



Nature-related Financial Disclosure in Japanese Agriculture and Aquaculture Listed Companies

— Status and Challenges —

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Abstract This study explores the disclosure quality of nature-related financial information within Japanese-listed companies in the fishery, agriculture, and forestry sectors. We survey 12 selected companies and identify a pervasive lack of detailed disclosure, emphasising a collective underdevelopment in corporate responsibility for environmental impact accountability. The study's unique contributions include a comprehensive analysis of disclosure practices, revealing significant deficiencies and patterns; our findings mainly focus on biodiversity and ecosystem conservation to ensure transparency and prevent fraudulent reporting. These insights hold future significance for companies, regulators, and stakeholders navigating Japan's evolving landscape of sustainable financial reporting.

Key words Task Force on Nature-related Financial Disclosures; sustainability; biodiversity; ecosystem; Biodiversity, Ecosystems, and Ecosystem Services

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I Introduction

As businesses grapple with the intricate interplay between economic activities and ecological systems, the imperative for comprehensive nature-related financial disclosure has gained prominence. In this section, we embark on an exploration of the evolving landscape surrounding nature-related financial information disclosure. The aim is to shed light on the challenges, research approaches, and frameworks that underpin corporate management decisions and disclosures in the realm of biodiversity, ecosystems, and ecosystem services (BEES). Through a series of in-depth discussions, we aim to provide readers with a discussion of the existing literature and initiatives, paving the way for a deeper understanding of the complexities and opportunities associated with nature-related financial disclosures. We navigate through critical studies, theoretical frameworks, and international standard-setting endeavours, offering readers a clear roadmap for comprehending the intricacies of this evolving domain.

Biodiversity and ecosystems are essential for sustainable development, exerting substantial influence on businesses and stakeholders. The risks and opportunities associated with these factors can significantly impact agribusinesses, which depend mainly on natural capital. Investors are increasingly focused on identifying and managing biodiversity- and ecosystem-related risks and opportunities. The International Sustainability Standards Board (ISSB), established in 2021 under the International Financial Reporting Standards (IFRS) Foundation, is currently developing standards with a specific emphasis on setting frameworks for disclosing nature-related financial information.

The ISSB's Sustainability Disclosure Standards, especially those for nature-related financial information, will draw upon the final recommendations of the Task Force on Nature-related Financial Disclosures (TNFD). Established in 2021 and published in September 2023, the TNFD Final Recommendations v1.0 version (TNFD, 2023) will serve as a reference for ISSB's future standards (ISSB, 2023e). Therefore, the sustainability disclosure standard will align with the TNFD framework. Once the

ISSB sets the standard, Japanese-listed companies are expected to reflect nature-related financial information disclosure in their reporting practices.

The adoption of the TNFD framework by the ISSB is poised to broaden the consideration of environmental-related risks and opportunities, including climate change and natural disasters.

In this study, we assume that the early adoption of the TNFD framework, regardless of the extent, may become a prevalent practice among listed companies in industries heavily dependent on natural capital. Furthermore, similarly to the early adoptions of other international sustainability frameworks and standards, the issue of reliability is likely to surface. Compared to traditional financial information, ensuring the reliability of sustainability disclosures remains challenging. No established and systematic principles or rules exist to ensure its accuracy and comprehensiveness, besides early principles endorsed and supported by the ISSB. For example, sustainability information on biodiversity and ecosystem conservation themes can involve various challenges in identifying the scope of information disclosure, setting indicators and targets, and analysing scenarios for risk assessments. Therefore, the theoretical and practical relevance and reliability of information for investors and other stakeholders, in this domain remain limited.

This study explores the latest disclosures by listed companies in the Japanese fishery, agriculture, and forestry sectors and seeks to identify potential avenues for future research.

The discussions are based on debates surrounding corporate management and information disclosure on biodiversity and ecosystem conservation, creating a foundation for preliminary exploration. The significance of this study lies in its contribution to shaping the research agenda, offering valuable input for the formulation of sustainability accounting and reporting policies that incorporate nature-related financial disclosures.

The remainder of this paper is organised as follows. In Section II, we present relevant debates concerning the disclosure of nature-related financial information, particularly in the realms of management and accounting. In Section III, we analyse the latest disclosure data to determine the status of nature-related financial details

of listed companies in the Japanese fishery, agriculture, and forestry industries. Section IV concludes with recommendations for future developments in this domain.

II Discussions on nature-related financial disclosure

1. Research approaches to nature-related business management

Nature-related information, encompassing BEES, constitutes a critical element within the broader spectrum of sustainability information. However, academic literature and theoretical frameworks addressing corporate management and disclosures in this realm remain limited (Whiteman et al., 2013; Hahn and Tampe 2021). Notably, in the supply chain management context, where biodiversity holds substantial relevance, researchers have paid scant attention to the management of biodiversity within purchasing and supply chains (Salmi et al., 2023).

Some studies on corporate sustainability management reevaluate the ecological and systemic foundations of sustainability, adopting a collaborative approach with the natural sciences. For example, the planetary boundary, a concept defining earth's limits and the breaking points at which humans can survive (Stockholm Resilience Centre, 2023), identifies climate change, global nitrogen cycle, and biodiversity loss rate as three out of nine critical threshold. Other studies suggest measuring corporate impacts against boundary processes that can reach or exceed them (Whiteman et al., 2013). A 2023 study conducted by the Stockholm Resilience Centre reports that six of the nine planetary boundary areas exceeded their limits. Consequently, companies should adopt a collaborative approach with natural sciences to identify the scope of their sustainability management practices and expand their nature-related management and information disclosure. Hahn and Tampe (2021) argue that conventional corporate sustainability research often focuses on organisations and strategies from a business perspective, while a systems approach extends beyond this logic, deriving business strategies from the logic of the social-ecological system on which human and corporate activities depend. Their study uniquely conceptualises corporate sustainability from the perspective of businesses that thrive by enhancing the health of socio-ecological systems and argues that

Nature-related Financial Disclosure in Japanese Agriculture and Aquaculture Listed Companies (Kawahara, Fitriasari, Irie) providing regenerative business strategies supporting life support conditions in socio-ecological systems is essential for businesses.

In contrast to this theoretical approach, Salmi et al. (2023) inductively develop a theoretical framework for corporate biodiversity management based on interviews with representatives of six Finnish and New Zealand companies and other institutions. Their study examines company practices leading to biodiversity management that reduces or eliminates adverse impacts on biodiversity and contributes to its restoration and rehabilitation. It suggests that sustainable purchasing and supply chain management, extending beyond company boundaries and supply chains, involve stakeholders across different geographies and industries, including government agencies and non-governmental organisations. The theoretical framework developed by Salmi et al. (2023) suggests that the scope of information disclosure expands with the expansion in the scope of corporate control.

Studies exploring other facets of natural capital include Pawsey et al. (2023), which examines soil-related disclosure in institutional annual reports, corporate governance reports, and corporate social responsibility (CSR) reports of 25 Australian-listed agricultural companies between 2019 to 2021. Soils significantly impact agriculture, drought tolerance, and other ecosystem services such as climate regulation. The study finds increased reporting of factors such as greenhouse gas emissions, water management, and climate change, with negligible discussion on soil management, soil health, and soil-related risks. Pawsey et al. (2023) interviewed 14 financial statement preparers from the surveyed companies and a wide range of information users for triangulation. Triangulated findings affirmed the perceived significance of soil health in maintaining agricultural productivity. Furthermore, several investors demonstrated a nuanced understanding of the nature and impact of soil health. While acknowledging a growing awareness of soil importance a thorough understanding of its nature and impact is yet to be realised. Pawsey et al. (2023) posit a favourable inclination forwards increased soil-related reporting within agribusinesses, emphasising investors' consideration of soil factors when making investment decisions. Conversely, Pawsey et al. (2023) recognise the inherent challenges in defining soil health and establishing consensus on indicators and

targets because of the diverse and complex nature of soils. In conclusion, Pawsey et al. (2023) indicate a preference among investors for increased soil-related reporting to attract investments, emphasising the need for clear and concise communication. Practically applied, they conclude that such reporting practices may lead to a reduced degree of information asymmetry. The study additionally suggests that reported information should align with existing practices within the agribusiness industry to ensure relevance and reliability.

2. Framework for nature-related financial information disclosure

The most problematic aspect of nature-related financial information, particularly BEES disclosures, stems from the intensity of investors' demands for decision-useful information on BEES risks and opportunities. However, a notable gap exists in the disclosure landscape, and a widely accepted framework for reporting on this specific domain is lacking (ISSB, 2023f). Traditional sustainability reporting has limited attention to nature-related reporting, potentially diminishing the willingness of agribusinesses to implement nature-related management, and eventually restricting its disclosure, as suggested by Pawsey (2023). The study underscores that despite the crucial role of soil in agricultural production, drought tolerance, and ecosystem services, it is seldom linked to organisational performance in financial statements. Furthermore, is under reported by prominent entities such as the ISSB, Task Force on Climate-related Financial Disclosure (TCFD), Global Reporting Initiative (GRI), International Integrated Reporting Council (IIRC), and the US Sustainability Accounting Standards Board (SASB).

In response to this global situation, ongoing efforts are in place to establish a regime for international nature-related financial disclosure standards, with leadership from the ISSB, which aims to create a global baseline for investor-focused sustainability reporting. It has published two standards: the General Requirements for Disclosure of Sustainability-related Financial Information (IFRS S1) (ISSB, 2023a) and Climate-related Disclosures (IFRS S2) (ISSB, 2023b). Following these two standards, the ISSB is currently prioritising three research projects on sustainability-related risks and opportunities with its standard-setting work programme for the

next two years, which includes human capital and standards for nature-related financial information, taking precedence over projects on human rights (ISSB, 2023d, p. 3).

The ISSB has proposed and is contemplating the creation of an IFRS Sustainability Disclosure Taxonomy to reflect the disclosure requirements of the two standards. This taxonomy aims to facilitate the use and reporting of sustainability-related financial information, including descriptive information, in digital form and to enable information to be tagged, searched, and categorised (ISSB, 2023c, p. 18). Given this, nature-related financial information may also be tagged to facilitate future reporting.

Similar to the climate change agenda, the ISSB collaborates with organisations considered experts or influential in BEES. The ISSB collaborates with the TNFD to develop a framework for the disclosing nature-related financial information. The ISSB has articulated that the TNFD's recommendations in its report on nature-related risks will help companies communicate these risks and opportunities to investors and other stakeholders. The TNFD has declared its commitment to enhancing the quality of reporting on nature-related risks and establishing an international baseline for sustainability-related financial disclosures in collaboration with the ISSB. Additionally, the TNFD aims to develop recommendations compatible with the ISSB's disclosure standards, incorporating the TCFD's four-pillar disclosure structure—governance, strategy, risk management, and indicators and targets. These pillars are integrated into the ISSB's climate-related standards. Furthermore, the TNFD believes that the steps leading up to disclosure, the Locate, Evaluate, Assess, and Prepare (LEAP) approach specific to the TNFD will enable companies to progressively analyse and organise their dependencies, impacts, risks, and opportunities.

The ISSB has adopted a strategy of including citations to external documents, such as the TNFD, in its standards. Market participants have welcomed this approach as it allows the ISSB to build on the work of market-driven initiatives based on the latest best practice and thinking. As a precedent, the ISSB's Climate-related Disclosure Standard (ISSB, 2023b) references and enhances the TCFD Recommendations (TCFD, 2017) published by it in 2017.

Reflecting on the adoption of current ISSB standards, the ISSB may set an IFRS sustainability disclosure standard based on the TNFD. However, this standard may not immediately affect the disclosure practices of listed companies in Japan. This is because the ISSB has a track record of requiring Prime Market-listed companies to provide TCFD or similar climate change-related disclosures based on the market soft law, such as in the Corporate Governance Code, before sustainability disclosures become compulsory in the institutional annual report, as mandated in the annual securities report. Furthermore, although the establishment of ISSB's BEES-related standards based on the TNFD is expected to progress, some studies have questioned the TNFD framework.

The TNFD is expected to encounter disclosure difficulties compared to the TCFD, as the former focuses on risks from ecosystems (risks of degradation or deterioration of ecosystem services on which the business depends) and risks to ecosystems (risks of pollution or other adverse impacts on ecosystems). These risks present complex contexts that are challenging to standardise in disclosures. The required information is technically complex and demands a region-specific approach (Mori and Mader, 2021). Regional risks also affect biodiversity-related financial risk profiles (Nedopil, 2023). These risks also lead to difficulties in applying an internationally standardised TNFD framework. Based on the current state of TNFD case studies, translations from natural risks and opportunities into financial consequences and benefits can be formulated (see the case study by BloombergNEF, 2023). However, a direct comparison of economic implications or benefits requires context-based analyses, challenging the usefulness of the minimum disclosure and taxonomy of BEES.

III Survey on the state of disclosure of listed Japanese agricultural companies

1. Purpose of the survey

This study aims to furnish current insights into the extent of biodiversity and ecosystem conservation information disclosed in the institutional disclosure documents

Nature-related Financial Disclosure in Japanese Agriculture and Aquaculture Listed Companies (Kawahara, Fitriasari, Irie) of Japanese-listed companies in the agriculture and aquaculture sectors, to identify potential future disclosure issues.

2. Methodologies

The target companies for this survey comprised 12 Japanese entities (6 Prime and 6 Standard) listed on the Prime and Standard Markets of the Tokyo Stock Exchange as of 21 November 2023, the survey reference date. These companies operate within the fishery, agriculture, and forestry industry categories. With only four Japanese stock exchanges (the Tokyo Stock Exchange: 3,920 listed companies, comprising 1,659 listed on the Prime Market and 1,619 on the Standard Market; Nagoya Stock Exchange: 281 on the same market; Fukuoka Stock Exchange: 107; Sapporo Stock Exchange: 62; data as of 30 November 2023), the Tokyo Stock Exchange's Prime and Standard Market encompass the majority of listed companies in Japan, rendering them suitable for gauging the disclosure landscape in Japan.

The specific context of Japan is relevant for this study. Amendments to the Cabinet Office Ordinance on Disclosure of Corporate Information have introduced a section addressing 'sustainability-related policies and initiatives' within the annual securities report, which is the institutional disclosure document for the financial year ending 31 March 2023. This institutionalisation ensures the provision of sustainability-related information across companies, regardless of size, industry sector, or applied accounting standards. The study leverages this regulatory context to assess the status of such information. Additionally, the 2021 revision of the Tokyo Stock Exchange's Corporate Governance Code requires Prime Market-listed companies to disclose climate-related information based on TCFD or an equivalent disclosure format. We assume that the early adoption of TNFD or BEES information is possible in the same markets as the anticipation of the ongoing project by the ISSB, as companies previously anticipated TCFD.

The surveyed documents included the annual securities reports prepared and disclosed by the 12 companies following Article 24 (1) of the Financial Instruments and Exchange Act and other corporate annual reports. The documents were selected using the Financial Services Agency's Electronic Disclosure for Investors' NETWORK

('EDINET') system for securities reports and other disclosure documents under the Financial Instruments and Exchange Act. The selection encompassed the most recently submitted documents within one year of the survey reference date. Data collection involved searching for information on EDINET and reviewing the written documents of the target companies. In cases where companies referenced URLs in their annual reports, these URLs were also explored.

Securities reports were prioritized as the primary data source for this study, considering the need to compare and contrast disclosures in institutional documents for the market from the perspective of accountability in stakeholder theory. According to this theory, information disclosure serves as a mechanism of accountability by companies to provide evidence of their performance and resource allocation, which stakeholders hold them accountable for. Given that investors are considered stakeholders, the theory adopted in this study aligns with ISSB's perspective on market-oriented disclosures. The survey aimed to compare information disclosure in market-oriented institutional documents.

The selected survey attributes included financial year, market segment, accounting standards, TCFD endorsing companies, foreign shareholder ratio, size (sales and total assets at year-end), return on equity (ROE), and price-to-earnings ratio (PER). Companies TCFD adoption was verified through the endorsement status on the Ministry of Economy, Trade and Industry (METI) website.

This disclosure analysis focused on specific sections of the annual report, particularly the 'Sustainability-related policies and initiatives' section. In such a case, an examination was conducted for statements in the 'Management policy, business environment, and issues to be addressed' section, which has historically been utilised for sustainability-related statements.

The survey items were defined based on the presence or absence of disclosures following TCFD and TNFD formats, focusing on four pillars: 'governance', 'strategy', 'risk management', and 'metrics and target'. Additionally, the following BEES-related keywords were considered: 'certification (including sustainable fisheries and aquaculture certification)', 'biodiversity', 'resource status (understanding and management)', 'ecosystems/conservation of resources', 'sustainable use of resources/

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sustainable provision of resources', 'resource sustainability', 'business sustainability/sustainable business', 'sustainable procurement (only statements with nature-related references)', 'resource access', 'traceability and tracing', 'supply chain', 'natural capital/biological resources', '(nature-related) risk assessment/dependency analysis/dependency survey', 'TNFD', 'LEAP approach', and 'nature positive'. The frequency of description of each of these terms disclosed in the 'Sustainability-related policies and initiatives' or 'Management policy, business environment, and issues to be addressed' sections was evaluated.

Additionally, potential links between IFRS adoption and the disclosure of nature-related financial information were explored. Finally, the presence or absence of descriptions of biodiversity and ecosystem conservation risks in the section 'Business and other risks' was assessed.

3. Results

(1) Profile of surveyed companies

Table 1 provides an overview of the profiles of the surveyed companies (see Appendix 1). First, the number of listed companies on the Tokyo Stock Exchange was 3,275 (1,657 on the Prime Market and 1,618 on the Standard Market) as of the survey reference date (21 November 2023). Of these, 12 companies were in the fishery, agriculture, and forestry sectors (6 Prime Market and Standard Market companies each; see Table 1, I).

Of the six Prime Market companies, five had a March year-end, while in the Standard Market, two companies had a March year-end (see Table 1, II). From 31 March 2023, the statement of 'Sustainability-related policies and initiatives' related to the disclosure in the annual securities report, became a mandatory section of annual securities reports, thereby requiring companies with fiscal years ending in March to disclose sustainability information.

Only one Prime Market company applied IFRS, while the other 11 companies (5 Prime Market and 5 Standard) adhered to Japanese accounting standards. Most companies are either in the preparatory stage of transitioning to IFRS or have not yet decided on the transition (see Table 1, III).

Regarding TCFD support, five Prime Market companies endorsed TCFD, unlike the other seven (one Prime Market and six Standard Market). This suggests a greater inclination for TCFD endorsement in the Prime Market (see Table 1, IV).

Examining the percentage of foreign shareholders as of the closing date reveals that two Prime Market companies had less than 10%, two had between 10% and 20%, and one had more than 20%. In comparison, all six Standard Market companies had less than 10% foreign shareholding. The average percentage of foreign shareholders was 2.2% for the group of companies in the Standard Market compared to 12.3% for those in the Prime Market, indicating a higher percentage of foreign shareholders in the Prime Market (see Table 1, V).

In terms of annual sales in the Prime Market, one company had sales below 5 billion yen, two between 5 and 10 billion yen, one between 10 and 50 billion yen, and two over 50 billion yen. In the Standard Market, five companies had sales below 5 billion yen and one between 5 and 10 billion yen. The average turnover of companies in the Standard Market was 2.0 billion yen compared to 375.5 billion yen in the Prime Market (see Table 1, VI).

Similarly, for total assets, in the Prime Market, one company had assets of less than 5 billion yen, three between 10 and 50 billion yen, and two over 50 billion yen. In the Standard Market, all six companies had assets below 5 billion yen. The average value assets of companies in the Prime Market were 271.9 billion yen compared to 16.6 billion yen in the Standard Market, indicating a considerable difference in the total asset size between the two markets (see Table 1, VII).

Concerning profitability, the policy target for Japanese companies is a ROE of 8% (METI, 2014, p. 6). In the Prime Market, one company had an ROE below 8%, four companies between 8% and 10%, and one company had no data because it recorded losses. In the Standard Market, four companies had a loss of less than 8%, and two had a loss of more than 10%. The average ROE of companies in the Prime Market group was 10.5%, slightly higher than the average of 9.7% for the Standard Market group of companies, indicating a slightly elevated ROE for the Prime Market group (see Table 1, VIII).

Finally, regarding PER, a high value generally indicates the overvaluation of

share prices relative to profits, whereas a low value suggests undervaluation and serves as an indicator for determining an appropriate share price. In the Prime Market, three companies had a PER below 10%, one between 10% and 20%, one above 20%, and one had no data because of losses. In the Standard Market, one company had a PER below 10%, four between 10% and 20%, and one above 20%. The average PER of companies in the Prime Market was 14.6%, slightly lower than the average of 15.4% for the Standard Market group, suggesting a marginally lower PER for the Prime Market group (see Table 1, IX).

Table 1 Overview of Profile of Companies Surveyed

No.	Item	Prime Market	Standard Market	Total
I	Number of Companies Listed on Tokyo Stock Exchange ^{*1}	1657	1618	3275
	Fisheries and Agro-forestry	6	6	12
	Other	1651	1612	3263
II	Fiscal Year End ^{*2}			
	End of March	5	2	7
	Other	1	4	5
III	IFRS Adoption ^{*2}			
	Adopting IFRS ^{*3}	1	0	1
	Not Adopting IFRS	5	6	11
IV	TC FD Endorsement ^{*4}			
	Endorsement	5	0	5
	non-endorsement	1	6	7
V	Foreign Shareholder Ratio ^{*2}			
	Under 10%	3	6	9
	10%-20%	2	0	2
	Over 20%	1	0	1
	Average (%)	12.3	2.2	7.3
VI	Annual Consolidated Turnover ^{*2}			
	Under 50 billion yen	1	5	6
	50-100 billion yen	2	1	3
	100-500 billion yen	1	0	1
	Over 500 billion yen	2	0	2
	Average (billion yen)	375.5	20.0	197.8
VII	Consolidated Assets at End of Year ^{*2}			
	Under 50 billion yen	1	6	7
	50-100 billion yen	0	0	0
	100-500 billion yen	3	0	3
	Over 500 billion yen	2	0	2
	Average (billion yen)	271.9	16.6	144.2
VIII	Return on Equity (ROE) ^{*2}			
	Under 8%	1	4	5
	8%-10%	4	0	4
	Over 10%	0	2	2
	N/A	1	0	1
	Average (%)	10.5	9.7	10.1
IX	Price-to-Earnings Ratio (PER) ^{*2}			
	Under 10%	3	1	4
	10%-20%	1	4	5
	Over 20%	1	1	2
	N/A	1	0	1
	Average (%)	14.6	15.4	15.0

Note:

*1 Source: Tokyo Stock Exchange website as at 21 November 2023

*2 Source: Annual securities report ('Yukashoken Hokokusyo')

*3 One company that had adopted IFRS was a company with an end-March financial year end.

*4 Source: The Ministry of Economy, Trade and Industry, List of members who have joined the Japan TCFD Consortium after expressing their support for the TCFD recommendations, https://www.meti.go.jp/policy/energy_environment/global_warming/tcdf_supporters.htm (accessed 21 November 2023)

(2) Climate-related and nature-related financial disclosures

Table 2 presents the status of climate-related and nature-related financial disclosures of the surveyed companies. First, concerning climate-related financial disclosures, all six Prime Market companies outlined the content aligned with the four recommended elements in the TCFD framework: governance, strategy, risk management, and indicators and targets. However, in the Standard Market, only one company explicitly addressed two elements, strategy and indicators and targets; two companies provided brief policy statements, one described certain practices, and two did not furnish any description.

Second, regarding nature-related financial disclosures in the Prime Market, one company described content encompassing the four areas recommended in the TNFD framework—governance, strategy, risk management, indicators, and targets—and also elaborated on specific initiatives: two companies presented only some brief policy statements, one detailed certain practice, and two did not provide any information. Conversely, in the Standard Market, only one company outlined some brief policy statements, whereas the other five did not furnish any description (see Table 2).

Table 2 Status of Climate-related and Nature-related Financial Disclosure for Companies Surveyed

No.	Name of Company	Climate-related Financial Disclosures					Nature-related Financial Disclosures						
		Governance	Strategy	Risk Management	Metrics & Targets	Concise Policy	Case Description	Governance	Strategy	Risk Management	Metrics & Targets	Concise Policy	Case Description
Prime Market													
1	KYOKUYO CO., LTD.	✓	✓	✓	✓						✓		
2	NISSUI CORPORATION	✓	✓	✓	✓			✓	✓	✓	✓	✓	
3	MARUHA NICHIRO CORPORATION	✓	✓	✓	✓							✓	
4	YUKIGUNI MAITAKE CO., LTD.	✓	✓	✓	✓								
5	SAKATA SEED CORPORATION	✓	✓	✓	✓				✓				
6	HOKUTO CORPORATION	✓	✓	✓	✓								
	Total	6	6	6	6	0	0	1	1	1	1	2	2
Standard Market													
7	KANEKO SEEDS CO., LTD.					✓					✓		
8	AKIKAWA FOODS & FARMS CO., LTD.					✓							
9	XYZ CO., LTD.						✓						
10	HOB CO., LTD.		✓		✓								
11	BERG EARTH CO., LTD.												
12	HOKURYO CO., LTD.												
	Total	0	1	0	1	2	1	0	0	0	0	1	0

(3) Number of terms disclosed for nature-related financial information

Table 3 presents the disclosure frequency (number of times) of terms searched for as nature-related financial information in the 12 companies surveyed, totalling 46 occurrences.

Out of 46 occurrences, 45 were found in four Prime Market companies, whereas only a single occurrence of one term (business sustainability/sustainable business) was observed for one Standard Market company (see Table 3).

Finally, in evaluating the presence or absence of descriptions of biodiversity and ecosystem conservation risks in the section 'Business and other risks', only one Prime Market company included such descriptions. In this instance, the disclosures

Table 3 Number of Searched Terms for Nature-related Financial Disclosure for Companies Surveyed

Searched Terms	Numbers of Companies Surveyed*												Total	
	Prime Market						Standard Market							
	1	2	3	4	5	6	7	8	9	10	11	12		
Certification/Sustainable Fisheries and Aquaculture Certification		1	6											7
Biodiversity	1		3		2									6
Resource Status (Understanding and Management)		6												6
Ecosystems/Conservation of Resources	1	1	2											4
Sustainable Use of Resources/Sustainable Provision of Resources		1	1		2									4
Resource Sustainability		4												4
Business Sustainability/Sustainable Business		3					1							4
Sustainable Procurement		3												3
Resource Access		2												2
Traceability/Tracing		1	1											2
Supply Chain		1	1											2
Natural Capital/Biological Resources		1												1
Risk Assessment/Dependency Analysis/Dependency Survey			1											1
TNFD														0
LEAP Approach														0
Nature Positive														0
Total	2	24	15	0	4	0	1	0	0	0	0	0	0	46

Note: *Control numbers of the following companies were surveyed: Kyokuyo Co., Ltd., (2) Nissui Corporation, (3) Maruha Nichiro Corporation, (4) Yukiguni Maitake Co., Ltd., (5) Sakata Seed Corporation, (6) Hokuto Corporation, (7) Kaneko Seeds Co., Ltd., (8) Akikawa Foods & Farms Co., Ltd., (9) Axy Co., Ltd., (10) Hob Co., Ltd., (11) Berg Earth Co., Ltd., and (12) Hokuryo Co., Ltd.

pertained to raw material procurement and marine plastic pollution.

This study examines potential links between IFRS adoption and the disclosure of nature-related financial information. Only one Prime Market company applied IFRS. This company's financial information included a note on the valuation of biological assets under the International Accounting Standards (IAS) 41. However, no nature-related financial details were included in the 'Sustainability policies and initiatives' or 'Business and other risks' sections.

IV Discussion

1. Theoretical explanations for corporate disclosure behaviour

In the pursuit of enhancing the quality of nature-related financial information disclosure by Japanese companies, this study delved into the current status of such disclosures among listed companies in Japan's fishery, agriculture, and forestry industries. The results indicated a notable lack of nature-related financial information disclosure among the majority of surveyed companies, with a few exceptions.

The ensuing discussion explores the underlying corporate behaviour shaping these results, drawing upon three prominent theories extensively employed in academic research on sustainability information disclosure (Gray et al., 2010; Gray et al., 2014; Ding et al., 2023). The three theories are stakeholder theory (Ansoff, 1965; Ullmann, 1985; Roberts, 1992; Deegan, 2002), legitimacy theory (Hogner, 1982; Patten, 1992; Gray et al., 1995; Deegan et al., 2002), and institutional legitimacy theory (DiMaggio and Powell, 1983).

Among the 12 listed companies, climate change disclosures aligned with the TCFD format were observed in all six Prime Market companies. This adherence, when viewed through the lens of legitimacy theory, can be interpreted as disclosures made to demonstrate compliance with market discipline to maintain their legitimacy as Prime Market-listed companies. Unexpectedly, even in the Standard Market, where disclosure in TCFD-style disclosure is recommended but not obligatory, four of the six companies were found to make varying degrees of climate-related disclosure. According to institutional legitimacy theory (DiMaggio and Powell, 1983), this can be explained as

corporate behaviour in the Standard Market, although not mandated to comply with Prime Market discipline, mirrors the practices of Prime Market companies. Furthermore, the decision to disclose climate-related financial information can be justified through legitimacy theory, suggesting that companies disclose such information to affirm their proactive disclosure efforts. This is attributed to the institutionalisation of sustainability information disclosure in securities reports and the setting of government targets for carbon neutrality. Additionally, this can be explained by strategic stakeholder theory, as companies seek to appeal to investors, including environmental, social, and governance (ESG) investors, who are pivotal stakeholders in the market.

Conversely, among the 12 listed companies, almost no biodiversity or ecosystem conservation information was disclosed, with only one exception. This lack of disclosure may be attributed to most companies preparing their nature-related financial information disclosure systems, anticipating the final recommendations of the TNFD (TNFD, 2023), published in September 2023, and the ISSB sustainability disclosure standards for BEES, which are likely being formulated to align with TNFD recommendations. Based on the institutional legitimacy theory, the lack of practice resembles the state of non-disclosure, influenced by the prevalent trend among other companies waiting for a more institutionalised context similar to TCFD. This behaviour can also be viewed as a justification practice, where companies delay disclosure until TNFD becomes institutionalised, partly to evade scrutiny from stakeholders on this matter. These findings contradict this study's assumption that companies, driven by a sense of accountability, should disclose information on their impact on biodiversity and ecosystem conservation, regardless of the institutionalisation state. However, this scenario was not evident in most of the target companies.

The single company that disclosed information in the TNFD format stood out because of its unique circumstances. First, the company's size, measured by turnover and total assets, considerably surpassed that of other Prime Market companies under study. This aligns with the previous research findings suggesting that the extent of corporate environmental information disclosure correlates with organisational activities (Gray et al., 2014). The company can be said to possess the ability to allocate

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management resources to nature-related management activities and information disclosure. Other company attributes are characterised by a significantly higher proportion of foreign shareholders (22.7%) than other companies examined. Based on stakeholder theory, this corporate behaviour can be explained as an attempt to gain recognition by strategically promoting its system of disclosing nature-related financial information and the nature of its initiatives to foreign stakeholders. In addition, the legitimacy theory explains this proactive information disclosure as a means to maintain business legitimacy. Deeply involved with natural resources through its seafood business, including aquaculture and food business, the company deems it necessary to present risk maps and articulate resource risks in the context of business and other risks and conducts domestic and international business activities.

On the contrary, one company that applied IFRS did not provide any nature-related information, despite having notes on the valuation of biological assets following IAS 41. This suggests that having a well-established internal system for applying IFRS accounting standards does not necessarily translate to having a robust system for sustainability information disclosure. This highlights the challenge of treating sustainability information disclosure as an extension of the traditional accounting system, emphasising the need for new management resources to be allocated specifically to this endeavour.

2. Impact of and response to the establishment of a nature-related financial disclosure standard

The existence of an international nature-related financial information disclosure standard-setting regime, such as the ISSB and TNFD collaboration, is expected to have a significant long-term effect on sustainability information disclosure in institutional corporate reporting, particularly for listed companies in the Japanese market. IFRS adoption seems to have no influence on adoption among the companies analysed. Listed companies in industries that tend to impact the degree of natural capital consumption and the conservation of biodiversity may recognise the urgent need to establish a management system for disclosing nature-related information, complementing existing disclosures on climate-related information over the long term.

We assume those companies have a window to prepare their system and governance.

The problem with institutionalisation is the reliability of the information, which requires reliable disclosure systems and governance. Some leading large companies have begun to disclose information on biodiversity using integrated and sustainability reports. The information has been published voluntarily outside the system, but reliable statements are still required to avoid suspicion of misstatements in institutional disclosures to investors. This entails a careful selection of statements and detailed descriptions. In terms of misstatements, greenwashing lawsuits have emerged as a global occurrence. Therefore, preventing fraudulent misstatements and avoiding the risk of litigation in the future will be essential. A taxonomy defining green activities and performance has been published in Europe. The regulation of financial instruments has also begun. However, to improve the efficiency and effectiveness of corporate management, measures to ensure the quality of statements, such as taxonomies and their related governance and the setting of industry standards based on scientific evidence, are required for market disclosure. The case is relevant in Japan. Establishing industry standards based on scientific evidence and a reliable taxonomy that leads to reliable information is also required for market disclosure in Japan.

The TNFD, akin to the TCFD, provides recommendations for disclosure in specific areas and serves as a guideline for users to comprehend information. The TNFD can be recognised as a mainstream framework for future IFRS Sustainability Disclosure Standard. When adopted or practiced, listed companies may be compelled to engage in biodiversity-related management activities subject to disclosure along with recognising risks and opportunities, and conducting scenario analysis. Companies analysed in this study have potential business risks related to climate change and biodiversity, and therefore, are likely to encounter an urgent management challenge in responding to TNFD information disclosure. However, the results of our analysis indicate that they have disclosed scant biodiversity-related information. This might be due to legitimacy-oriented or institutionalisation behaviour. Regardless, if reliable information is the goal, challenges in establishing scenario analysis and setting industry-standard targets and indicators based on scientific evidence will be among

the key challenges to overcome.

As previously mentioned, a key challenge in handling TNFD disclosure is the reliability of information, intertwined with the allocation of management resources to prepare for the adoption of the forthcoming ISSB Standard aligned with the TNFD. Similar to TCFD-oriented disclosure, the report's context, depth, and breadth can vary among companies and industries. Scenario analysis and the acknowledgement of risks and opportunities can involve assumptions that inherently pose additional decision-making risks for investors. As our soil example illustrated, nature-related information is intricate, region-specific, and regionally diverse. In the case of biodiversity, a wide range of scenario assumptions and target configurations adds complexity, rendering the setting itself intricate. Addressing these new disclosures can be viewed as a new environmental regulatory cost, potentially incentivising companies unable to bear the cost burden to resort to fraudulent reporting practices.

Regarding information users, the challenges lies in the discrepancy in information literacy between environmental and financial issues. This discrepancy may lead to difficulties in contextual interpretation and comparison of information among companies within the same industry. As environmental information possesses diverse characteristics compared to financial information, without user literacy, the disclosed information may become market noise. In other words, rather than signalling transparency, the information may contribute to additional noise, thereby hindering accurate company evaluation.

Whether the quality of the information content is at a level that helps investors' decision-making depends on the issue of reliability. Currently, no definitive criteria are available for environmental information. Even with prescribed disclosure standards, the extent of disclosure is likely a management decision, weighing the costs and benefits of complying with those standards. This is probable when the standards are considered soft laws or recommendations. Moreover, similar to TCFD, the TNFD disclosure of information should focus on disclosing risks and opportunities that must be translated into financial consequences through assumptions and historical data. This involves uncertain information that is challenging to verify, leading to potentially misinformed investment decisions. Superficial disclosures, lacking positive

environmental effects or greenwashing, can lead to future lawsuits and reputational risks. Even when environmental disclosures focus on past performance information, fraudulent disclosure practices can occur as part of adjustments to TNFD-oriented reporting based on reality.

3. Challenges in disclosing nature-related financial information

Addressing challenges in disclosing nature-related financial information extends beyond resolving ambiguity in sustainability information. Compared to climate change disclosure, nature-related financial information poses even greater challenges, particularly related to scenario analysis (TNFD, 2023). For instance, while climate change deals with common global targets, such as the 1.5-degree target of the Paris Agreement, nature-related financial information involves local and region-specific issues. Unlike climate change, which has a single conversion indicator such as greenhouse gas emissions, nature-related financial information involves setting indicators and targets and analysing from multiple environmental perspectives—including soil, water systems, and the atmosphere—leading to a more complex assessment with multiple indicators to judge and verify. Furthermore, assessing biodiversity-related financial risks adds another layer of complexity, necessitating a focus on local risks based on the nature of biodiversity impacts and dependencies. Researching and analysing these factors can be costly for companies unfamiliar with such considerations. Moreover, challenges arise in regions where data are obscure or non-exist, leaving companies with limited means to fulfil their TNFD-oriented reporting.

To overcome difficulties in disclosing information on natural capital, companies must grapple with how to allocate their limited resources and collaborate with others. The small size of companies in Japan's fishery, agriculture, and forestry industries, even as listed companies, means limited management resources available for disclosure. Therefore, the cost-effectiveness of disclosure becomes a significant concern, particularly regarding company size and shareholder composition. If nature-related financial information requires information on supply chain ecosystem conservation and biodiversity initiatives, the costs associated with tracing,

monitoring, and reporting become additional reporting costs. Furthermore, challenges in determining the scope of disclosure of nature-related financial information in supply chains may lead to arbitrary information selection and mundane and formal information disclosure practices. This raises the risk of the information itself becoming a negative market signal or contributing to market noise.

V Conclusion

In this study, we aimed to identify the issues that must be addressed to improve the disclosure of nature-related financial information by Japanese-listed agribusinesses. To this end, the state of progress in the disclosure of nature-related financial information by listed companies in Japan's fishery, agriculture, and forestry industries revealed that, with a few exceptions, most companies do not disclose nature-related financial information aligned with the TNFD framework yet.

Institutional legitimacy theory, legitimacy theory, and stakeholder theory provided partial explanations for corporate behaviour, highlighting the limited disclosure in a situation where nature-related financial information disclosure has not yet been institutionalised. This indicates a lack of disclosure within the context of corporate responsibility to be accountable to related stakeholders regarding natural capital and its financial consequences.

To enhance the quality of nature-related financial information disclosure among the studied Japanese companies, and potentially for other listed companies in Japan, several key issues need attention. Listed companies in industries with significant influence on natural capital and biodiversity conservation face an urgent management challenge to establish management systems for nature-related information disclosure alongside existing climate-related information. Preventing fraudulent reporting or lack of reporting entails stock exchange authorities setting taxonomies and industry standards that streamline BEES-related information, incorporating science-based targets and indicators. Improving information literacy among recipients is also essential to prevent reports from becoming mere market noise.

The cost-effectiveness of nature-related financial information disclosure may become an important management issue for listed companies in Japan's fishery, agriculture, and forestry sectors, the majority of which are small-sized compared to their multinational counterparts. Limited resources may hinder adequate allocation, leading to arbitrary information selection and formal information disclosure practices that merely contribute to market noise. The remaining issues include analysing the impact of the full-scale introduction of nature-related financial disclosure standards to responsible personnel and policies to support partnerships in regional contexts. These pragmatic and academic issues warrant further attention.

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Appendix 1 Profile of Surveyed Companies Categorised under Fishery, Agriculture, and Forestry Sectors by the Tokyo Stock Exchange

No.	Name of Company	Founded	Head Office Location	Fiscal Year End	IFRS Adoption	TCFD Endorsement	Annual Consolidated Turnover (Million Yen)	Consolidated Assets at End of Year (Million Yen)	Foreign Shareholder Ratio (%)	ROE (%)	PER (%)
Prime Market											
1	KYOKUYO CO., LTD.	1937	Tokyo	Mar	No	Yes	272,167	146,301	5.6	12.8	6.4
2	NISSUI CORPORATION	1943	Tokyo	Mar	No	Yes	768,181	549,013	22.7	10.4	8.0
3	MARUHA NICHIRO CORPORATION	1943	Tokyo	Mar	No	Yes	1,020,456	637,227	15.5	11.0	6.5
4	YUKIGUNI MATTAKE CO.,LTD.	2017	Niigata	Mar	Yes	Yes	42,204	33,304	8.1	11.3	33.8
5	SAKATA SEED CORPORATION	1913	Kanagawa	May	No	Yes	77,263	160,715	13.7	7.2	18.2
6	HOKUTO CORPORATION	1964	Nagano	Mar	No	No	72,980	104,897	8.4	N/A	N/A
	Total						2,253,251	1,631,457	—	—	—
	Average						375,542	271,910	12.3	10.5	14.6
	Median						174,715	153,508	11.0	11.0	8.0
Standard Market											
7	KANEKO SEEDS CO., LTD.	1947	Gunma	May	No	No	62,179	46,707	5.5	6.2	11.5
8	AKIKAWA FOODS & FARMS CO., LTD.	1979	Yamaguchi	Mar	No	No	7,070	6,073	0.8	7.5	27.9
9	AXYZ CO., LTD.	1962	Kagoshima	June	No	No	24,101	22,636	1.5	7.3	12.1
10	HOB CO., LTD.	1987	Hokkaido	June	No	No	2,489	1,108	1.5	14.6	12.5
11	BERG EARTH CO., LTD.	2001	Ehime	Oct	No	No	6,393	6,074	2.2	15.3	19.4
12	HOKURYO CO.,LTD.	1949	Hokkaido	Mar	No	No	17,823	16,849	1.6	7.1	9.2
	Total						120,055	99,447	—	—	—
	Average						20,009	16,575	2.2	9.7	15.4
	Median						12,447	11,462	1.6	7.4	12.3