement is value-generating*, *Engagement influenced company*)	rho= 50%		

Panel B. Perceived motives of nature-related investor engagement

Motive	Ranked motive as top 2 (N=201)
Risk considerations	85%
Reputation	50%
Genuine nature interest/reducing company impact	31%
Competition	15%
Marketing	8%
Other	5%

Table 5. (continued)

Panel C. Engagement and nature risk actions

	Nature impact assessments	*Nature dependency assessments*	*Mitigate negative impact*	*Offset negative impact*	*Adapt to dependencies*	*Hedge*	*Carry out stress tests/scenario analysis*	*Implement technological innovations*	*Provide disclosure*
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Engagement influenced company	0.11	0.25***	0.21***	0.34***	0.30***	0.26***	0.18*	0.31***	0.17***
	(1.15)	(2.72)	(3.24)	(4.03)	(3.11)	(3.62)	(1.92)	(3.34)	(2.87)
Size bin fixed effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry fixed effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
World region fixed effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Respondent function fixed effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Distribution fixed effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	137	128	146	129	119	130	136	128	152
adj. R^2	0.097	0.229	0.074	0.139	0.139	0.182	-0.012	0.115	0.095

Note: Panel A tabulates whether companies have experienced investors raising questions or expressing opinions about their approaches to nature risks during shareholder engagement/investor meetings (Question C.4). The panel also tabulates whether companies perceive engagement on nature-related topics as value-generating/beneficial to their businesses (Question C.5). Depending on the response, a classification of the reasons is reported below. We classified open-text responses ourselves. The panel also reports whether nature-related engagement by investors (or anticipation of such engagements) influenced a company's strategic decisions or operational practices (Question C.6). Panel B tabulates corporate perceptions of the main motivations for why investors conduct nature engagements. For each motivation, we report the percentage of respondents that ranked a given motivation as the top-2 motivation. Panel C reports OLS regressions relating the (planned) existence of a nature risk action to whether nature-related engagement has influenced a company's strategic decisions or operational practice. Do not know responses are treated as missing values. Regression variables are defined in Appendix A. *t*-statistics (reported in parentheses) are based on robust standard errors. *, **, *** represent significance levels of 0.10, 0.05, and 0.01, respectively.

Table 6. Corporate perceptions of investors' climate versus nature priorities.

Will investors prioritize a topic? (N=211)		Investor priority appropriate? (within response category)			
		Yes	No, so intertwined that one cannot prioritize	No, the other topic should be prioritized	Do not know
Prioritize climate	50%	45%	50%	0%	5%
Prioritize nature	3%	57%	29%	14%	0%
So intertwined that one cannot prioritize	31%				
Do not know	16%				

Note: This table tabulates corporate perceptions of whether investors, in the foreseeable future, relatively prioritize topics related to climate change or topics related to nature in their investment/engagement strategies (Question C.3). Depending on the responses, the table also displays whether companies believe a given priority is appropriate (Questions C.3.1, C.3.2).

Table 7. Research highlights.

Topic	Finding	Implication
Materiality	48% of companies consider nature risks financially material, with 43% reporting physical risks already affect them today.	Underscores urgency of nature risks, and need for attention from companies, investors, and policymakers.
Sectoral and regional variation	Consumer Staples emerges as the most exposed sector, while Asian and North American companies report somewhat higher exposure to physical nature risk than European companies.	Nature risk management frameworks must account for significant sectoral and regional differences while recognizing that nature risk awareness and concern is global, rather than concentrated in specific regions.
Complexity	Financial effects originate from various stakeholders and dispersed sources throughout the value chain.	Standard one-size-fits-all metrics (like carbon emissions for climate) are insufficient to accurately capture nature risk exposure.
Nature risk management gap	82% of companies implement nature impact mitigation strategies while only 43% invest in offsetting or restoration.	Current approaches may lead to continued underinvestment in natural capital despite mitigation efforts.
Investor engagement	Among companies experiencing investor engagement 73% find it value-generating and 56% have adjusted their strategies in response.	Engagement can produce tangible benefits and influence corporate behaviour on nature topics.
Integration into valuation models:	While 40% believe investors consider nature risks, less than 25% think investors assess cashflow or cost of capital effects.	Further theoretical and empirical work is needed to explore whether/how nature risks are incorporated into financial valuation models.
Climate-nature nexus:	50% believe investors prioritize climate over nature, though half of these think the topics should receive equal attention.	Climate and nature strategies should be integrated rather than pursued separately or sequentially.

Note: This table summarizes some of the key findings and their implications.

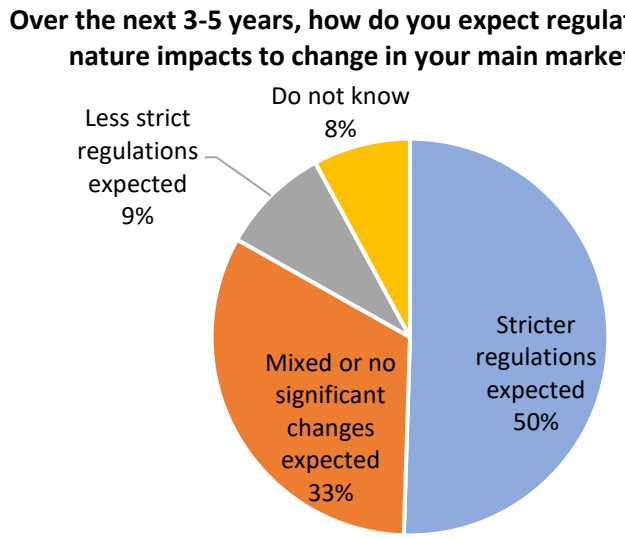


Figure 1. Expected regulation on nature topics.

Note: This figure displays how companies, over the next 3-5 years, expect regulation related to nature impacts to change in their main markets (Question A.3).

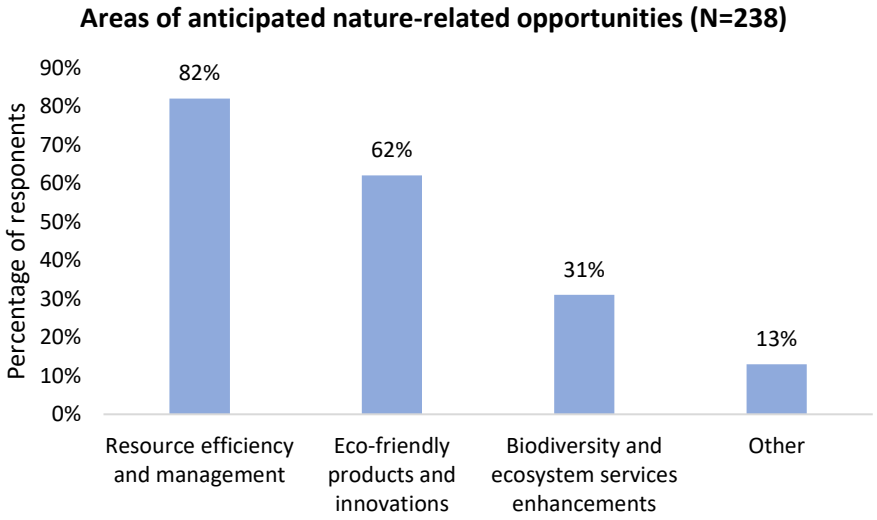


Figure 2. Areas for nature-related opportunities.

Note: This figure displays the areas in which companies pursue or anticipate nature-related opportunities (Question A.4). We report the percentage of respondents that indicated that they see opportunities within an area (multiple responses possible).

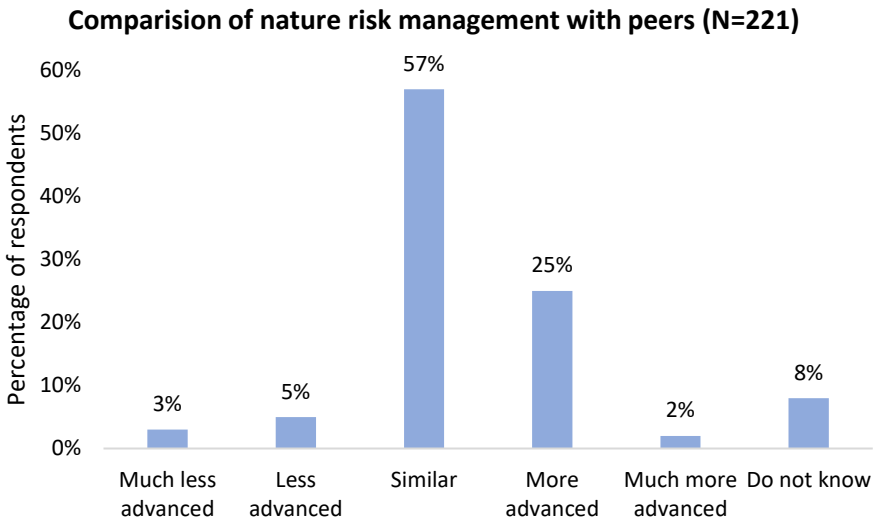


Figure 3. Peer-comparison of nature risk management.

Note: This figure displays perceptions of how a company's approach to nature risks compares to that of industry peers/companies exposed to similar risks (Question B.4).

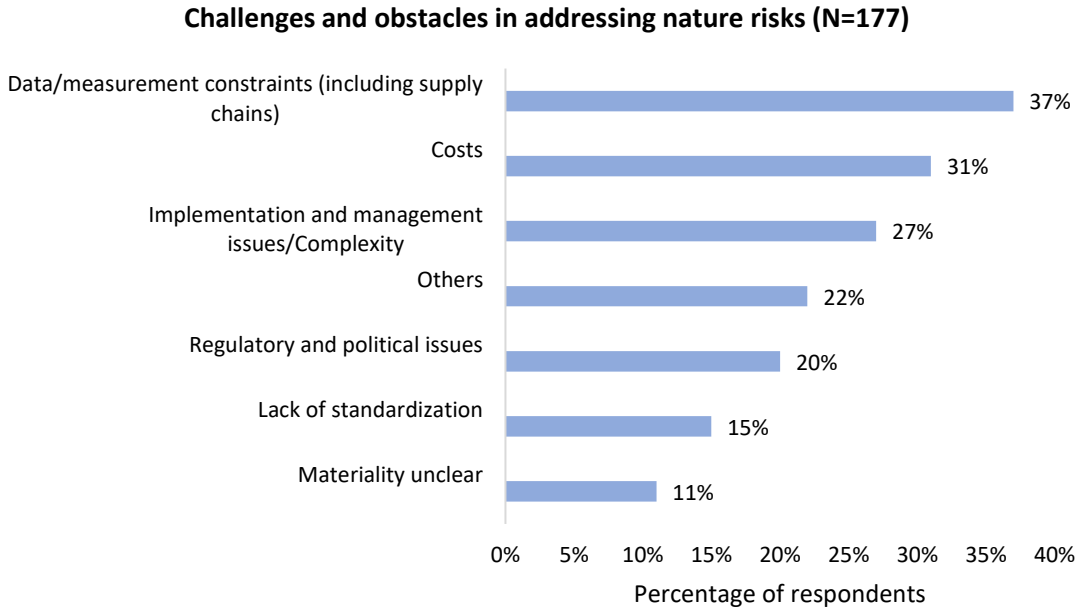


Figure 4. Obstacles and challenges to nature risk management.

Note: This figure displays obstacles/challenges that companies see for them when addressing nature risks (Question B.3). We report the percentage of respondents that saw a certain challenge. We classified the open-text responses ourselves (multiple responses possible).

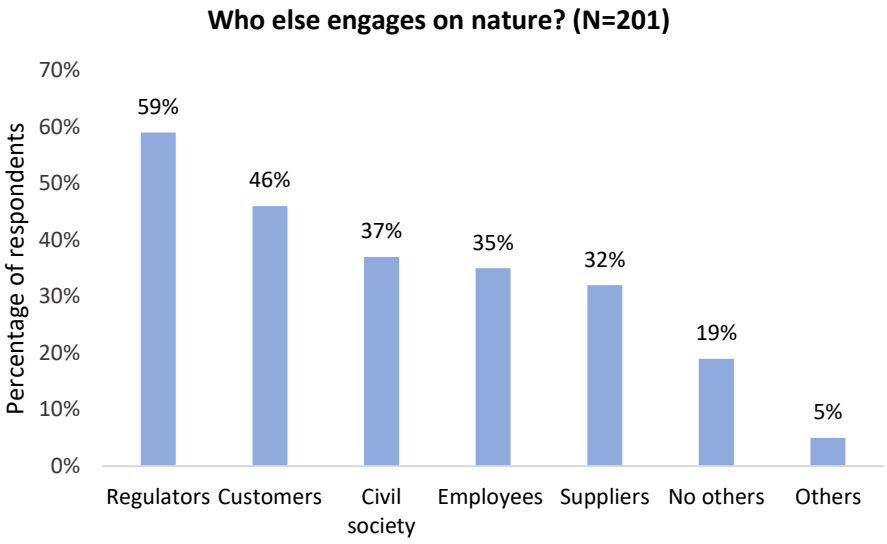


Figure 5. Stakeholder groups that engage on nature.

Note: This figure displays any other stakeholder groups, beyond shareholders, that engage a company on nature risks (Question C.8). We report the percentage of respondents that indicated a certain stakeholder group (multiple responses possible).

Supplementary Appendix

for

Corporate nature risk perceptions

Snorre Gjerde, Zacharias Sautner, Alexander F. Wagner, Alexis Wegerich

Supplementary Appendix A. Survey instrument.

This appendix provides a copy of the survey instrument. The actual survey was programmed in Qualtrics and was available via a webpage. Questions in light grey were included in the survey but are not analyzed in this paper. When appropriate, response categories were randomly ordered.

Survey on Corporate Nature Risks: Introductory Text Page 1

This survey is an independent research collaboration between the University of Zurich and NBIM, and it is not part of NBIM's regular engagement dialogue as a shareholder.

With the survey, we seek to learn more about the role of nature risks for companies and shareholders. The purpose of the survey is to inform academic research. We want to emphasize that the survey is **anonymous.** We cannot trace back any respondents. If you wish, you can voluntarily provide the identity of your company at the end of the survey. In any case, information pertaining to individual companies from this survey will not be used by NBIM to inform its ownership work and/or investment analysis. Participation in the survey is fully voluntary.

The main part of the survey takes about 20 minutes to complete. At the end, there are some additional, optional questions. Your responses will be saved automatically after each question in case you are interrupted or need to collect additional information internally. **Please only answer the survey from one device.** We recommend answering the survey on a desktop computer. You can continue the survey from the same device by accessing the link you were sent. Thank you for taking the time to participate in this survey!

Survey on Corporate Nature Risks: Introductory Text Page 2

To ensure that survey participants have a shared understanding, this page defines the terms "nature" and "nature risks". Please briefly review this before starting the survey.

Nature refers to the natural world, including all living things (like plants, animals), their interactions with each other, and their connections to the non-living environment, such as water, air, and soil.

As **nature risks**, following the definition of the Taskforce on Nature-related Financial Disclosures (TNFD), we consider in this survey the potential threats posed to an organization linked to its, and other organizations', dependencies on nature and nature impacts.

Nature risks can potentially arise from two sources:

(i) nature-related physical risks result directly from dependencies of economic activity on nature, ecosystem equilibria, including soil quality and species composition, and ecosystem services (e.g., pollination, flood protection, water or food).

(ii) nature-related transition risks result from changes in regulation and policy, legal precedent, technology or investor sentiment and consumer preferences, and in general from a misalignment of firms with actions aimed at protecting, restoring and/or reducing negative impacts on nature.

Part A: Exposure to Nature Risks

(A.1) Are nature risks financially material for your company? [Yes; No; Do not know]

- (A.1.1) [If (A.1) = "Yes"] Which ones (Tick all that apply): [Nature-related transition risks; Nature-related physical risks; Others, namely:]
    - (A.1.2a) [If (A.1.1) = "Nature-related transition risks"] Through which channels are financial effects of nature-related transition risks materializing? Rank the following items by order of importance. Items you move below the THRESHOLD RANK line will be considered to be not important at all for you (independent of their order). [*Rank by order of importance:* Effects on own products/services; Effects on own operations; Effects on supply chain; Reputational effects/Loss of "license to operate"; Investor demand; Other effects, namely [Open text]; THRESHOLD RANK]
    - (A.1.2b) [If (A.1.1) = "Nature-related physical risks] Through which channels are financial effects of nature-related physical risks materializing? Rank the following items by order of importance. Items you move below the THRESHOLD RANK line will be considered to be not important at all for you (independent of their order). [*Rank by order of importance:* Effects on own products/services; Effects on own operations; Effects on supply chain; Reputational effects/Loss of "license to operate"; Investor demand; Other effects, namely [Open text]; THRESHOLD RANK]
    - (A.1.2c) [If (A.1.1) = "Others, namely"] Through which channels are financial effects of other nature-related risks materializing? Rank the following items by order of importance. Items you move below the THRESHOLD RANK line will be considered to be not important at all for you (independent of their order). [*Rank by order of importance:* Effects on own products/services; Effects on own operations; Effects on supply chain; Reputational effects/Loss of "license to operate"; Investor demand; Other effects, namely [Open text]; THRESHOLD RANK]
    - (A.1.3a) [If (A.1.1) = "Nature-related transition risks"] Over what time horizons will the financial effects of nature-related transition risks materialize? [Already today; Over next 5 years; In 5 to 10 years; In 10 to 25 years; In 25+ years]
    - (A.1.3b) [If (A.1.1) = "Nature-related physical risks"] Over what time horizons will the financial effects of nature-related physical risks materialize? [Already today; Over next 5 years; In 5 to 10 years; In 10 to 25 years; In 25+ years]
    - (A.1.3c) [If (A.1.1) = "Others, namely"] Over what time horizons will the financial effects of other nature-related risks materialize? [Already today; Over next 5 years; In 5 to 10 years; In 10 to 25 years; In 25+ years]

(A.2) When undertaking major investments, does your company (plan to) conduct ...

Nature *impact* assessments? [Yes; No; Do not know]

Nature *dependency* assessments? [Yes; No; Do not know]

(A.3) Over the next 3-5 years, how do you expect regulations related to nature impacts to change in your main market(s)? [Stricter regulations expected; Mixed or no significant changes expected; Less strict regulations expected; Do not know]

(A.4) In which areas does your company pursue or anticipate nature-related opportunities? (Tick all that apply) [Resource efficiency and management; Eco-friendly products and innovation; Biodiversity and ecosystem services enhancements; Other, please state [Open text]]

Part B: Management of Nature Risks

(B.1) The next questions are about your company's operational, upstream supply chain, or downstream value chain activities (hereafter "activities").

Does your company (plan to) ...

(B.1.1) ... mitigate/reduce any negative *impacts* on nature caused by these activities? [Yes (please elaborate) [Open text]; No; Do not know]

(B.1.2) ... offset any negative *impacts* on nature caused by these activities [Yes (please elaborate) [Open text]; No; Do not know]

(B.1.3) ... manage/adapt to any *dependencies* on nature of these activities? [Yes (please elaborate) [Open text]; No; Do not know]

(B.1.4) … hedge through financial instruments the risks associated with nature impacts and dependencies of these activities? [Yes (please elaborate, (e.g., insurance, derivatives, or other) [Open text]; No; Do not know]

(B.1.5) … carry out nature risk stress tests and/or scenario analysis? [Yes; No; Do not know]

(B.1.6) … provide public disclosure on its nature risks? [Yes (please state on which framework, e.g., CDP, ESRS, GRI, TNFC, undecided, or other?) [Open text]; No; Do not know]

(B.1.7) … implement technological innovations or solutions to manage or mitigate its nature risks? [Yes (please elaborate) [Open text]; No; Do not know]

(B.2) What do you see as the main drivers/motivations for why companies may want to address nature risks? Please select all that apply [Physical risk considerations/degradation of nature; Transition risk from consumer pressure; Transition risk from regulation; Competitive advantages; Investment opportunities; Others (please elaborate) [Open text]].

(B.3) Which obstacles/challenges do you see for companies when addressing nature risks? [Open text]

(B.4) How does your company's approach to addressing nature risks compare to that of industry peers/companies exposed to similar risks?

Much less advanced	Less advanced	Similar	More advanced	Much more advanced	Do not know
□	□	□	□	□	□

Part C: Investor Interest in Nature Risks

(C.1) Do you believe that investor attention to nature-related topics has increased in the past 3 to 5 years? [Yes; No; Do not know]

- (C.1.1) [If (C.1) = "Yes") What do you believe drives this increase (Tick all that apply) [Growing public awareness; Policy/regulatory changes; Reassessment of nature risks; Major negative nature events; Changing consumer preferences; Technological developments; Other (state)]

(C.2.1) To what extent do you believe that investors consider your company's dependency on nature (physical risks) when making **investment decisions**?

Never	Rarely	Sometimes	Often	Always	Do not know
□	□	□	□	□	

- (C.2.1a) [If (C.2.1) != "Never"] In your opinion, how do investors consider dependency on nature when assessing your company's **future cashflows**? [Not at all; Reduce forecasted cashflows; Increase forecasted cashflows (e.g., because of lower costs); Do not know]
- (C.2.1b) [If (C.2.1) != "Never"] In your opinion, how do investors consider dependency on nature when assessing your company's **cost of capital?** [Not at all; Reduce cost of capital; Increase cost of capital; Do not know]
- (C.2.1c) [If (C.2.1) != "Never"] In your opinion, what are the views of investors on when your nature-related physical risks will start materializing? [Already today, Over next 5 years; In 5 to 10 years; In 10 to 25 years; In 25+ years; Never; Do not know]
- (C2.1d) [If (C.2.1) = "Never" OR "Rarely"] Do you expect that investors consider your company's nature-related physical risks significantly more in the future? [Yes; No; Do not know]

(C.2.2) To what extent do you believe that investors consider your company's impact on nature (transition risks) when making **investment decisions**?

Never	Rarely	Sometimes	Often	Always	Do not know
□	□	□	□	□	□

- (C.2.2.a) [If (C.2.2) != "Never"] In your opinion, how do investors consider negative impact on nature when assessing your company's **future cashflows**? [Not at all; Reduce forecasted cashflows; Increase forecasted cashflows (e.g., because of lower costs); Do not know]
- (C.2.2.b) [If (C.2.2) != "Never"] In your opinion, how do investors consider negative impact on nature when assessing your company's **cost of capital**? [Not at all; Reduce cost of capital; Increase cost of capital; Do not know]
- (C.2.2.c) [If (C.2.2) != "Never"] In your opinion, what are the views of investors on when your nature-related transition risks will start materializing? [Already today; Over next 5 years; In 5 to 10 years; In 10 to 25 years, In 25+ years; Never; Do not know]
- (C2.2.d) [If (C.2.2) = "Never" OR "Rarely"] Do you expect that investors consider your company's nature-related transition risks significantly more in the future? [Yes; No; Do not know]

(C.3) Do you believe that investors will, in the foreseeable future, relatively prioritize topics related to climate change or topics related to nature in their investment / engagement strategies? [Prioritize climate; Prioritize nature; So intertwined that one cannot prioritize; Do not know]

- (C.3.1) [If (C.3) = "Prioritize climate"] Do you think this priority on climate is appropriate? [Yes; No, investors should prioritize climate; So intertwined that one cannot prioritize; Do not know]
- (C.3.2) [If (C.3) = "Prioritize nature"] Do you think this priority on nature is appropriate? [Yes; No, investors should prioritize climate; So intertwined that one cannot prioritize; Do not know]

(C.4) Have investors raised questions or expressed opinions about your company's approach to nature risks during shareholder engagements / investor meetings? [Yes, No, Do not know]

- (C.4.1) [If (C.4) = "Yes"] Which investor types or investor groups? (Select all that apply) [Mutual funds; Pension funds; State/Sovereign wealth funds; Hedge funds; Family offices; Banks; Insurance companies; Investor coalitions (e.g., Nature Action 100); Others, namely [Open text]]

(C.5) Do you perceive engagement by investors on nature-related issues as value-generating / beneficial to your business? [Yes; No; Do not know]

- (C.5.1) [If (C.5) = "Yes"] In what ways? [Open text]
- (C.5.2) [if (C.5) = "No"] Why not? [Open text]

(C.6) Have nature-related engagements by investors (or the anticipation of such engagements) influenced strategic decisions or operational practice at your company? [Yes; No; Do not know]

- (C.6.1) [If (C.6) = "Yes"] In what ways? [Open text]
- (C.6.2) [If (C.6) = "No"] Do you believe this will change in the next 5 years? [Yes; No; Do not know]

(C.7) In your opinion, what are the main motivations for investors to conduct nature-related engagements? Rank the following items by order of importance. Items you move below the THRESHOLD RANK line will be considered

to be not important at all for you (independent of their order). [*Rank by order of importance:* Genuine nature interest/reducing company impact; Risk considerations; Reputation; Marketing; Competition; Other effects, namely [Open text]]

(C.8) Are there any other stakeholder groups (beyond investors) that engage with your company on nature risks? (Tick all that apply) [No; Customers; Suppliers; Civil society organizations; Regulators; Employees; Other (please state) [Open text]; Do not know]

Part D: Company Characteristics

We are now going to ask a few questions about your company's characteristics. The survey is **anonymous**, but for the purpose of analyzing the responses, it will be very useful to implement some tabulations by these characteristics. Simply leave the question unanswered and move on to the next if you prefer not to answer.

(D.1) Your company's primary industry/sector [FTSE ICB Sectors]

(D.2) What are your company's total sales/revenues in USD [Less than $25 million; $25-$99 million; $100-$499 million; $500 million-$999 million; $1-$4.9 billion; $5-9.9 billion; More than $10 billion]

(D.3) Over the last 3 years, what is your company's approximate ROE in % (rounded to an integer, e.g., 11%): _____

(D.4) Over the last 3 years, what is your company's approximate total shareholder return in % (rounded to an integer, e.g., 8%): _____

(D.5) Location of headquarters (country) [Open text]

(D.6) Location of stock listing (country) [Open text]

(D.7) Your position at your company [Investor relations; Sustainability; Strategy; Legal; R&D; Procurement; Other, namely [Open text]]

(D.8) Does your company have a committee/task force for nature risks? [Yes; No; Do not know]

- (D.8.1) [If (D.8) = "Yes"] What is the direct reporting line? [Executive Board, Sustainability Department, Specific business unit/division, Other (state) [Open text]]

(D.9) Does your company have a majority shareholder? [Yes; No; Not majority, but large (>20%)]

(D.10) Which shareholder types are among the top-5 investors in your company? (Tick all that apply) [Mutual funds; Pension funds; State/Sovereign wealth funds; Hedge funds; Family offices; Banks; Insurance companies; Others (name) [Open text]].

Part E: Optional Further Questions

In this final part, we include a few additional questions, including some where you have an opportunity to provide additional information on some questions raised earlier. Your answers here will be very useful, so please consider filling out this **optional** part as well. You will also have an opportunity to enter your company.

(E.1a) [If (A.1.3a) = "Already today"] You stated earlier that nature-related transition risks have already started to materialize for your company. Can you share why and how your company had to deal with the materialization of these risks, and how your company reacted?

(E.1b) [If (A.1.3b) = "Already today") You stated earlier that nature-related physical risks have already started to materialize for your company. Can you share why and how your company had to deal with the materialization of these risks, and how your company reacted?

(E.2a) [If (A.1.1) = "Yes" to "Nature-related transition risks"] You stated earlier that nature-related transition risks are material for your company. Are these risks concentrated / stemming from a few sources only? [Yes, concentrated risk (please elaborate) [Open text]; No, scattered risk (please elaborate) [Open text]; Do not know]

(E.2b) [If (A.1.1) = "Yes" to "Nature-related physical risks"] You stated earlier that nature-related physical risks are material for your company. Are these risks concentrated / stemming from a few sources only (e.g., from dependency on one/two ecosystem services)? [Yes, concentrated risk (please elaborate) [Open text]; No, scattered risk (please elaborate) [Open text]; Do not know]

(E.3a) [If (A.2) "Nature impact assessments" = "Yes"] You stated earlier that when undertaking major investments, your company conducts or plans to conduct nature impact assessments. Please elaborate: [Open text]

(E.3b) [If (A.2) "Nature dependency assessments" = "Yes"] You stated earlier that when undertaking major investments, your company conducts or plans to conduct nature dependence assessments. Please elaborate: [Open text]

(E.4) Have you *personally* experienced realizations of physical nature risks that affected your beliefs about the importance of nature risks? [Yes; No; Prefer not to answer]

(E.5) Are you *personally* concerned about biodiversity loss? [Yes; No; Prefer not to answer]

(E.6) Your company's name [Open text]

(E.7) Please share any comments you have about the survey and its topic. [Open text]

We thank you for your time spent taking this survey.

Your response has been recorded.

Supplementary Appendix B. Creating an investor and UZH sample.

Our initial dataset of investee companies consists of all 8,738 companies in which NBIM was invested in the year 2024, including firm-specific attributes, industry classification, and geographic distribution. Since our study relies on survey responses, we exclude firms without a valid email address, yielding a contactable sample of 6,335 firms for the sampling process. We stratify firms based on three key dimensions: firm size quartiles (proxied by market capitalization of the last known month), industry (proxied by the investor's 11-industry classification), and region of headquarters (proxied by continent).

Within each stratum, firms are randomly selected with a probability of 10%. Observations with missing firm characteristics remain part of the sampling process. Thus, firms are randomly selected within groups that share the same three stratification attributes, irrespective of whether an attribute is missing. The selected (unselected) firms receive the university (investor) survey. The distribution of firms across countries, regions, and industries closely mirrors that of the full sample.

To assess potential selection biases, we compare key firm characteristics between selected and non-selected firms using Welch's *t*-tests. Specifically, we examine differences in return on assets, sales growth, market capitalization, leverage, total assets, and the investor's investment scaled by market capitalization. No significant differences in firm characteristics emerge between selected and non-selected firms. Hence, conditional on having a valid email address, the stratified sampling effectively mitigates sample selection concerns. Firms with valid email addresses are larger and more highly levered, on average.

Supplementary Appendix C. Comparison with other nature metrics.

We connect our survey-based measure of nature risk exposure to nature-related risk metrics provided by ESG data vendors and other research teams. We conduct this analysis at the industry level as our decision to perform the survey anonymously implies that we cannot match individual survey responses to company-specific metric. To date, there are only limited scores or ratings available that allow researchers to identify how companies are exposed to nature risks. Yet, our survey provides an opportunity for validation by comparing them with company-based assessments. Results, reported in Supplementary Appendix Table C.1, show that companies in industries with (i) greater *Corporate Biodiversity Footprints* (CBF) and greater *Dependency Score* (measures from Iceberg Data Lab), (ii) greater *Nature Dependency* and *Ecosystem Footprint* scores (according to S&P), and (iii) greater *Biodiversity & Land Use Exposure* score (from MSCI) are more likely to consider nature risks as financially material. We also find that companies with greater nature dependence, measured according to Garel et al. (2025), are more likely to report exposure to nature risks.

Table C.1. Comparison with other nature-risk metrics.

		Corporate Biodiversity Footprint (IDL)	*Dependency Score* (IDL)	*Biodiversity & Land Use Exposure* (MSCI)	*Nature Dependency* (S&P)	*Ecosystem Footprint* (S&P)	*NatureDep* (Garel et al. 2025)
Nature risks	Yes	1622.79	10.29	2.32	0.62	843.95	2.67
	No	1435.86	7.93	1.76	0.59	737.90	2.53
Nature transition risks	Yes	1714.59	10.67	2.36	0.62	954.13	2.68
	No	1409.08	8.08	1.83	0.60	685.63	2.55
Nature physical risks	Yes	1670.04	10.28	2.31	0.62	898.37	2.66
	No	1415.88	8.15	1.81	0.60	704.74	2.55

Note: This table compares the survey-based measures of financial materiality of nature risks (risk exposure) at the industry-level with other metrics provided by data providers or research teams. We compare with the Corporate Biodiversity Footprints (CBF) and Dependency Score from Iceberg Data Lab, the Nature Dependency and Ecosystem Footprint scores from S&P, Biodiversity & Land Use Exposure score (from MSCI), and Nature Dependence (NatureDep) score from Garel et al. (2025). Industries are matched at the FTSE Industry Classification Benchmark 173 Subsectors level if available, and otherwise at the 11 Industry level.

Supplementary Appendix D. Prompt for ChatGPT-based classifications of text.

We provided the following prompts to analyze open-text responses to Questions B.1.1, B.1.2, B.1.3, and B.1.7. We used ChatGPT 4o in March 2025.

"Here is an excel file with answers to a survey question. Use the Sheet "XXX". The first two columns contain identifiers (ResponseId and id). The third column contains answers to the question "XXX" In a first step, read through all the responses. Come back with a reasonable number of proposed categories that reflect specific actions. Use either K-means clustering or LDA, as you deem appropriate given quality criteria. Provide a short label and a brief description for each category and state how many observations (and what percentage of observations) are in each category. Use a maximum of 4 categories, and additionally also allow for a "Other" category (though make sure this category is not too big). When you are done, go through the responses one by one and check whether the category really makes sense, and then perhaps adjust categories and allocation accordingly. Also note that the categories do not have to be of equal size. From the data, provide two real and clear examples per category and check whether the category really makes sense given the examples. As output, I need a WORD file that explains the analysis conducted, and an EXCEL file that appends a column with the category of each observation. Also report the frequency of each category in percent and the total number of observations."

Supplementary Appendix E. Additional tables.

Table E.1. Selected survey responses and respondent functions

	Nature risk exposure	*Engagement is value-generating*	*Engagement influenced company*
	(1)	(2)	(3)
Sustainability function	0.14		
	(1.60)		
Investor relations function		–0.02	–0.01
		(–0.19)	(-0.09)
Size bin fixed effect	Yes	Yes	Yes
Industry fixed effect	Yes	Yes	Yes
World region fixed effect	Yes	Yes	Yes
Distribution fixed effect	Yes	Yes	Yes
N	154	129	159
adj. R^2	0.098	0.028	–0.050

Note: This table reports OLS regressions relating the financially materiality of nature risk and perceptions of nature-related investor engagement to the function of respondents. Regression variables are defined in Appendix A. *t*-statistics (reported in parentheses) are based on robust standard errors. *, **, *** represent significance levels of 0.10, 0.05, and 0.01, respectively.

Table E.2. Nature risk actions across sectors and world region

Panel A. Distribution by sector

	Mitigate negative impact	*Offset negative impact*	*Adapt to dependencies*	*Hedge*	*Carry out stress tests/scenario analysis*	*Implement technological innovations*	*Provide disclosure*
Basic material	90%	75%	80%	29%	78%	86%	82%
Consumer discretionary	75%	29%	50%	0%	60%	60%	88%
Consumer staples	100%	80%	100%	25%	50%	100%	67%
Energy	71%	40%	43%	13%	57%	60%	88%
Financials	86%	44%	63%	24%	66%	42%	82%
Health care	79%	21%	50%	36%	60%	62%	71%
Industrials	89%	38%	63%	13%	53%	68%	86%
Real estate	78%	40%	53%	32%	65%	53%	85%
Technology	68%	40%	13%	9%	55%	45%	75%
Telecommunication	100%	80%	80%	60%	60%	75%	100%
Utilities	88%	50%	75%	33%	80%	83%	86%
Other	78%	32%	55%	17%	64%	54%	79%

Panel B. Distribution by world region

	Mitigate negative impact	*Offset negative impact*	*Adapt to dependencies*	*Hedge*	*Carry out stress tests/scenario analysis*	*Implement technological innovations*	*Provide disclosure*
Europe	80%	34%	55%	25%	67%	50%	86%
North America	78%	37%	40%	10%	42%	61%	72%
Asia	89%	61%	61%	21%	61%	67%	71%
Australia	67%	50%	40%	0%	60%	40%	86%
Rest of world	92%	45%	70%	36%	75%	100%	100%

Note: This table tabulates whether companies (plan to) undertake a certain nature risk management approach or (plan to) conduct public disclosures on its nature risks (Questions B.1.1-B.1.7). We report the percentage of respondents that responded with "yes" to a question. Do not know responses are coded as missing for the table. Variables are defined in Appendix A.

Table E.3. Specific nature risk actions

Mitigate negative impact (N=149)		Adapt to dependencies (N=74)	
Operational environmental management	36%	Dependency risk management	30%
Impact mitigation and risk reduction	25%	Raw material and supply chain dependency awareness	30%
Green infrastructure and resource use	22%	Sustainability integration and strategic planning	22%
Sustainability strategies and programs	16%	Natural resource efficiency and substitution	19%
Other	1%	Other	0%
Implement technological innovations (N=80)		Offset negative impact (N=64)	
Nature risk tools and technology integration	31%	Carbon offsets and credit purchases	36%
Sustainable products and building solutions	30%	Offsetting via ecosystem or partner projects	30%
Sustainability reporting and customer-focused solutions	21%	Nature-based projects (reforestation & biodiversity)	17%
Low-carbon and energy efficiency innovations	18%	Environmental protection and efficiency measures	17%
Other	0%	Other	0%

Note: This table tabulates the frequency of specific actions that companies take within a respective nature risk management approach. Responses are based on ChatGPT classifications of open-text responses.

Table E.4. Engagement and nature risk actions.

	Nature impact assessments	*Nature dependency assessments*	*Mitigate negative impact*	*Offset negative impact*	*Adapt to dependencies*	*Hedge*	*Carry out stress tests/scenario analysis*	*Implement technological innovations*	*Provide disclosure*
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Engagement is value-generating	0.17*	0.17	0.25***	0.23**	0.52***	0.20**	0.41***	0.34***	0.33***
	(1.77)	(1.53)	(2.82)	(2.19)	(5.13)	(2.06)	(3.61)	(3.15)	(3.93)
Size bin fixed effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry fixed effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
World region fixed effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Respondent function fixed effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Distribution fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	112	104	118	106	95	105	109	103	123
adj. R^2	0.170	0.208	0.092	0.049	0.318	0.080	0.037	0.211	0.145

Note: This table reports OLS regressions relating the (planned) existence of a nature risk action to whether nature-related engagement is perceived as being value-generating for a company. Do not know responses are treated as missing values. Regression variables are defined in Appendix A. *t*-statistics (reported in parentheses) are based on robust standard errors. *, **, *** represent significance levels of 0.10, 0.05, and 0.01, respectively.

Table E.5. Evaluating acquiescence bias

Panel A. Potential top-5 ownership by the investor

	Nature risk exposure	*Mitigate negative impact*	*Offset negative impact*	*Adapt to dependencies*	*Hedge*	*Carry out stress tests/scenario analysis*	*Implement technological innovations*	*Provide disclosure*	*Engagement is value-generating*	*Engagement influenced company*
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
NBIM potentially top-5 investor	0.07	0.08	0.08	0.14	–0.05	–0.02	0.08	–0.18**	–0.03	0.07
	(0.62)	(0.91)	(0.68)	(1.23)	(–0.47)	(–0.19)	(0.70)	(–2.09)	(–0.23)	(0.64)
Size bin fixed effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry fixed effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
World region fixed effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Respondent function fixed effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Distribution fixed effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	139	138	124	116	126	128	119	143	119	143
adj. R^2	0.129	0.044	0.006	0.091	0.045	-0.007	0.032	0.081	0.046	–0.030

Panel B. Alternative distribution channels

Channel		*Nature risk exposure*	*Mitigate negative impact*	*Offset negative impact*	*Adapt to dependencies*	*Hedge*	*Carry out stress tests/scenario analysis*	*Implement technological innovations*	*Provide disclosure*	*Engagement is value-generating*	*Engagement influenced company*
Investor	Mean	54%	81%	42%	56%	23%	63%	58%	81%	63%	38%
	N	253	199	171	155	162	181	160	201	153	186
UZH	Mean	88%	100%	86%	71%	14%	86%	80%	100%	100%	50%
	N	8	8	7	7	7	7	5	8	5	6
	Difference	–34%	–19%	–44%	–15%	9%	–23%	–22%	–19%	–37%	–12%
	t-test (*p*-value)	0.0594	0.1801	0.0206	0.4273	0.5982	0.2216	0.3308	0.1687	0.0889	0.5416

Table E.5. (continued)

Note: Panel A reports OLS regressions relating the financially materiality of nature risk, the (planned) existence of a nature risk action, and perceptions of nature-related investor engagement to whether a state or sovereign wealth fund is a top-5 investor in a company. This variable indicates whether top-5 ownership by our investor is likely. Do not know responses are treated as missing values. Regression variables are defined in Appendix A. *t*-statistics (reported in parentheses) are based on robust standard errors. *, **, *** represent significance levels of 0.10, 0.05, and 0.01, respectively. Panel B compares summary statistics (mean values) of the financially materiality of nature risk, the (planned) existence of a nature risk action, and perceptions of nature-related investor engagement across distribution channels (distribution by the investor versus distribution by University of Zurich, UZH). As only 11 companies responded to the UZH survey, we conduct the comparison using *t*-tests and report *p*-values of difference-in-means tests. Do not know responses are treated as missing for the table.

Table E.6. Evaluating respondent selection bias

Panel A. Respondent personally experienced nature risk realizations

	Nature risk exposure	*Mitigate negative impact*	*Offset negative impact*	*Adapt to dependencies*	*Hedge*	*Carry out stress tests/scenario analysis*	*Implement technological innovations*	*Provide disclosure*	*Engagement is value-generating*	*Engagement influenced company*
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Personally experienced nature risks	–0.01	0.03	–0.04	0.00	0.08	0.02	0.04	0.09	0.31***	0.10
	(–0.10)	(0.37)	(–0.33)	(0.01)	(0.80)	(0.15)	(0.35)	(1.13)	(2.80)	(1.04)
Size bin fixed effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry fixed effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
World region fixed effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Respondent function fixed effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Distribution fixed effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	114	115	100	97	105	108	99	121	97	122
adj. R^2	0.015	–0.003	0.104	0.084	0.025	–0.078	0.007	0.023	0.081	–0.065

Table E.6. (continued)

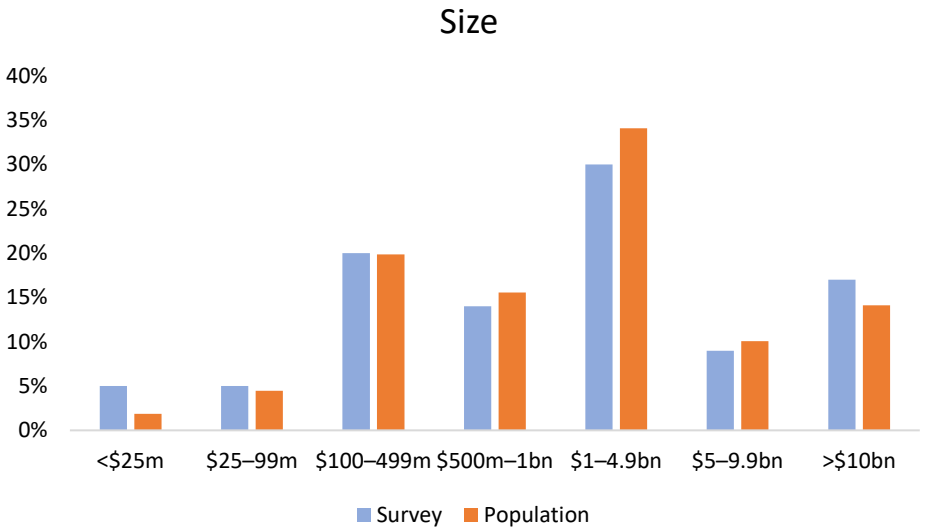
Panel B. Respondent personally concerned about biodiversity loss

	Nature risk exposure	*Mitigate negative impact*	*Offset negative impact*	*Adapt to dependencies*	*Hedge*	*Carry out stress tests/scenario analysis*	*Implement technological innovations*	*Provide disclosure*	*Engagement is value-generating*	*Engagement influenced company*
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Personally concerned about nature loss	–0.02	0.22*	0.38***	0.27*	0.00	0.04	0.09	0.14	0.37***	0.02
	(–0.14)	(1.72)	(2.80)	(1.78)	(0.03)	(0.24)	(0.54)	(1.27)	(3.01)	(0.15)
Size bin fixed effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry fixed effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
World region fixed effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Respondent function fixed effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Distribution fixed effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	137	136	119	110	124	126	115	140	114	142
adj. R^2	0.053	0.021	0.025	0.073	0.038	-0.049	–0.006	0.066	0.068	–0.055

Note: This table reports OLS regressions relating the financially materiality of nature risk and the (planned) existence of a nature risk action to whether a respondent personally experienced realizations of nature risks (Panel A) or is personally concerned about biodiversity loss (Panel B). Prefer not to answer responses are treated as missing values. Regression variables are defined in Appendix A. *t*-statistics (reported in parentheses) are based on robust standard errors. *, **, *** represent significance levels of 0.10, 0.05, and 0.01, respectively.

Figure E.1. Comparison of the size, industry, and regional distributions between respondents and the population.

Panel A. Size



Panel B. Industry

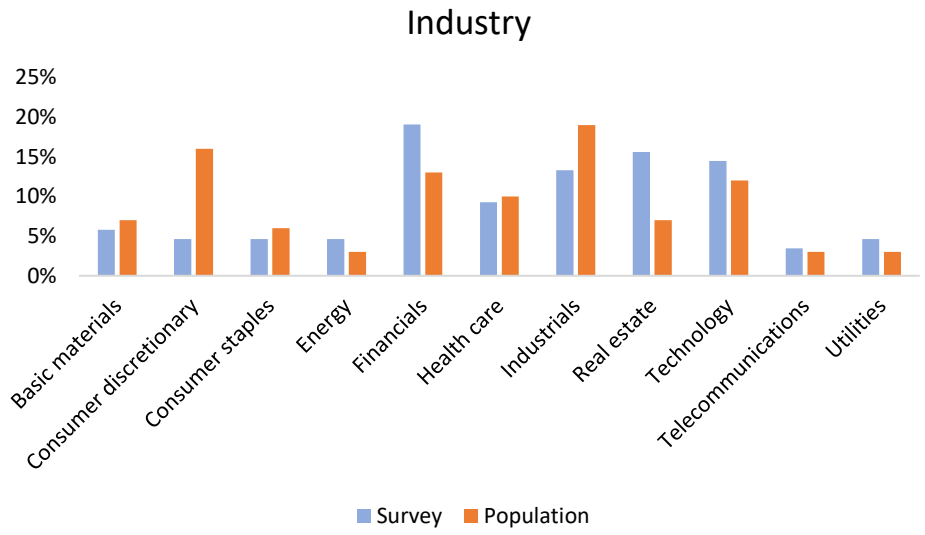
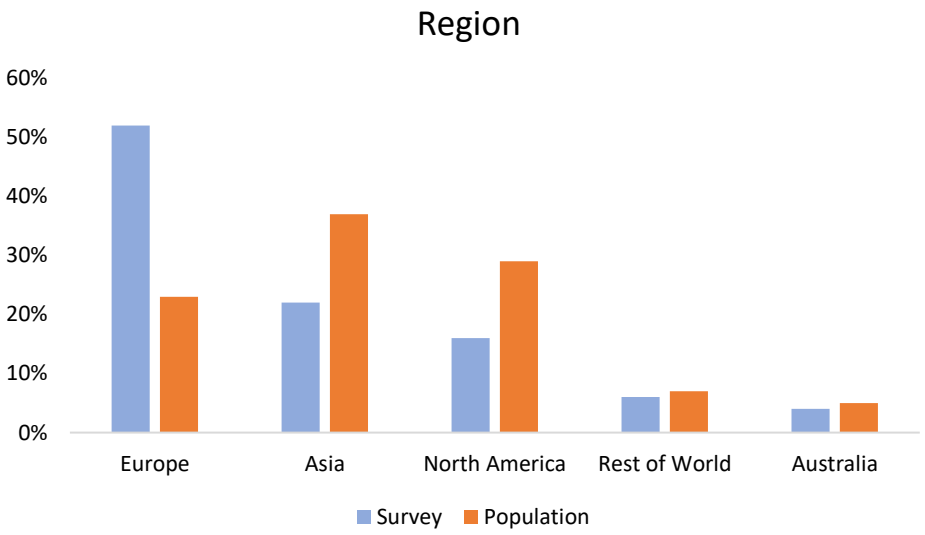


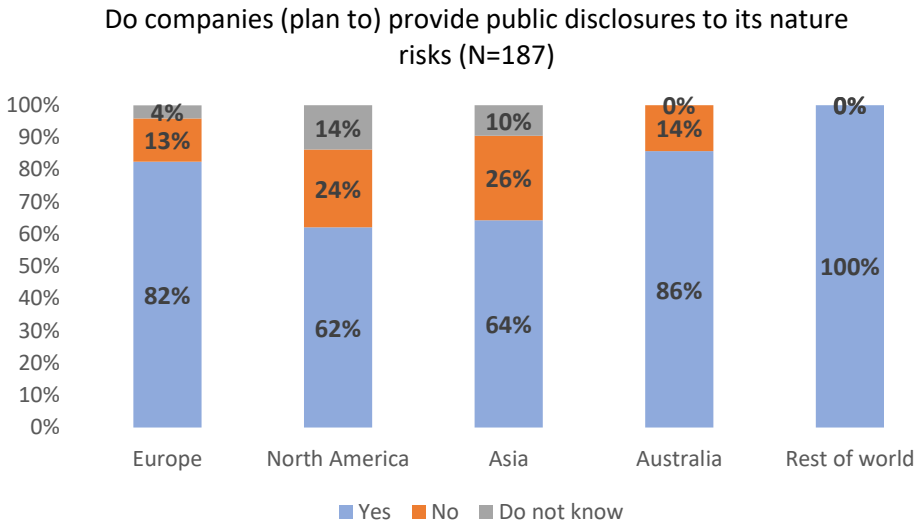
Figure E.1 (continued)

Panel C: Region



Note: This figure compares the size (Panel A), industry (Panel B), and regional (Panel C) distributions of the survey respondents with the corresponding distributions of the companies in the investor's listed equity portfolio (for those companies for which relevant contact emails were available). For the industry comparison, we omit the "other" category and adjust the distribution percentages accordingly.

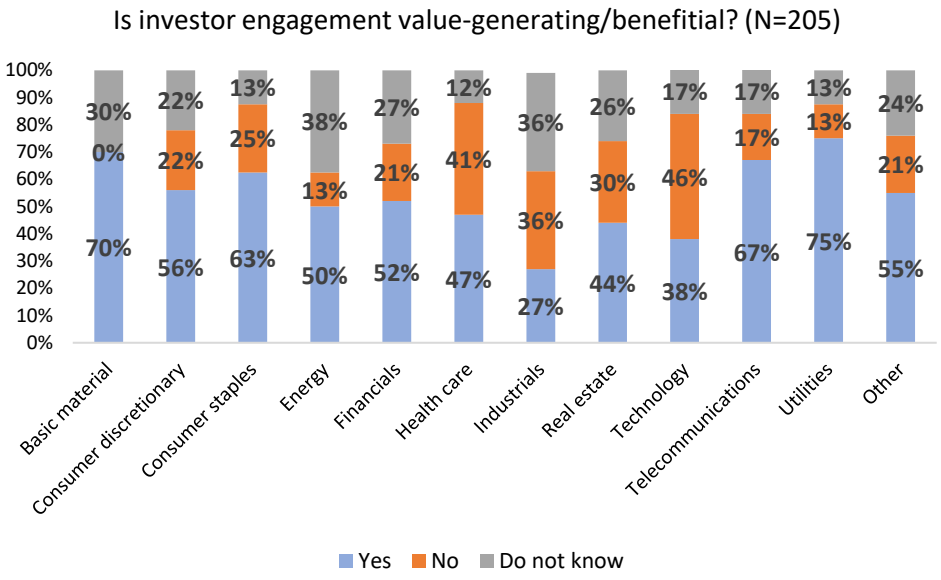
Figure E.2. Nature risk disclosure across world regions.



Note: This figure tabulates whether companies (plan to) provide public disclosures to its nature risks by world region (Question B.1.6).

Figure E.3. Perceptions of investor engagement across sectors and world regions.

Panel A. Distribution by sector: Is engagement value-generating?



Panel B. Distribution by sector: Did engagement influence the strategy?

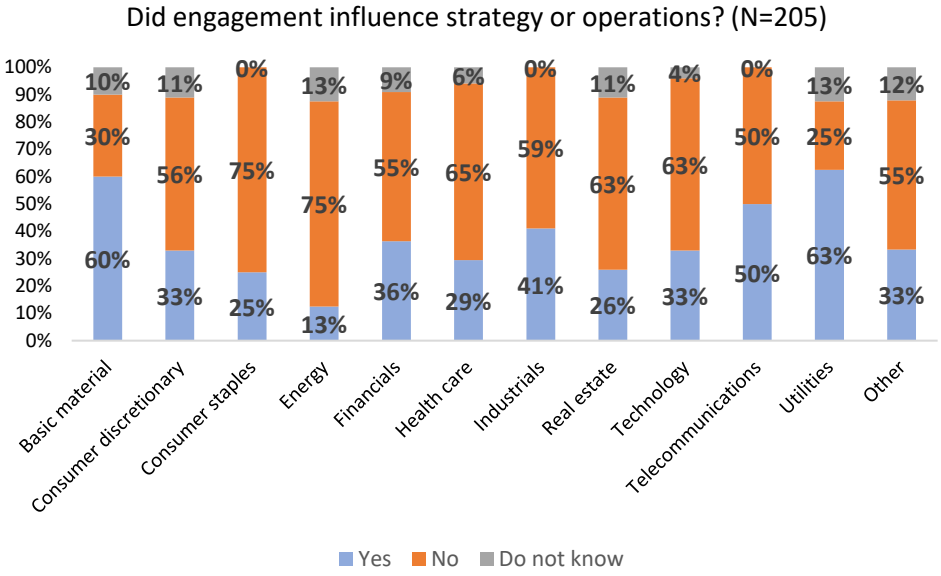
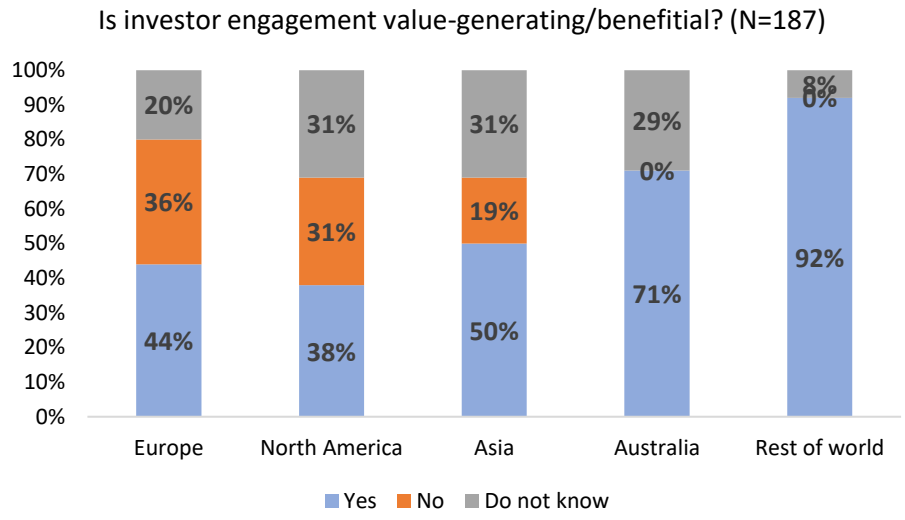
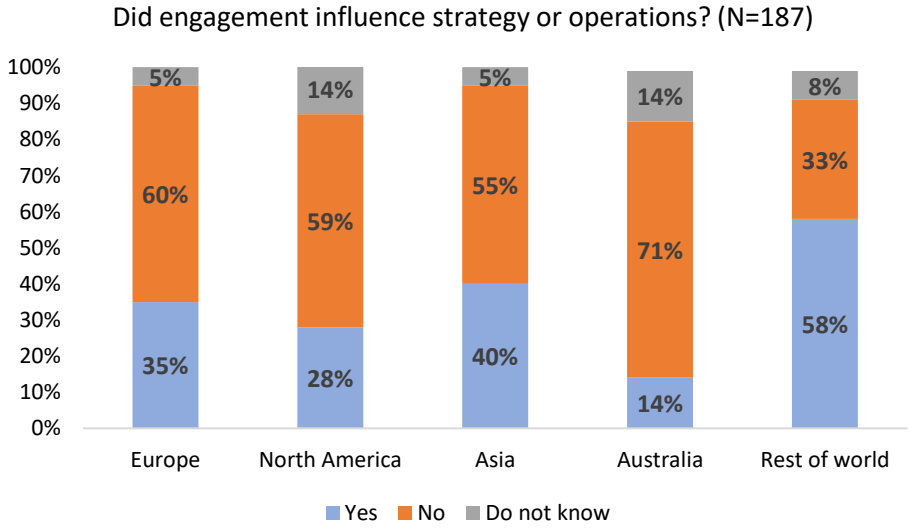


Figure E.3 (continued)

Panel C. Distribution by world region: Is engagement value-generating?



Panel D. Distribution by world region: Did engagement influence strategy?



Note: This figure displays the percentage of respondents by sector (Panels A and B) or world region (Panels C and D) that consider nature-related engagement as value-generating (Question C.5) or stated that it influenced the company's strategy or operations (Question C.6).

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c/o University of Geneva, Bd. Du Pont d'Arve 42, CH-1211 Geneva 4
T +41 22 379 84 71, rps@sfi.ch, www.sfi.ch

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