MS&AD Insurance Group

# MS&AD
# TCFD・TNFD REPORT 2025

～MS&AD GREEN RESILIENCE REPORT～



# Contents





## (1) Contents
















**Appendix –
Detailed Analyses**

Contents





# Toward Green Resilience

## (2) Introduction

### (i) Priority Issues in Sustainability

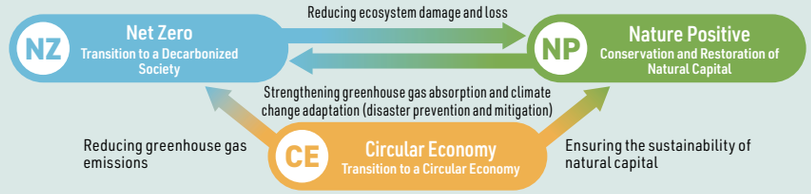
The MS&AD Insurance Group has positioned Planetary Health (symbiosis with the global environment), Resilience (safe and secure society), and Well-being (happiness of diverse people) as its priority issues. In particular, the Group focuses on the principle that the well-being of diverse people can be realized only when both environmental sustainability and social safety are secured. Accordingly, we advance our initiatives based on an integrated approach, rather than addressing each issue separately.


Created based on Stockholm Resilience Centre's SDGs wedding cake

### (ii) Advancing the Priority Issue of Symbiosis with the Global Environment

The increase in natural disasters caused by climate change results in extensive damages around the world, undermining social sustainability, while also significantly affecting the Group, which provides disaster compensation through insurance products. To reduce natural disaster risk, the Group is promoting an integrated approach to responding to climate change and conserving and restoring natural capital, providing risk solutions that enhance the resilience of society as a whole. Through these activities, we aim to build a sustainable society by fulfilling our Mission to "contribute to the development of a vibrant society and help secure a sound future for the planet by enabling safety and peace of mind."

Relationships Between Net Zero, Nature Positive, and the Circular Economy




Because both positive synergies and negative trade-offs can arise when implementing net-zero, nature-positive, and circular-economy efforts, we approach them in an integrated manner and implement them effectively.

Further, because a circular economy that recycles finite resources supports both net zero (transition to a decarbonized society) and nature-positive (conservation and restoration of natural capital) goals, the Group clearly demonstrates and advances initiatives such as controlling resource use, substituting with renewable resources, and reducing and recycling waste, showing how these efforts contribute to net zero and nature-positive outcomes.

### (iii) Green Resilience and This Report

The MS&AD Insurance Group promotes Green Resilience focusing on the diverse functions of nature. This concept involves creating a virtuous cycle by utilizing the benefits provided by nature, protecting biodiversity, advancing decarbonization, mitigating damage from natural disasters, and revitalizing communities using the appeal of nature. We are pursuing activities for conserving and restoring the natural environment, along with collaborative efforts with local governments and universities.

In 2023, the MS&AD Insurance Group became the first company in Japan to issue a stakeholder report concerning both climate and nature – our Climate/Nature-Related Financial Disclosure (TCFD/TNFD Report). In fiscal 2024, it was retitled with "Green Resilience" added to it.

Through this report, the Group aims to provide investors, analysts, and other stakeholders with useful information on climate- and nature-related risks and opportunities for the Group. At the same time, it clearly communicates our Green Resilience initiatives to help achieve a resilient and sustainable society while enhancing the resilience of the Group' s business operations.

# Contents





## (3) Overview and Key Points of This Report (Summary)

### 1 [ Correlations between the non-life insurance business and climate/nature ]

- The non-life insurance business not only compensates for economic losses caused by disasters and accidents but also plays a vital role in supporting social stability and fostering growth. The MS&AD Group views the continuation of this role as the mission of its non-life insurance business.
- Reducing the growing risks associated with natural disasters is a critical issue for us, as it is essential to our ability to continue providing insurance coverage into the future.
- We strive to conduct integrated climate and nature analysis, including assessing the risk of natural disasters caused by climate change and changes in nature.
- We use the latest data and analytical tools to analyze the risks posed by nature-related dependencies and impacts on our insurance and investment/loan portfolio companies.
- Taking these risks and opportunities into account, we engage in demonstration experiments and joint research aimed at risk management, the provision of products and services, and natural disaster risk reduction.

### 2 [ Alignment with the TCFD and TNFD disclosure frameworks ]

- The Group discloses information in accordance with the four pillars required under the TCFD (Task Force on Climate-related Financial Disclosures) and TNFD (Task-force on Nature-related Financial Disclosures) frameworks: Governance, Strategy, Risk and Impact Management, and Metrics and Targets.
- In particular, as a company that has contributed a member to the TNFD, the Group is an early mover in conducting advanced analyses and studies related to climate- and nature-related aspects within the Strategy pillar, which explains corporate business strategies and their resilience.

### Survey and analysis of climate/nature-related risks and opportunities P.22

**Current situation for natural disasters and the non-life insurance business**

Insurance claim payments under fire insurance have been increasing in Japan, particularly for water-related disasters (covered under fire insurance), where risks are on the rise. Measures such as basin-wide flood management are becoming increasingly important.

**Exposure to TNFD areas of concern through investment and loan portfolios**

Based on location data for the Group's top 500 investment/loan portfolio companies, we analyzed their connections to key areas of natural importance and water-related risks, identifying river basins where such companies facing high flood risk are concentrated.

**Identification of six key industries**

Taking into account the degree of dependency and impact on climate and nature–as well as the proportion of insurance and investment/loan transactions with the Group–we identified six key industries for further detailed analysis

**Detailed analysis of business activities and nature (LEAP Approach)**

Analysis of dependencies and impacts on nature in the marine transportation industry

Analysis of the cumulative impacts of onshore wind power generation on the natural environment

**Physical risk analysis**

Assessment of climate-related risks based on the location data of 500 investment/loan portfolio companies

Evaluation of the effects of changing typhoon patterns on insurance underwriting

**Transition risk analysis**

Assessment of the impact of carbon costs on investments and loans

Analysis of investment/loan portfolio company alignment with the Paris Agreement (2°C target)

### Initiatives addressing risks and opportunities P.31

- Enhancing Value Provision in Response to Increasing Natural Disasters
- Engagement and Risk Assessment with Customers on Climate and Nature Issues
- Provision of Insurance Products and Services that Support Net Zero, Nature Positive, and the Circular Economy
- Collaboration and Foundation Building for Green Resilience

### Risk Management P.42

- Process for identifying dependencies, impacts, and risks
- Management of natural disaster risks
- Integration of sustainability considerations

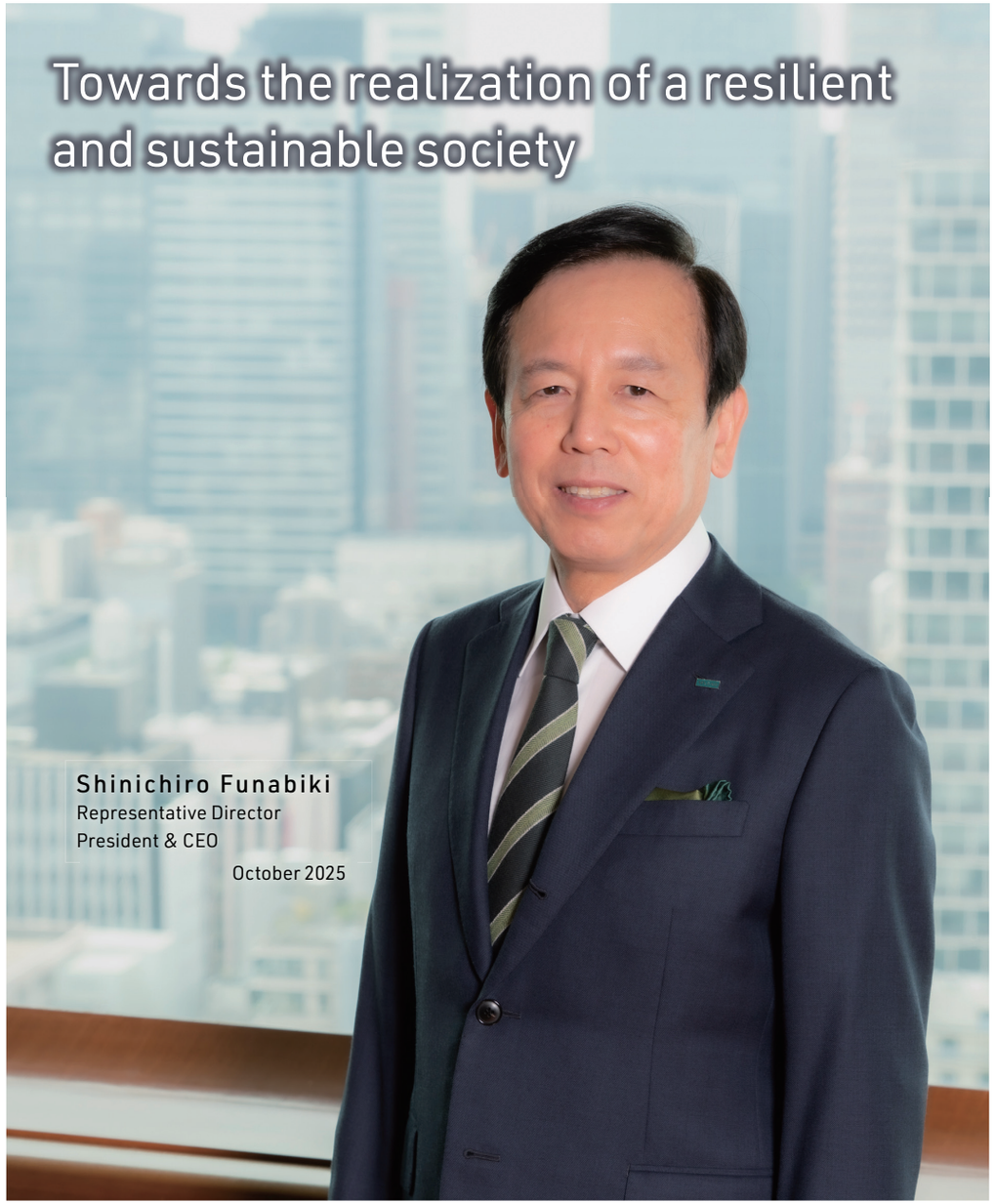
### Metrics and Targets P.47

Contents





# (4) CEO Message




## Mission of the Non-Life Insurance Business

As an insurance and financial group with a focus on non-life insurance, the role of the MS&AD Group is not only to compensate for economic losses caused by disasters and accidents, but also to support social stability and promote growth. Non-life insurance is indispensable both for preparing for unexpected risks in daily life and for enabling companies to conduct business. By making prompt insurance payouts after a major natural disaster, we support rapid recovery and complement the public social security system. Fulfilling this vital role reliably into the future is the mission of our non-life insurance business.

## Rising Natural Disaster Risks

In Japan, the Group has long worked to improve the profitability of fire insurance. Recently we succeeded in bringing the Group' s fire insurance business back into the black for the first time in 15 years. However, according to the Intergovernmental Panel on Climate Change (IPCC), even if the rise in global temperatures can be held within 1.5°C, record-breaking extreme weather events are still expected to occur more frequently. The volatility of natural disaster risks will continue to increase, and the environment surrounding the non-life insurance business will become increasingly severe.

In addition, the widening "protection gap" – the portion of economic losses from natural disasters that is not covered by insurance – has become a serious global issue, and Japan, with its high disaster risk, is no exception. For example, among small and medium-sized enterprises, only 35% carry earthquake insurance and only 60% have flood coverage under fire insurance.

It is essential for companies to properly understand natural disaster risks and secure sufficient insurance coverage. At the same time, insurers are expected to provide fire insurance, which functions as society' s safety net, at affordable premiums.

# Contents





## Building Disaster-Resilient Communities

The intensification of natural disasters due to climate change is having a profound impact on economies and societies. Japan' s rural Noto Peninsula was struck by a major earthquake in January 2024, followed by damaging heavy rains in September of that same year. This has resulted in a succession of local companies facing bankruptcy and closure, while people continue to move away. The aging of its resident population had already weakened local disaster resilience, and with the strain of two large-scale natural disasters, recovery and reconstruction has been slow, accelerating depopulation further.
To build communities that are resilient to natural disasters, we see it as our challenge to work with national and local governments and support small and medium-sized enterprises in establishing business continuity plans.

## Challenges for Sustainable Coverage

The MS&AD Group aims to deepen its understanding of climate and nature-related risks by region.
This year, we undertook flood risk assessments using site location data from our investment and loan portfolio companies, and analyzed the impact of land-use changes in major river basins on flood control. While challenges remain in terms of data granularity and analytical results due to the expanded scope of this year' s analysis compared with last year, we will continue to enhance our analytical techniques and datasets. We want each of our employees to strengthen their ability to analyze water-related disaster risks by region and river basin, so that we can propose measures to reduce customer risks and make policy recommendations to local governments on disaster prevention and mitigation. We see this as a core part of the value we will provide going forward.
In addition, in evaluating the impact of a 4°C temperature rise scenario on asset management, our analysis showed that heat stress would have the greatest impact on our business after 2050, due to declines in labor productivity and rising cooling costs. Extreme heat affects not only human health but also corporate management. Economic and social impacts from reduced crop yields, declines in fishery resources, and poor livestock growth are also

expected to grow. We must consider adaptation measures for these chronic risks, in addition to acute risks such as floods and windstorms.

## Shaping the Future Together with Society

Insurance is like a mirror of our times, and the MS&AD Group has always provided new value in response to changing eras. Today, we face the major challenges of environmental and social transformation.
This fiscal year, with a focus on "water-related disaster risks" and "demographic shifts," we have begun discussions across the Group on the medium- to long-term direction of our products, services, and initiatives. The more we discuss and act, the more convinced we are that solutions will require collaboration with a diverse range of stakeholders. In order to continue providing the coverage society needs, it is not enough to simply raise awareness of risks, as broad-based efforts are essential. This includes rethinking the balance between self-help and public support, promoting urban development that considers regional climate and nature-related risks, encouraging investment in disaster preparedness, and providing financing for nature conservation.
I hope that this Green Resilience Report serves as a catalyst for broad dialogue and action across society. Through the creation of new value, our Group will work together with diverse stakeholders to enhance social resilience.

# Contents





# Message from Advisor Mami Mizutori

Mami Mizudori
Senior Advisor, Mitsui Sumitomo Insurance Co., Ltd.
October 2025

After graduating from the Faculty of Law at Hitotsubashi University, they joined the Ministry of Foreign Affairs. Following assignments in Washington, D.C., and London, they resigned in 2010 and moved to the United Kingdom, where they became the Director of the Sainsbury Institute for the Study of Japanese Arts and Cultures. From 2018 until the end of 2023, they served as the Special Representative of the UN Secretary-General for Disaster Risk Reduction and the Head of the United Nations Office for Disaster Risk Reduction. They have been in their current position since November 2024.

## Entering a New Phase of Natural Disasters

In 2024, the world's average temperature surpassed the previous year's record high, exceeding for the first time the 1.5°C target set under the Paris Agreement. While the success or failure of the Paris Agreement should not be judged on the result of a single year's temperature rise, the reality is that we are already witnessing worrisome phenomena worldwide: ocean warming and acidification, rising sea levels, and increasingly severe and frequent disasters.

The situation in Japan is even harsher. In addition to climate change, Japan also faces disaster risks of geological origin, such as earthquakes, which often result in multiple and compound disasters. Last year, the Noto Peninsula was struck not only by a major earthquake on January 1, but also by heavy rains that September.

When I visited Noto, I witnessed firsthand the difficulty of recovery and reconstruction in the face of overlapping disasters, along with the emergence of new vulnerabilities. In Japan, with its shrinking and aging population, elderly people living alone face great difficulties repairing their homes, while the migration of younger generations to the cities leaves too few hands for reconstruction. Meanwhile, the region had many trainees from Southeast Asia working in local fisheries and tourism under Japan's technical intern system. When disaster struck however, it became clear that these foreign residents often did not know where to find evacuation shelters or food aid.

In depopulated regions, the small number of infrastructure users can result in insufficient funding to maintain essential services. In Noto, for example, restoring the water supply took four months. These previously hidden vulnerabilities stem from social changes such as demographic shifts, and are problems shared by many rural regions in Japan.

Human activities have intensified global warming and environmental degradation, magnifying the scale of disaster impacts. In light of this, perhaps the very idea of a "natural" disaster is no longer accurate. We must recognize that human pressures on natural systems amplify the impacts of disasters, and we need to pursue disaster prevention and mitigation measures that enable sustainable symbiosis with nature.

## Importance of Making Disaster Risks Visible to Improve Resilience

It is, of course, important to issue early warnings when the likelihood of disasters such as typhoons increase, and to respond as quickly as possible after disasters occur. It is no less important to pursue the objective to "build back better" during recovery and reconstruction to prepare for the next disaster. Yet above all, prevention and preparedness as everyday activities are essential. Without sufficient measures and investment in prevention, a society can find itself in a downward spiral when the same kinds of disasters strike again and again despite repeated recovery and reconstruction.

To put prevention and preparedness into practice, we must analyze and evaluate which places and which people in society are vulnerable, and then devise response measures. As climate, nature, and society itself change, the vulnerabilities of individuals and communities also shift. Identifying new vulnerabilities and taking action benefits diverse groups of people and strengthens resilience across society as a whole.

The first step is to make risks visible. Prevention requires upfront investment, but we cannot act effectively without understanding what risks exist and where. Unless we can quantify and express in numbers the impacts that intensifying and more frequent disasters will have on society, it is difficult to gain support for such investments. Therefore, data is key. As we work to enhance social resilience, it is increasingly important to make disaster risks visible. In particular, demonstrating how preventive investments can mitigate damage is a key focus.

## Significance of Risk Visualization as Promoted by the MS&AD Group

For decades, the MS&AD Group has assessed risks and provided compensation for losses. Drawing on this expertise, the Group is now developing tools to visualize and quantify risks in the fields of climate and nature, and accumulating expertise in the process. The Group' s platforms such as the "Flood Risk Finder," "Hailstorm Alerts," and "Vehicle Submersion Emergency Alert," mentioned in this report, make it possible to visualize risks that are normally invisible in daily life – namely the exposure of people and facilities in disaster-prone locations.

The Group' s expertise is also being applied in awareness-raising activities on disaster prevention and mitigation, in services delivered through partnerships with local governments and agencies, and in nature conservation initiatives in river basins such as the Kuma River in Kumamoto Prefecture and Lake Inbanuma in Chiba Prefecture. Alongside top-down initiatives by government, such local, community-based partnerships enhance the capacity of individuals and society to manage and reduce disaster risks.

Through its initiatives, the MS&AD Group is enhancing the distribution of information and services that support disaster prevention and mitigation. As disasters become more severe and more frequent, the role of self-help – the ability of individuals to protect themselves – will become increasingly important, alongside mutual help and public assistance. Insurance, through visualizing risks and providing compensation, equips each person with the fundamental resilience needed to safeguard their future. I hope that the examples and risk visualization initiatives featured in this report will serve as an opportunity for individuals to reflect on disaster prevention, preparedness, and the risks around them, and that this will help strengthen resilience for both individuals and society.

Contents





# (6) Climate/Nature-related Initiatives of MS&AD Insurance Group

■ Related to climate change ■ Related to natural capital ■ Sustainability in general

## »2005

2005 ■ Launched the Indonesia Reforestation Project

2007 ■ Launched "The Story of Biodiversity Told by Companies" symposium (First corporate symposium held by companies on biodiversity)

2008 ■ Established Japan Business Initiative for Biodiversity (JBIB).

Japan Business Initiative for Biodiversity

## »2010

2010 ■ Formulated the Medium- to Long-term Plan for $CO_2$ Emission Reduction

■ Launched MS&AD Ramsar Supporters (biodiversity conservation activities by our employees)

2012 ■ Signed the PSI (Principles for Sustainable Insurance)

2013 ■ The Association for Business Innovation in harmony with Nature and Community (ABINC) was launched. Participated in it as the association's secretariat(Certification of corporate green spaces considering biodiversity (ABINC certification) and other activities)

ABINC

## »2015

2015 ■ Signed the PRI (Principles for Responsible Investment)

■ Signed the Principles for Financial Action for the 21st Century

■ Established "Green Resilience Working Group" in the Association for Resilience Japan

■ Signed the "The Paris Pledge for Action" to work toward the realization of the COP21 "Paris Agreement"

2016 ■ The first Japanese non-insurance company to sign the "Natural Capital Declaration"

2017 ■ Endorsed disclosure based on the recommendations of the Taskforce on Climate-related Financial Disclosures (TCFD)

2018 ■ Launched the LaRC-Flood® Project (in collaboration with the University of Tokyo, and Shibaura Institute of Technology)

■ Participated in the Japan Climate Initiative

2019 ■ Began tree planting activities in Bihoro Town, Hokkaido

■ Began disclosure of the TCFD report

## »2020

2020 ■ Announced our "Business Activities Considering Sustainability"

2021 ■ Set the target "Net Zero Carbon Emissions by 2050"

■ The Taskforce on Nature-related Financial Disclosures (TNFD) launched with our employee participating as a member

■ Joined PCAF

2022 ■ Joined the GX League

■ Joined the 30 by 30 Alliance

■ Our employee joined the SSBJ Preparation Committee

■ Established the TNFD Consultation Group Japan

■ Established the Carbon Accounting Adviser Institute

■ Launched the MS&AD Green Earth Project.
(Began NbS* initiatives in three areas: Kuma River basin, MinamisanrikuTown and Inbanuma Basin)
* Nature-based solutions

2023 ■ Established the Finance Alliance for Nature Positive Solutions (FANPS)
(Four financial institutions, including our company, support positive nature initiatives by companies)

■ Began TCFD/TNFD Report disclosure

■ Signed the TNFD Early Adopters

■ Surugadai Green Spaces certified as OECMs

■ Established GHG emission reduction targets regarding underwriting and investment/loan portfolios companies

2024 ■ Participated in "Nature Positive Sustainable Development Hub" of Tohoku University

■ Signed agreement with the Nature Conservation Society of Japan to achieve nature positive outcomes

■ Revised our "Sustainability Approach"

2025 ■ Participated in the Kumamoto Water Positive Action project

■ Participated in the Japan Water Stewardship Leadership Group

■ Obtained a "Certificate of Nature Symbiosis Site Support (Trial Version)" for the conservation of wetlands in the Kuma River Basin, Kumamoto Prefecture

## Contents





Our Promotion System

# Governance



# Governance

## Contents



## (1) Supervisory Framework by the Board of Directors

Following approval at the 17th Regular General Shareholders' Meeting held on June 23, 2025, the Group transitioned from a company with a Board of Company Auditors to one with an Audit and Supervisory Committee. The Board of Directors is composed of a majority of Outside Directors, and a portion of decision-making authority regarding important business execution has been delegated to Directors.
Through this change in structure, we are working to strengthen the Board' s supervisory and checking functions, enhance the objectivity of management decisions, and facilitate swifter decision-making and business execution. In addition, the Group is further enhancing its governance through proactive information disclosure.
In the area of sustainability, our governance structure, including climate/nature-related matters, consists of the Board of Directors, the Group Management Committee, and Task-Specific Committees.

### (i) Board of Directors

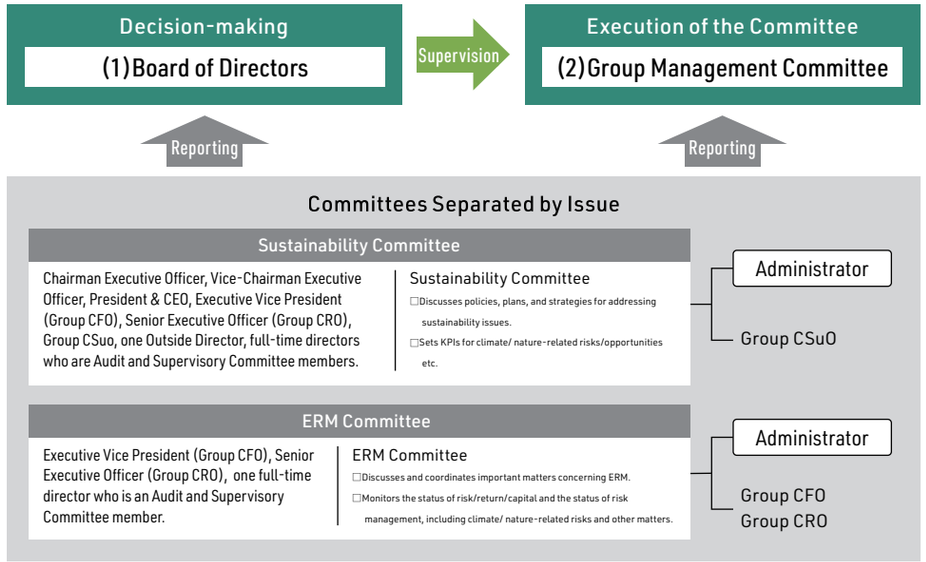
The Board of Directors discusses and makes decisions on important matters regarding management policies, management strategies and capital policy, including climate/ nature-related issues, and also oversees the execution of duties by directors and executive officers.

### (ii) Group Management Committee

The Group Management Committee discusses management policies, management strategies, and other matters that are priority issues to the Group management, including those related to climate/nature, and also monitors specific business operations. Sustainability-related issues and initiatives are reported to both the Board of Directors and the Group Management Committee for determination after discussion by, primarily, the Sustainability Committee and the ERM Committee, which are Task-Specific Committees.

### (iii) Sustainability Committee

The Sustainability Committee, headed by the Group CSuO (Chief Sustainability Officer), discusses policies, plans, and strategies, etc. for addressing sustainability issues, including KPI setting for climate/ nature-related risks/opportunities. In FY2024, the committee met four times under the chairmanship of the Group CSuO. The main topics of discussion included strengthening communication concerning the importance of sustainability to business activities, revision of our "Sustainability Approach," the status of greenhouse gas emission reduction efforts by business partners, current and future initiatives for the circular economy, the status of response measures to achieve appropriate sustainability disclosure, initiatives related to natural capital, as well as the current status and future efforts regarding group-wide human rights protection.
These discussions were reported to the Board of Directors.




→ Internal control
https://www.ms-ad-hd.com/en/group/value/group.html

### (iv) ERM Committee

The ERM Committee, headed by the Group CFO and the Group CRO, discusses and coordinates important matters concerning ERM, as well as monitoring the status of risk management, including climate/nature-related risks and other matters. It was held seven times in FY2024. At the meeting held in February 2025, discussions included maintaining climate change as a critical risk to be managed by the Group' s senior management, and the Board of Directors determined the Group Material Risks. In addition, the ERM Committee discusses such issues as improving handling of natural catastrophic events including climate change and continuing monitoring of "depletion of natural capital (exhaustion of resources, deterioration of and crises of ecosystems, and human-induced pollution and accidents that cause major damage to the environment)" as examples of risk events which could adversely affect medium- to long-term Group management and management should also be conscious of (Group Emerging Risks). Details of the discussion are reported to the Board of Directors.

# (2) Role of Senior Management

## (i) Setting KPIs

In its medium-term management plan, aiming to become a "Group which supports a resilient and sustainable society," the Group has set KPIs for not only financial indicators such as profitability and soundness, but also non-financial indicators for sustainability-related items, and monitors them on a regular basis. KPIs for non-financial indicators have been set for each of the three priority issues determined based on our materialities. Major KPIs include GHG emissions reduction rates, rate of increase in the number of accepted policies for products which help improve the resilience of society, and number of policies in force for products which help solve health-related social issues, which are reflected to the remuneration of directors.

### Major KPIs

- 1 GHG Emission Reduction Rate
- 2 Increase Rate in the Number of Underwritten Products Contributing to Enhanced Social Resilience
- 3 Number of In-force Contracts for Products that Contribute to Solving Health-related Social Issues, etc.

## (ii) Officer Remuneration System

As part of the initiatives contributing to medium- to long-term performance, we have non-financial indicators reflected in the performance-linked remuneration for directors excluding external directors. As evaluation items for non-financial indicators, "Basic strategies" and "Platforms" that support the basic strategies have been selected in order to realize "A corporate group that supports a resilient and sustainable society," which is an aspiration of the Group' s Medium-Term Management Plan (2022-2025). Countermeasures against climate change and initiatives related to the improvement of the sustainability of natural capital are included in the evaluation of the Platform (Sustainability).

| | Evaluation item |
|---|---|
| Basic strategies | ● Value (creating value) ●Transformation (businesstransformation) ●Synergy (demonstrating Group synergy) |
| Platforms | ●Sustainability ●Quality ●Human resources ●ERM |

→Policies for determining the content of individual remuneration for Directors, etc.
https://www.ms-ad-hd.com/en/group/value/corporate.html#015

## (iii) Skills Matrix of Officers

In order to promote debate from diverse viewpoints in our efforts to reach the goal of achieving growth strategy for the Group, the Nomination Committee as an internal committee of the Board of Directors deliberates and decides regarding skills necessary to assure the effectiveness of the Board of Directors (knowledge, experience, and capability) from the standpoint of supervising the decisions made and execution of duties on important matters required for management strategy,

### Three Essential Skills for Executives

(1) Base skills that are generally required: "Corporate management," "human resources and human asset development," "legal affairs and compliance," "risk management," and "finance and accounting,"

(2) Skills complementing the fact that the core business of the MS&AD Group is insurance, and that we engage in business globally: "Insurance business" and "internationality."

(3) Skills that take into account our current business environment and that are necessary to address business reform and issues considered important by the market: "IT and digital" and "sustainability."

| Officer | Skills | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | Corporate management | International | IT/Insurance / digital | Sustainability | Personnel affairs/ HR development | Legal affairs/ Compliance/ Internal audit | Risk management | Finance/ Accounting | Insurance business |
| Director Hara | ● | ● | | ● | ● | ● | ● | | ● |
| Director Kanasugi | ● | ● | | ● | ● | ● | | | ● |
| Director Funabiki | ● | ● | ● | ● | ● | ● | | | ● |
| Director Higuchi | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| Director Shimazu | | ● | ● | ● | ● | ● | ● | | ● |
| Director Shirai | | | | ● | | ● | ● | | ● |
| Outside Director Bando | ● | ● | | ● | ● | ● | | | |
| Outside Director Tobimatsu | | ● | | | | ● | | | |
| Outside Director Kopp | ● | ● | | ● | ● | | | | |
| Outside Director Ishiwata | | | | ● | | | | | |
| Outside Director Suzuki | ● | ● | | ● | ● | | | | |
| Auditor Suto | | | | | | | ● | ● | ● |
| Auditor Suzuki | | | | | | | ● | ● | ● |
| Outside Auditor Uemura | | | | | | ● | | | |
| Outside Auditor Kunii | ● | | | | | | | ● | |
| In addition, we have installed an executive officer system. The skills for Executive Officers who are not Directors are as follows. | | | | | | | | | |
| Executive Officer Tamura | | ● | ● | ● | ● | ● | ● | ● | ● |
| Executive Officer Motojima | ● | | | ● | ● | | | | ● |
| Executive Officer Niiro | ● | ● | | ● | ● | | | | ● |
| Executive Officer Hayakawa | ● | ● | | | | | | ● | ● |
| Executive Officer Tsuda | ● | ● | ● | | ● | | | | ● |
| Executive Officer Owada | | ● | | ● | ● | | | ● | ● |
| Executive Officer Arakawa | ● | | | ● | | | | | ● |
| Executive Officer Tatematsu | | | | | | | | | ● |
| Executive Officer Motoyama | | | ● | | ● | | | | ● |
| Executive Officer Sato | | | | ● | | ● | | | ● |
| Executive Officer Hori | | ● | | | | ● | ● | | ● |
| Executive Officer Morimoto | ● | ● | | | ● | | | | ● |

## Contents

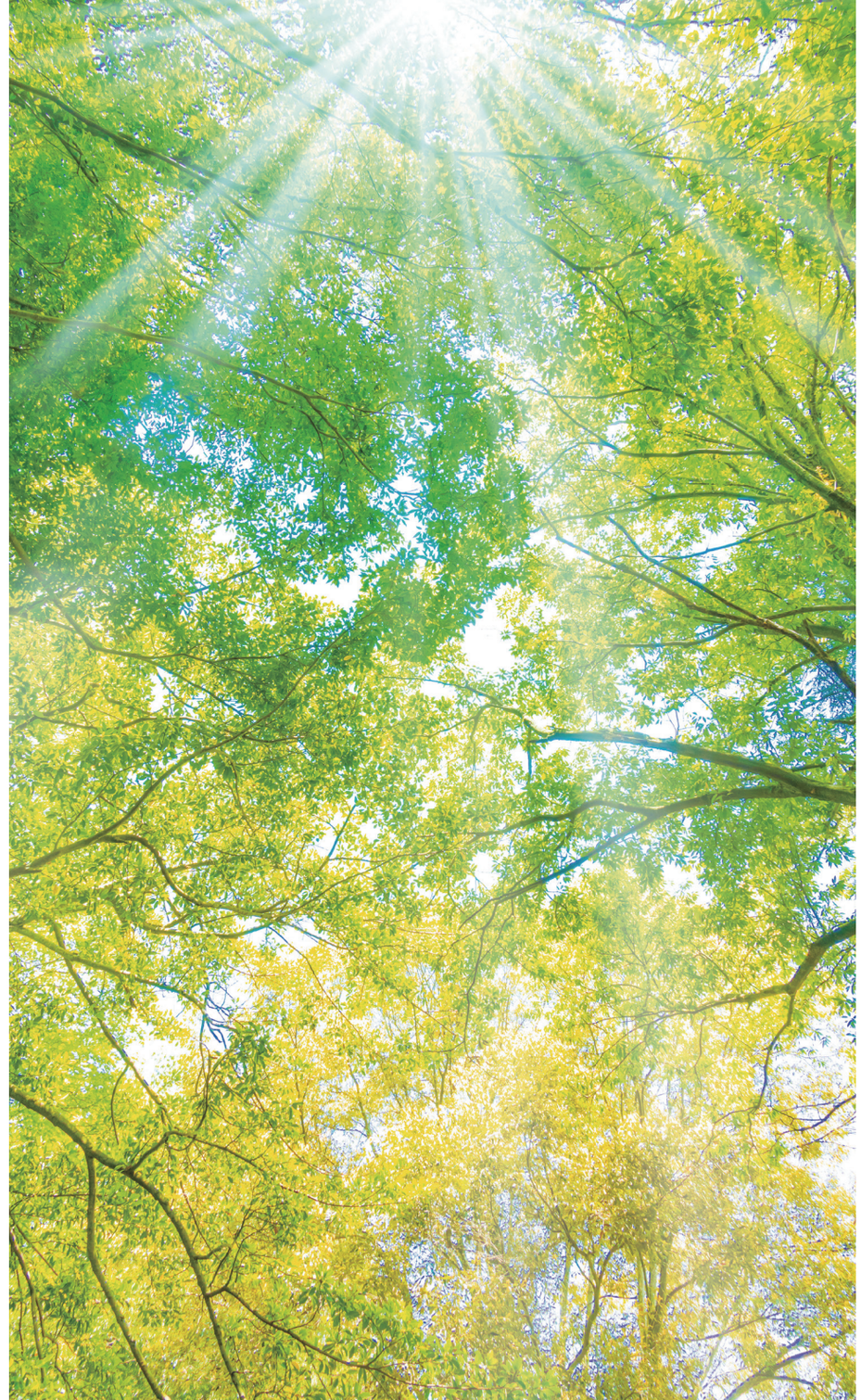




### What We Are Trying to Achieve

# Strategy





# Strategy | Assessment of Dependencies and Impacts

## [1] Climate/Nature-related Dependencies and Impacts

### 1. Dependencies and impacts on climate and nature in insurance underwriting and investment/loan activities

Non-life insurance supports people's daily lives and business activities by compensating for losses arising from accidents and disasters. Life insurance, through the payment of insurance claims and benefits, helps reduce the financial burden of medical expenses and supports individuals and families in the event of disability or death. An increase in the risks of disasters, accidents, and health issues leads to higher financial risks for the MS&AD Group and makes our management more vulnerable. Therefore, it is important for us to understand, from a medium- to long-term perspective, how changes in climate and nature influence these risks to loss and human health.

In addition, insurance, through its financial functions, underpins the economic activities of a wide range of clients. While the degree may vary, these activities exert some form of impact on climate and nature. Accordingly, the Group recognizes that its insurance business must take such indirect impacts into account as well.

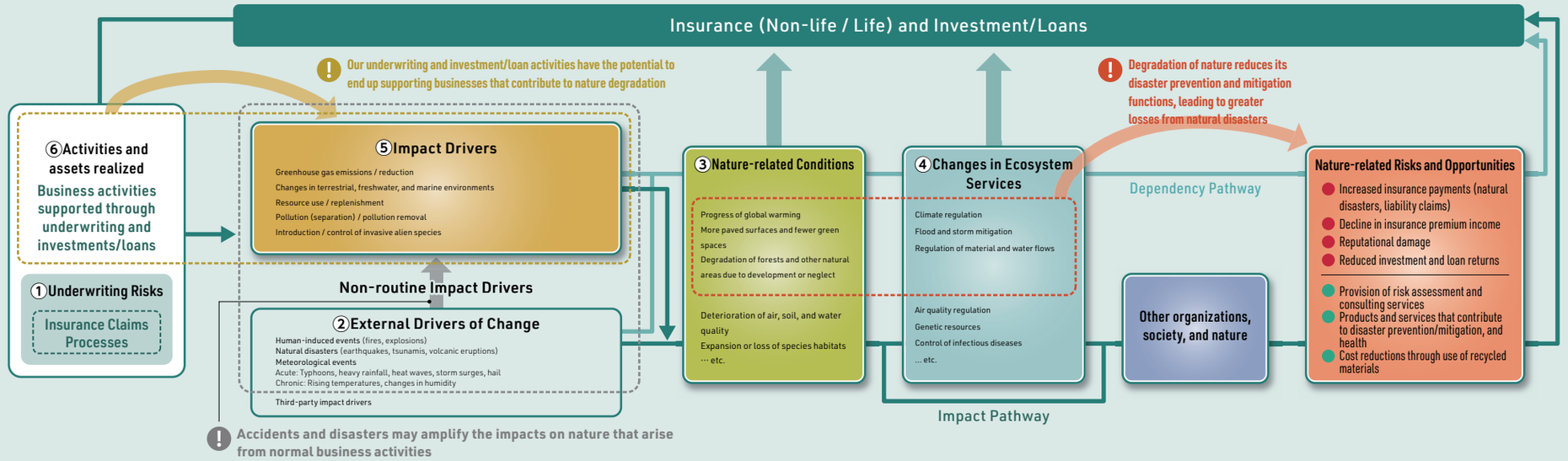
#### (i) Pathways of dependencies and impacts on climate and nature

To accurately understand the Group's nature-related risks and opportunities, we used the dependency and impact pathway framework outlined in the TNFD disclosure recommendations to analyze our business activities in terms of their dependencies and impacts on nature.

**Key findings of our analysis**

- In the non-life insurance business, the degradation of nature and the resulting decline in its disaster prevention and mitigation functions directly increase financial risk through the expansion of natural disaster losses.
- Businesses supported through insurance underwriting and investment/loans may, in turn, contribute to the degradation of nature, thereby amplifying the aforementioned financial risks.
- Accidents and natural disasters can amplify the environmental impacts of ordinary business activities, potentially leading to reputational damage or weaker performance at affected companies, which in turn may become business risks for the Group.

Pathways of Nature Dependencies and Impacts in the MS&AD Group's Businesses



### Understanding the pathways leading to the Group's own risks

All business activities, in some form, rely on natural resources and the functions provided by nature (ecosystem services). In other words, they are dependent on nature, while also exerting impacts on nature. These dependencies and impacts alter state of nature-related conditions and degrade ecosystem services. Meanwhile, external factors unrelated to our own business activities can also affect nature-related conditions and ecosystem services. The diagram illustrates how such internal and external dependencies and impacts on nature interact in complex ways and ultimately lead to opportunities and risks for the Group.

### Transforming into positive feedback loops

Because both internal and external dependencies and negative impacts lead to risks in business activities, companies must transform these pathways from negative feedback loops into positive ones to enhance the sustainability of their businesses.

### Analysis in two key areas: insurance underwriting and investment/loans

We re-examined our non-life insurance business using this pathway framework, integrating not only nature but also climate considerations into our analysis. Environmental impacts arising directly from operational activities – such as daily business activities and sales or damage inspections conducted using company vehicles – are limited in the non-life insurance business. The vast majority of dependencies and impacts related to climate and nature occur downstream in the value chain, through insurance underwriting and investment/financing activities. Accordingly, our analysis focuses on these two activity areas.

## (ii) Dependencies on climate and nature

In non-life insurance, compensation is provided for losses or damages to the insured assets and business activities **[in figure: 1 underwriting risks]** when they are affected by fires or natural disasters like earthquakes and typhoons **[in figure: 2 external drivers of change]** .

### Expansion of losses due to degradation of ecosystem services

The extent of these damages and losses varies greatly depending not only on external drivers of change but also on the disaster prevention and mitigation functions **[in figure: 4 changes in ecosystem services]** inherent in nature itself **[in figure: 3 nature-related conditions]** .

#### > Expansion of fire damage

For example, when abnormally hot and dry weather **[in figure: 2 external drivers of change]** occurs in an unmanaged forest where dead trees and dry grass have accumulated **[in figure: 3 nature-related conditions]** , any small fire outbreak will continue to grow **[in figure: 4 changes in ecosystem services]** , likely resulting in a major forest fire.

#### > Intensification of water damage

Similarly, when a short period of heavy rainfall **[in figure: 2 external drivers of change]** occurs in a dense residential area developed on low-lying land **[in figure: 3 nature-related conditions]** , the ground is unable to absorb the sudden influx of rainwater **[in figure: 4 changes in ecosystem services]** , leading to flooding with greater severity.

#### > Impact on Financial Risk

When climate-related external factors worsen due to climate change and the nature-related conditions deteriorate, the usual functions for natural disaster prevention and mitigation weaken, resulting in greater damage from natural disasters and higher insurance claim payouts.

### Health risks due to degradation of ecosystem services

Human health also depends on ecosystem services, including climate regulation, protection from hazards, and disease control. These are functions that directly reduce health risks and support physical and mental well-being through clean water, nutritious food, and access to nature for recreation. In addition, disease treatment relies on natural resources for pharmaceuticals and raw materials. The deterioration of nature and ecosystem services therefore heightens these health risks.

#### > Increase in heatstroke and infectious diseases

In particular, the increase in heatstroke cases caused by the combined effects of heat waves and urbanization, and the spread of infectious diseases resulting from human encroachment into wildlife habitats, have significant implications for the financial risks of life insurance companies.

### Contributing to Risk Hedging for Society as a Whole

In conclusion, the insurance industry, particularly the non-life insurance sector, is heavily dependent on ecosystem services that help prevent disasters, in addition to changes in external factors due to the impacts of climate change. Most people and businesses live their lives without particularly noticing the "degradation of ecosystem services," but the effects of this degradation are exposed through sudden events such as natural disasters. Currently, much of the economic damage and losses caused by natural disasters are covered by insurance, and insurance companies contribute to risk hedging for society as a whole by taking on such financial risks.

### Enhancing sustainability by considering ecosystem services

Therefore, in order to enhance the sustainability of our business, the MS&AD Group recognizes the need not only to monitor risk events that trigger insurance payouts, but also to pay close attention to the ecosystem services that influence the scale of losses.

### Decline in investment returns

Businesses that receive our investing or loans are also affected by climate risks and depend on specific ecosystem services. As the climate becomes more unstable and nature degrades business earnings may decline, leading to lower investment returns.

## (iii) On the Impact of Climate and Nature

The Group's insurance services, as well as our investments and loans made possible by premiums paid by customers, enable a variety of business and societal activities **[in figure: 6 activities and assets realized]**. These activities inherently contain drivers of impact on climate and nature **[in figure: 5 impact drivers]**, which in turn affect the state of nature and ecosystem services.

### Routine and non-routine impacts

In addition to ongoing (routine) impacts, human-induced events such as fires or explosions, and natural phenomena such as earthquakes or weather disasters, can cause sudden (non-routine) impacts–such as emissions of greenhouse gases or hazardous substances. Some of these non-routine impacts can be covered by environmental liability insurance, while others, such as widespread pollution, cannot. Either way, both can have significant effects on the state of nature and ecosystem services.

### Significant effects on insurance profitability

Insurers are not directly affected in terms of revenue by most of these routine or non-routine impacts (except in cases involving environmental liability insurance). However, as noted in section **(ii)** above, changes in the state of nature and in ecosystem services–particularly those related to disaster prevention and mitigation–have a major influence on insurance profitability.

For example, the progression of climate change caused by greenhouse gas emissions from business activities intensifies weather-related external factors such as flood risks from heavy rainfall. Improper forest management practices can trigger landslides, while larger paved surface areas due to land development prevent water from quickly penetrating into the ground, increasing the risk of inland flooding.

### Impacts from businesses supported by insurance and investment/loans

While our insurance and investment/loan activities support various businesses and social activities, we are well aware that the resulting impacts on climate and nature can degrade the state of nature and ecosystem services, increasing physical risks related to natural disasters and human health.

### Impacts during recovery and repair processes

Impacts can also occur during the claims payment process related to property damage, during process of emergency response for restoration, parts replacement, repair, and disposal.

Depending on the methods used for emergency response, restoration, or cleanup, it is possible to reduce the environmental impact. For example, rather than replacing all parts with new ones, repairing still-functional components or using recycled parts can help reduce impacts on nature. Likewise, recovered damaged items should not only be properly disposed of but also reused wherever possible.

### Simultaneous realization of impact driver reduction and value creation

In other words, in restoring assets damaged by unforeseen accidents or natural disasters, non-life insurance can create a positive feedback loop for both business as well as the climate and nature by incorporating circular economy principles. This means reducing impact drivers while enhancing the value provided to customers.

### Analysis from an integrated, medium- to long-term perspective

Therefore, it is essential for the Group to analyze, from an integrated, medium- to long-term and perspective, how changes in climate and nature will affect society and the economy. We must also anticipate potential events and trends, and consider not only individual underwriting and investment/loan decisions but also the overall business model.

## 2. Insurance products and services that mitigate impacts on climate and nature

The MS&AD Group offers insurance products and services that help mitigate the impacts of specific business activities on climate and nature. In the event of accidents or disasters, various impacts may arise. Therefore, we aim to prevent such occurrences by analyzing these risk factors and promoting loss prevention measures. Moreover, as noted above, we also advance initiatives to reduce the environmental impact of the claims payment process, such as the use of recycled parts, cleaning, and repairs. We have developed a range of insurance policy riders that enable replacement with more environmentally efficient options during recovery. In this way, we help advance "Building Back Better" efforts, which uses the recovery from accidents or disasters as an opportunity to reduce environmental impact drivers in ordinary business operations.

By focusing on dependencies and impacts within the claims payment process and sharing value with our clients, we recognize that actively mitigating negative impacts is a key role of an insurance company. Furthermore, these initiatives not only provide positive feedback to climate and nature but also improve insurance financial performance, thereby contributing to the sustainability of insurance itself.

| Insurance Type | Individual and Corporate Business Activities | Negative Impact on Nature | The Group's Insurance Products and Services That Mitigate Negative Impacts on Nature |
|---|---|---|---|
| **Automobile**  | ・Vehicular travel | (i) Times of normalcy (no accidents):<br>● GHG emissions ● Air pollution<br>● Land use change (ecosystem fragmentation by roads) ● Noise, light pollution<br>(ii) In the event of an accident:<br>● Pollution due to accident or damage<br>(iii) After an accident:<br>● Utilization of resources for repairs ● Pollution due to waste generation, GHG emissions | (i) Times of normalcy (no accidents):<br>○ Reduction of GHG emissions through promotion of safe driving by using Telematics technology such as dashcams<br>○ Prevention of roadkill with animal attention alert function<br>(ii) In the event of an accident:<br>Nothing in particular<br>(iii) After an accident:<br>○ Resource conservation through utilizing recycled parts for repairs |
| **Fire / Facility owners (managers) Liability / Erection All Risks**  | ・Operation of business bases<br>・Residence<br>・Construction | (i) Times of normalcy (no accidents):<br>● GHG emissions ● Air pollution, water pollution / ocean pollution<br>● Use change of land, Ocean, freshwater area ● Utilization of resources<br>(ii) In the event of an accident:<br>● Air pollution, water pollution ● Ocean pollution<br>● Pollution due to disaster-related waste generation<br>(iii) After an accident:<br>● Utilization of resources for repairs<br>● Pollution due to waste generation, GHG emissions | (i) Times of normalcy (no accidents):<br>○ Reduction in GHG emissions through support for carbon- neutral initiatives<br>○ Mitigation of pollution and utilization of resources by proposing accident prevention measures<br>○ Water resources conservation through basic evaluation service for water-related risks<br>○ Conservation of biodiversity through biodiversity-conscious land-use consulting<br>(ii) In the event of an accident:<br>○ Preservation and restoration of ecosystems such as forest resources through rapid forest rehabilitation under the "Forest Keeper," Endorsement for forestry business operators, which covers reforestation costs<br>○ Endorsement for Extended Compensation for Pollution Damage for facility owners (managers) Liability Insurance<br>(iii) After an accident:<br>○ Resource conservation through utilizing recycled parts and rebuilding<br>○ Reduction in GHG emissions through offering the Carbon Neutral Support Endorsement |
| **Hull/Cargo**  | ・Land and ship transportation of cargo | (i) Times of normalcy (no accidents):<br>●GHG emissions ●Air pollution, water pollution ●Ocean pollution<br>●Introduction of alien species ●Undersea noise, light pollution<br>(ii) In the event of an accident:<br>●Pollution due to accident or damage<br>(iii) After an accident:<br>●Utilization of resources for repairs<br>●Pollution due to waste generation, GHG emissions | (i) Times of normalcy (no accidents):<br>○ Mitigation of pollution and utilization of resources by proposing accident prevention measures<br>(ii) In the event of an accident:<br>○ Preservation and restoration of ecosystems through early removal of ocean pollution under Special Expense Clause for Ocean Pollution<br>(iii) After an accident:<br>○Waste and GHG emissions reduction through the Food Loss Reduction Endorsement for food-product businesses |

We conducted LEAP analysis of the shipping industry. Please also refer to this information. **For details, see page 55.**

# [2] Customer Dependencies and Impacts on Climate and Nature by Industry

## 1. Industry-specific heat maps

Underwriting | Investment/Loan

As an insurance group, we consider it important not just to evaluate our own direct operations but also to analyze the extent to which our clients (underwriting and investment/loan portfolio companies) depend on and impact nature. To visualize this, we have created two types of industry-specific heat maps showing both these dependencies and impacts, along with the underwriting and investment/loan ownership ratios.

### Dependencies and impacts organized and analyzed using a five-level heat map

**Key findings of our analysis**

- Many industries show a high dependence on water resources, including both groundwater and surface water, and depletion of these resources poses business risks for numerous companies.
- Among impacts on nature, greenhouse gas emissions are the largest and most common across all industries, serving as a major driver of global warming.
- Ecosystem services such as climate regulation and flood/storm damage prevention are directly linked to natural disaster risks, making it important to address ecosystem degradation.

We classified dependencies on ecosystem services and the impacts of various impact drivers*1 into five levels: Very High (VH), High (H), Medium (M), Low (L), Very Low (VL). This process allowed us to deepen our understanding of industry-specific dependence and impact on nature, as well as the relationship between associated risks and opportunities.

*1: Factors that exert impacts on nature

### Analysis results

Through the heat mapping process, we found that a number of industries depend on ecosystem services such as climate regulation*2 "flood/storm prevention," "groundwater," and "surface water," which exerted significant impacts on "utilization of terrestrial ecosystems," "water use," and "GHG emissions." In particular, water resources, which include "groundwater" and "surface water," represent the highest overall dependence, and the depletion of water resources may lead to business risks for many companies. Furthermore, GHG emissions, which have the greatest impact, accelerate global warming, increase changes in the frequency and amount of precipitation and snowfall, and adversely affect the water resource control functions of forests and rivers.

*2: A function that regulates the environment and atmosphere on earth's surface and maintains climate conditions in a state suitable for human and biological activities

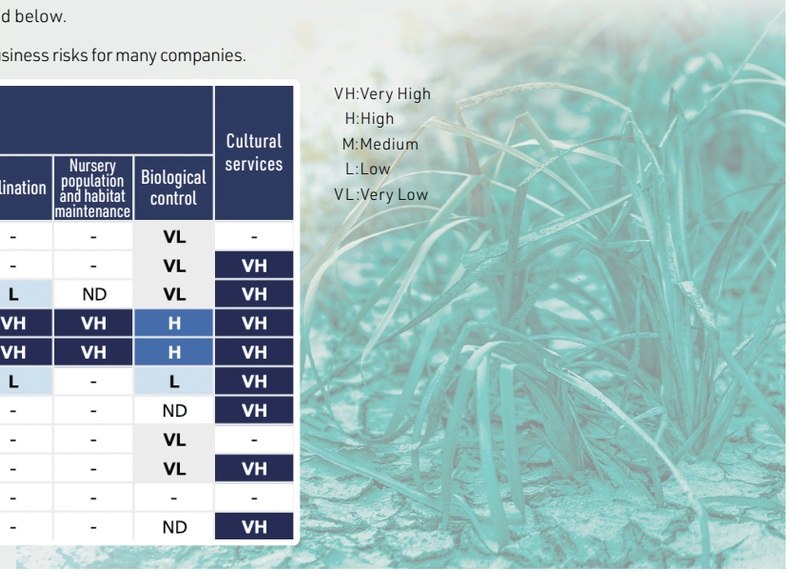
### Method for analyzing nature-related dependencies and impacts by industry regarding insurance policyholders and investment/loan clients

Using the latest data, this year we again updated the Dependency Heat Map and Impact Heat Map based on the analysis methodology described below.

**Dependency Heat Map** It has become clear that there is a high dependence on water resources, and the depletion of water resources may lead to business risks for many companies.

| GICS Sector Code | GICS Sector | GICS Sector | | Regulating & maintenance services | | | | | | | | | | | Cultural services |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Water resources | Other resources | Decontamination | Noise attenuation | Mediation of sensory impacts | Water flow regulation | Climate regulation | Flood and storm mitigation | Soil and sediment retention | Soil quality regulation | Pollination | Nursery population and habitat maintenance | Biological control | |
| 10 | Energy | H | L | VH | VL | L | H | H | VH | H | - | - | - | VL | - |
| 15 | Materials | H | L | VH | VL | L | H | H | VH | H | - | - | - | VL | VH |
| 20 | Industrials | H | M | VH | VL | VL | H | M | VH | H | - | L | ND | VL | VH |
| 25 | Consumer Discretionary | VH | VH | VH | M | M | VH | VH | VH | VH | VH | VH | VH | H | VH |
| 30 | Consumer Staples | VH | VH | VH | VL | VL | VH | VH | VH | VH | VH | VH | VH | H | VH |
| 35 | Health Care | H | H | VH | VL | VL | H | L | H | M | - | L | - | L | VH |
| 40 | Financials | VL | ND | ND | - | - | L | L | M | L | - | - | - | ND | VH |
| 45 | Information Technology | M | - | M | VL | VL | M | L | M | L | - | - | - | VL | - |
| 50 | Communication Services | L | ND | L | VL | VL | L | L | M | M | - | - | - | VL | VH |
| 55 | Utilities | VH | H | M | M | - | VH | VH | VH | VH | - | - | - | - | - |
| 60 | Real Estate | M | VL | M | VL | VL | M | M | VH | H | - | - | - | ND | VH |

VH:Very High
H:High
M:Medium
L:Low
VL:Very Low



# Contents



**Impact Heat Map** "It was found that many companies were affecting 'GHG emissions,' as well as 'soil and water pollutants' and 'disturbance.'"

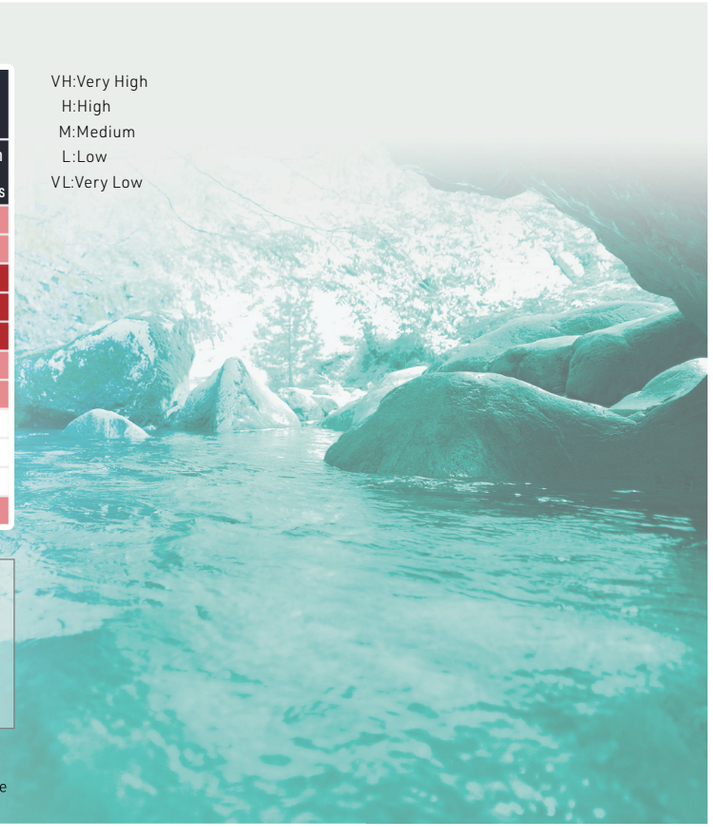
| GICS Sector Code | GICS Sector | Land/ freshwater/ ocean use change | | | Climate change | Resource use/ replenishment | | Pollution/pollution removal | | | | Invasive alien species |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Land use change | Freshwater use change | Ocean use change | GHG emissions | Water use | Other resource extraction | Waste generation and disposal | Non-GHG air pollutants | Soil/water pollutants | Distur-bances | Introduction of invasive alien species |
| 10 | Energy | M | VH | VH | VH | M | H | H | H | VH | VH | L |
| 15 | Materials | M | VH | VH | H | H | VH | VH | H | VH | VH | L |
| 20 | Industrials | M | M | M | H | M | VL | M | VH | VH | VH | VH |
| 25 | Consumer Discretionary | VH | H | H | H | VH | VH | VH | H | VH | VH | VH |
| 30 | Consumer Staples | VH | H | H | H | VH | VH | VH | H | VH | VH | VH |
| 35 | Health Care | M | ND | VL | M | M | VL | M | H | M | M | L |
| 40 | Financials | M | - | - | L | L | - | VL | VL | L | L | L |
| 45 | Information Technology | M | - | VL | M | M | - | L | H | H | M | ND |
| 50 | Communication Services | M | L | M | L | L | - | L | L | L | M | - |
| 55 | Utilities | H | H | M | VH | M | M | H | VH | VH | VH | - |
| 60 | Real Estate | L | M | M | H | L | - | M | L | H | VH | L |

VH:Very High
H:High
M:Medium
L:Low
VL:Very Low

In the heat maps, we organized dependencies and impacts on nature, utilizing "ENCORE"[1] and "SBTN Sectorial Materiality Tool for Step 1a."[2] (For terms, see Appendix: Terms in Heat Maps, on page 66.

- Based on the ENCORE analysis results (as of March 2024), we have identified business activities that depend on ecosystem services.
- Based on the results of analysis using SBTN Sectorial Materiality Tool for Step 1a, we have identified business activities that have a significant impact on natural capital.
- Insurance retentions cover 84.1% of premiums written on corporate policies[3] as of March 31, 2024.
- The percentages of investments and loans held covers listed stocks, corporate bonds, and corporate loans in the investment and loan portfolios as of the end of March 31, 2024.

*1: Nature-related risk management analysis tools provided by Natural Capital Finance Alliance and others
*2: A tool provided by SBTs for Nature to screen, by industry, degrees of environmental impact
*3: Corporate policies for automobile insurance, fire insurance, miscellaneous (excluding construction insurance), cargo insurance, hull insurance, and aviation insurance



## Awareness and determination based on analysis

For the Group, given the significant increase in the occurrence of water-related disasters, partly due to climate change, we recognize the need to consider addressing the degradation of ecosystem services for "flood and storm prevention." In addition, the Group carefully determines the conduction of a transaction with any industry that exerts major impact on nature due to modification of land and/or water areas (agriculture, forestry, and fisheries involving hydroelectric power generation and large-scale new development) and for business activities in areas that are rich in biodiversity (UNESCO World Natural Heritage Sites and Ramsar Convention-registered wetlands, etc.), based on environmental considerations, etc. of our underwriting and investment/loan portfolio companies.

# Contents



## 2. Identifying the Group's key industries

Underwriting | Investment/Loan

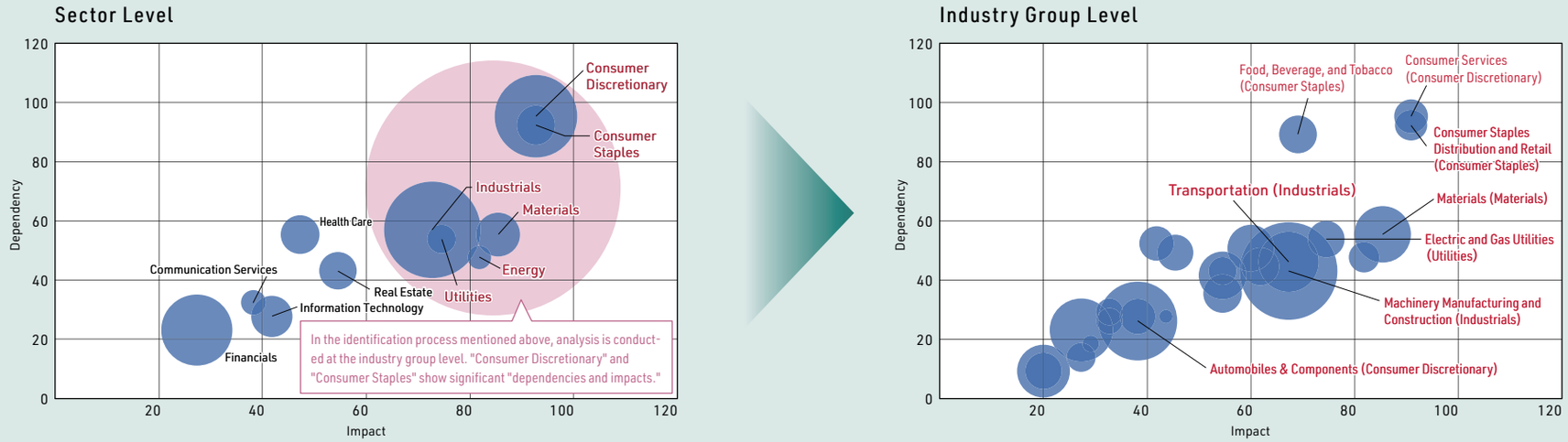
The impact of climate/nature-related physical risks, such as heat waves and water resource depletion, varies greatly depending on the industry. Transition risks, including technological innovations and changes in policies, laws and regulations, also involve industry-specific societal changes. Therefore, industry-specific analysis is crucial for properly assessing climate/ nature-related risks. For this reason, the Group has identified six key industry sectors, based on the degree of dependencies and impact of our business partners on climate and nature, as well as the percentage of the Group's underwriting and investments/loans held by these industries. In the chapter "Climate/Nature-Related Risks/Opportunities" (page 60) we analyzed the risks and opportunities for these six key industries. To identify these targets in fiscal 2025, we expanded from the sector-level analysis conducted in fiscal 2024 to a more detailed analysis that further classified sectors into industry groups.

**Page 60 "Risks and Opportunities in Six Industries"**

| FY2024 | FY2025 | |
|---|---|---|
| Sector | Sector | Industry Group (subcategory of sector)* |
| Industrials | Industrials | Transportation |
| Consumer Discretionary | Consumer Discretionary | Automobiles & Components |
| Materials | Materials | Materials (Petrochemicals) |
| Consumer Staples | Consumer Staples | Food & Beverage & Tobacco |
| Information Technology | Industrials | Machinery Manufacturing and Construction (including semiconductors used in manufacturing) |
| Utilities | Utilities | Electric and Gas Utilities |

* Industry group under the Global Industry Classification Standard (GICS)

### Identification of Key Industries




- Extract business activities that depend on ecosystem services and those that have a major large impact on natural capital, and then aggregate add up the evaluations for each item of dependencies and impact (with the impact of GHG emissions impact are calculated with double weighting of other items)
- Combine the percentage of insurance that accounts for 73% of premiums written for contracts with corporates as of March 31, 2024 with the percentage of investments and loans in force covering domestic and foreign listed stocks, domestic and foreign corporate bonds, and domestic and foreign corporate investments/loans as of March 31, 2024.
- Multiply the two combined values to identify the top 6 industries

## 3. LEAP analysis for selected industries

Among the six key industries identified on the previous page, analyses were conducted for the renewable energy business within the electric and gas utilities industry group and the marine transportation business within the transportation industry group, in accordance with the LEAP approach recommended by the TNFD.

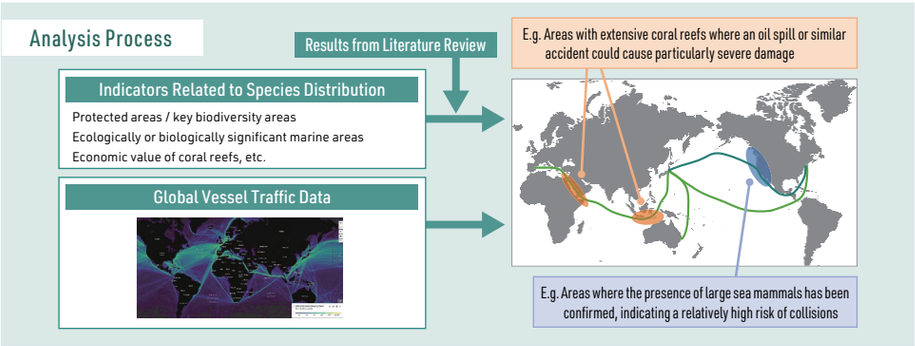
The LEAP approach is a framework for companies to identify and assess nature-related risks and opportunities. It comprises four steps: Locate (identifying interfaces with nature), Evaluate (assessing dependencies and impacts), Assess (evaluating material risks and opportunities), and Prepare (preparing for response and disclosure). It aims to support strategic decision-making by analyzing company's dependencies and impacts on natural capital.

### (i) Analysis of the marine transportation industry

The marine transportation industry represents a significant share of the MS&AD Group's insurance underwriting, investment and loan portfolios, making it an important sector. It depends on the ecosystem services of the world's oceans while also exerting multifaceted impacts on nature through shipping operations and logistics. The Group recognizes that deepening our understanding of the interrelationship between the marine transportation industry and nature is essential to achieving sustainable growth alongside this industry. Within the TNFD framework, the marine transportation industry has been identified as a priority sector due to its significant interface with nature, and sector-specific guidance was published in 2023. The Group participated in the discussions leading to the development of this guidance and conducted the recent LEAP analysis reflecting the insights gained through that process.

**Key findings of our analysis**

- While the industry relies broadly on the ocean's climate regulation function during vessel navigation, attention must also be given to more localized ecosystem services, such as the flood mitigation functions of wetlands and rivers around ports.
- Some major shipping routes traverse areas of high biodiversity. In addition to pollution risks from accidents, issues such as the introduction of invasive species and physical damage to ecosystems from ship hulls were identified as key areas requiring attention.
- Building on this analysis, the Group intends to deepen shared understanding with the industry, enhance the quality of analysis, and pursue mutual value creation through continued dialogue.




#### On the Impact on Nature

In addition to the continuous use of marine areas along shipping routes, the industry exerts significant impacts through the emission of greenhouse gases, air pollutants, and hazardous substances. It also contributes to the spread of invasive species via biofouling on ship hulls, and to the destruction of coastal ecosystems through accidents such as collisions with large marine animals or vessel groundings.

#### Impacts on biodiversity

In assessing detailed impacts, we identified affected species through a literature review and overlaid areas of high biodiversity and protected zones with shipping traffic intensity data to identify marine areas vulnerable to negative impacts. Key regions were found to be those with high vessel traffic located near protected areas or habitats of endangered species, where the impacts of marine use, pollution, and the introduction of invasive species are pronounced. These include waters around Japan, the Caribbean Sea, and the coasts of Northern Europe. Coral reef areas were noted as being particularly susceptible to the impacts of ship groundings, while seagrass and seaweed habitats are quite vulnerable to the arrival of invasive species. Furthermore, in highly trafficked areas where pollution is a particular concern, key impacts include oil spills and container losses affecting coral and habitats of endangered fish and reptiles. They also include light pollution* and oil contamination affecting bird habitats, as well as ship strikes harming sea mammals and other species and their habitats.

*Light pollution refers to the phenomenon in which excessive artificial light disrupts natural ecosystems and the behaviors of flora and fauna.

#### Dependencies

For activities such as port entry, vessel berthing, and cargo loading and unloading, the industry depends on the natural functions of mangroves, coral reefs, and similar ecosystems, including flood mitigation and control, storm moderation, and rainfall-pattern regulation. For vessel navigation, the industry depends on global natural systems that help keep ocean climates stable, maintain water quality, and regulate the flow of currents. These ecosystem services are also relevant to the insurance industry. For example, cargo insurance depends on natural flood and storm mitigation functions that help prevent damage to goods, while marine insurance relies heavily on natural climate regulation functions that help prevent vessel accidents.

#### Improving the quality our analysis going forward

The Group has long recognized marine pollution caused by vessel accidents and natural disasters as a critical issue and has offered insurance products such as the Special Expense Clause for Ocean Pollution," which covers the cost of timely cleanup of pollutants after an accident. Through this analysis, we have deepened our understanding of the interrelationship between the marine transportation industry and nature, as well as the implications for the insurance business. However, quantitative assessments and analyses of financial impacts remain at a developmental stage. Going forward, the Group will further refine its evaluations of dependencies and impacts on nature, and enhance dialogue with the industry. We will also leverage these insights to advance existing products and services, improve information provision, and strengthen our ability to respond to nature-related risks.

For details, see page 55.

# Contents



## (ii) Analysis of the renewable energy business

Transitioning to a decarbonized society requires the large-scale adoption of renewable energy (renewables), but such expansion must be pursued with due consideration for the natural environment and local communities.
Since fiscal 2023, the Group has included renewable energy projects in its environmental and social risk assessments conducted during insurance underwriting. Beginning in fiscal 2024, we also enhanced the quality of our risk assessment for onshore wind power projects through collaboration with the Nature Conservation Society of Japan (NACS-J). This report presents the results of a LEAP analysis (Locate, Evaluate, Assess, and Prepare) conducted for onshore wind power projects. It identifies issues such as cumulative impacts on ecosystems and local communities and the growing risks of future natural disasters, while also highlighting advanced initiatives undertaken by project developers and identifying the limitations of environmental impact assessments. Going forward, the Group will use the insights gained from this assessment to make solution proposals to underwriting clients and promote collaboration with local communities, thereby contributing to the realization of net zero and nature positive outcomes and to enhancing the resilience of society as a whole.

**For details, see page 56.**

### Key findings of our analysis

- Many of the onshore wind power projects underwritten by the Group are located near areas of high biodiversity importance.
- These projects rely heavily on ecosystem services such as climate regulation, flood control, and soil retention, while also exerting impacts through land alteration, noise and vibration, as well as bird strikes and disturbance.
- Although potential risks such as future landslides and flooding due to soil and vegetation loss exist, proactive efforts with developers to ensure sufficient consideration for the natural environment and local communities can help mitigate both reputational and disaster-related risks.

Column

## Case Study on Cumulative Impacts of Onshore Wind Power

Looking at the Hibaritaira Wind Power Project located on the Shimokita Peninsula in Aomori Prefecture, the MS&AD Group examined potentially significant dependencies and impacts, taking into account the project's specific characteristics. As the final Environmental Impact Assessment (EIA) report was not available for review, the analysis referenced information based on project location as well as comments and recommendations contained in interim documents such as the "Document on Environmental Considerations in the Planning Stage," "Scoping Document for Environmental Impact Assessment," and "Draft Environmental Impact Assessment Report."
The area surrounding the project site hosts numerous completed and planned wind farms, including some for which the Group provides insurance coverage (see Figure 1). According to the avian sensitivity map provided by Japan's Environmental Impact Assessment Database System (EADAS), the project site is classified as "Alert Level A2" for bird-strike risk. Nearby sensitive locations include "Sanriku coast and Matsumaekojima," designated as a Marine Important Bird and Biodiversity Area (Marine IBA), and the wetlands of Shimokita, a Key Biodiversity Area (KBA). There is also the Ogawara Lake wetlands, identified as wetlands of high importance for biodiversity. (See Figures 2 and 3).
While the project raises concerns over potential negative aspects, such as impacts on wetlands and rare raptors, there are also many positive aspects, including the project developer's bird-strike mitigation measures and the establishment of a post-operation monitoring framework. Nevertheless, cumulative impacts are beyond the capacity of individual developers to fully address, underscoring the necessity of integrated, area-wide risk management through public-private collaboration.


Figure 1: Existing Wind Power Plants and Facilities in the Vicinity of the Hibaritaira Wind Power Project (Source: EADAS)

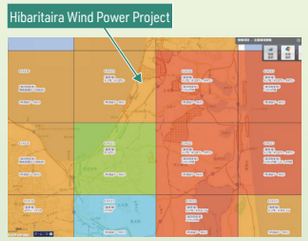



Figure 2: Impacts on Birds – Avian Sensitivity Map from EADAS

Alert Levels
- Alert Level A1
- Alert Level A2
- Alert Level A3
- Alert Level B
- Alert Level C
- No Information

Source: "Environmental Assessment Database – Avian Sensitivity Map for Wind Power Projects (FY2017)," Ministry of the Environment (Japan) (https://eadas.env.go.jp/eiadb/ebidbs/)


Figure 3: Impacts on Birds – Important Areas Surrounding the Hibaritaira Wind Power Project

Alert Levels
- Marine Important Bird and Biodiversity Area (Marine IBA)

Key Biodiversity Area (KBA)
- KBA within Protected Area
- KBA

Source (Marine IBAs): "Marine IBA White Paper" (Wild Bird Society of Japan and BirdLife International Tokyo, issued August 1, 2016)
Source (KBAs): GIS data prepared by Conservation International:
(1) KBA data – KBA map shapefile (ver. 2011.11.07)
(2) Data for KBA within a protected area – KBA protected area map shapefile (ver. 2011.11.07)

Sources (Power Plant Locations):
1. Created by the Group based on "National Land Numerical Information (Power Generation Facilities) FY2013", Ministry of Land, Infrastructure, Transport and Tourism (Japan)
2. "Cumulative installed capacity of Wind Power in Japan" (as of December 31, 2023); Japan Wind Power Association (JWPA)
Sources (Turbine Locations):
1. Aerial photographs, satellite images, and topographic maps (as of December 31, 2024)
2. "Cumulative installed capacity of Wind Power in Japan" (as of December 31, 2023); Japan Wind Power Association (JWPA)

# [3] Interface with Sensitive Locations Based on TNFD

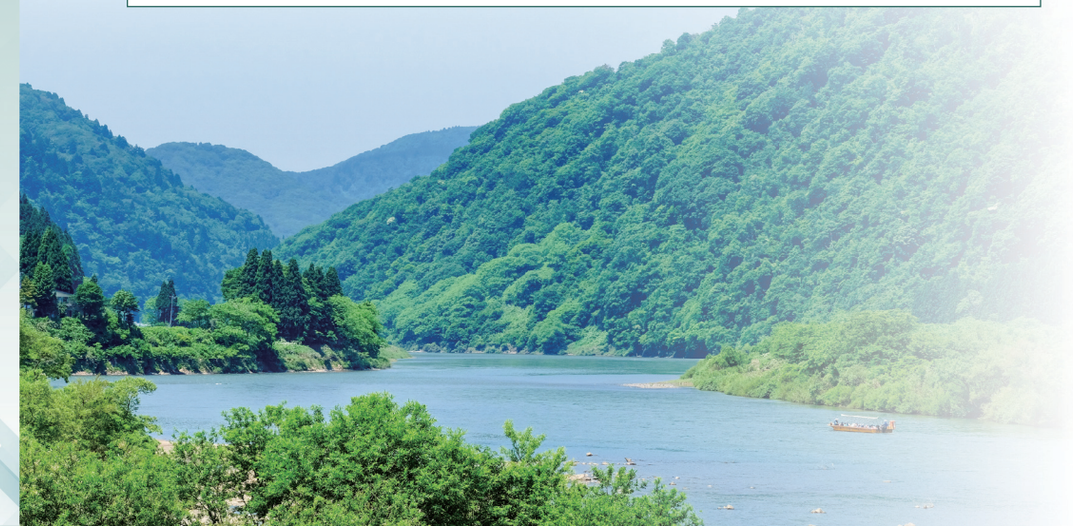
Under the recommendations of the Taskforce on Nature-related Financial Disclosures (TNFD), companies are urged to analyze and disclose their interface with sensitive locations along their value chains. Sensitive locations refer to areas such as those rich in biodiversity that are experiencing or at risk of ecological degradation, those highly dependent on natural capital such as water resources, and those vulnerable to natural disasters. Because these locations are most susceptible to climate- and nature-related risks, the MS&AD Group has assessed the extent to which our investment and loan portfolio as well as our own business sites are connected to such locations.

## 1. Assessment of TNFD sensitive locations among our top 500 investment/loan portfolio companies Investment/Loan

The Group's two main sources of revenue are insurance underwriting and asset management. We invest and manage funds entrusted by our customers to generate returns, which are then used, among other things, to pay insurance claims. To understand climate- and nature-related risks within these asset management activities, it is essential to grasp how each investment/loan portfolio company depends on and impacts nature. Based on the TNFD additional guidance for financial institutions, we evaluated the extent to which the direct operational sites of our top 500 investment/loan portfolio companies overlap with sensitive locations—areas considered significant in terms of nature-related issues—using location data for their direct operational facilities.

### Key findings of our analysis

- To understand climate- and nature-related risks affecting investment returns, we identified the degree of dependence and impact on nature at the direct operational sites of investment/loan portfolio companies, and conducted an analysis focusing on flood inundation risk in sensitive locations.
- Analysis of the distribution of sites located in areas with a flood inundation risk index of four or higher (corresponding to an inundation depth of over one meter) revealed that, in Japan, the Group's investment/loan portfolio company sites are particularly concentrated in high flood-risk areas along the Arakawa and Yodo River basins.



### (i) "Importance of Biodiversity" × "Integrity of Ecosystem"

When our value chain companies are located in areas that score highly in terms of biodiversity importance (which assesses proximity to protected areas) and ecosystem integrity (which measures the completeness and health of ecosystems), operations that could have a significant negative impact are more likely to face risks such as business suspension following an accident or reputational damage arising from consumer boycotts. We conducted an assessment based on this understanding.

**Distribution by sector**

On average by sector, the proportion of business sites located in regions with high biodiversity importance or ecosystem integrity was slightly above 2% even for the most affected sectors. The sectors showing relatively higher ratios were Communication Services, Consumer Discretionary, Consumer Staples, Industrials, and Financials.

### (ii) Importance of ecosystem service provision

In areas where ecosystem service provision is highly important, local communities often both support and depend on these ecosystem functions. Businesses operating in such areas should therefore be mindful of potential conflicts with local residents and place importance on coexisting harmoniously with regional stakeholders.

**Distribution by sector**

Our analysis showed that the Energy sector, due to its extensive land use and reliance on natural resources, and the Financials sector, with operations spread globally, tended to have higher ratios of sites located in such areas.

### (iii) Water-related physical risks

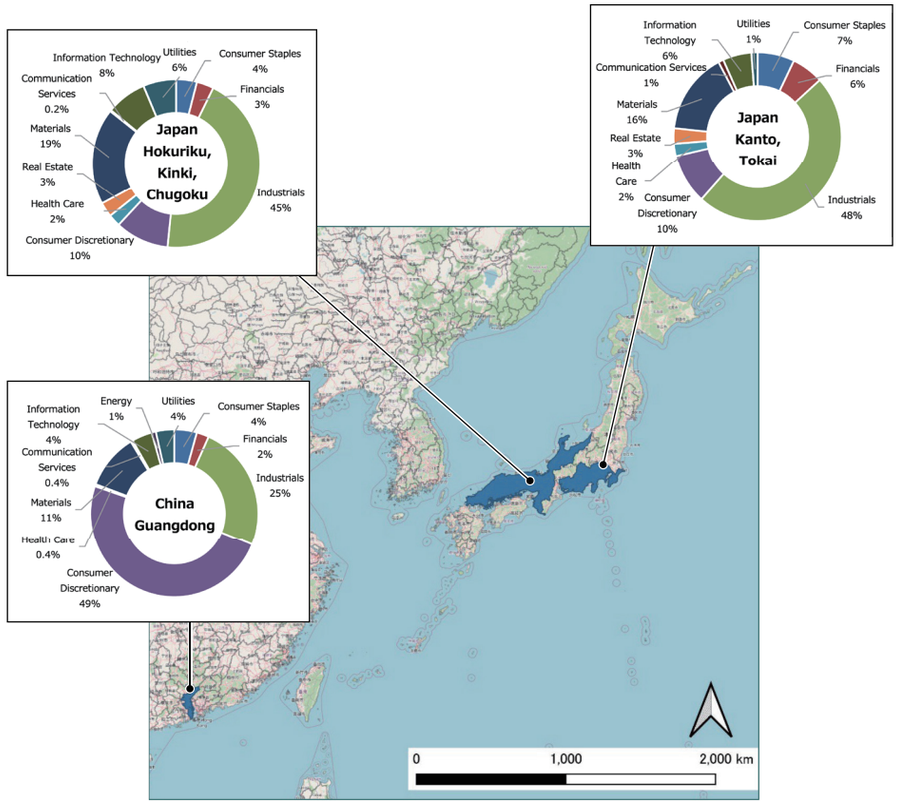
Since more than 20% of business sites across all sectors are located in sensitive locations, this issue was identified as a high priority.
Given the significant increase in water-related disasters in recent years, the Group considers it important to conduct a deeper analysis of flood inundation risk, as it is a key component of physical water risk in sensitive locations. Accordingly, we typically assess locations at risk of severe flooding by estimating the depth of water from a 1-in-100-year flooding event using a high-resolution 500 by 500 meter grid.
This fiscal year, rather than analyzing each investment/loan portfolio company's location individually within sensitive locations, we assessed the distribution of investment/loan portfolio company sites where the flood inundation risk index was four or higher (corresponding to an inundation depth of one meter or more). A concentration of such sites indicates higher potential risk in the event of an actual flood.

### Investment/loan portfolio company distribution in sensitive locations

In Japan, the Arakawa and Yodo river systems were found to have particularly high flood inundation risks and the greatest concentration of our investment/loan portfolio company sites.

### Water-related physical risks by watershed region

Looking at river basins in the Kanto-Tokai and the Hokuriku-Kinki-Chugoku regions, sites with higher risks mainly belonged to client companies in the Industrials sector, accounting for 48% and 45% of the total respectively, while sites in basins located in China's Guangdong Province were mostly in the Consumer Discretionary sector at 49%. Taking into account the characteristics of each of these sectors, we use the findings to inform engagement with our clients on measures to address water-related disaster risks.



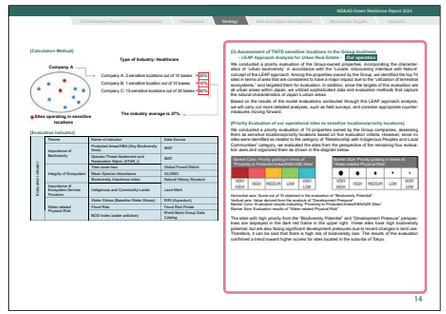

## 2. Assessment of TNFD sensitive locations in the Group business

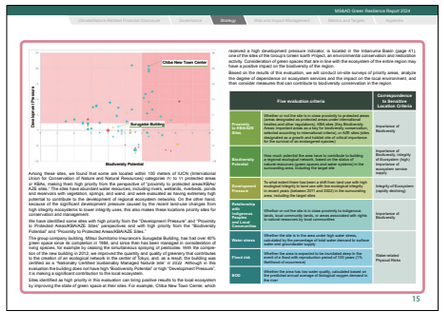
MS&AD Group Operations

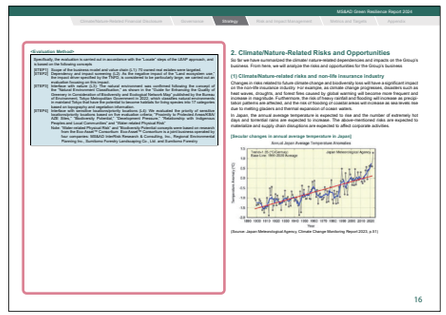
For details on the assessment of TNFD sensitive locations in relation to the Group' s business sites, please refer to page 14 of the MS&AD Green Resilience Report 2024.

→ MS&AD Green Resilience Report 2024
https://www.ms-ad-hd.com/en/csr/main/05/teaserItems1/01/link/

Indicates relevant section







# Strategy | Analysis of Risks and Opportunities

## [1] Physical Risk [Underwriting / Investment and Loan]

Climate- and nature-related risks include the direct impact of climate change and damage to nature (physical risk) and the impact of rapid social change toward net zero and nature positivity (transition risk). As an insurance and financial group centered on non-life insurance business, we need to evaluate risks from both perspectives of underwriting and investment/loan (asset management).

### 1. Climate- and Nature-Related Physical Risks

#### Acute and chronic climate/nature-related risks

The growing risk of natural disasters associated with climate change has already begun to exert financial impacts on the insurance underwriting of the MS&AD Group. These include wind and flood damage from typhoons and heavy rainfall, as well as wildfires and hailstorms. In many cases, these damages are further amplified by the degradation of natural capital. Moreover, not only acute risks like natural disasters but also chronic climate- and nature-related risks, such as the depletion of water resources, are expected to have an increasing medium- to long-term impact on society and business activities.

H+: Very High H: High M: Medium L: Low

| Classification | Event | Examples of main impacts on policyholders and investment and financing recipients | Examples of main impacts on the Group and degree of impact (◆Underwriting ◆Investment/loan) | | Period of manifestation | | |
|---|---|---|---|---|---|---|---|
| | | | | | Short term | Medium term | Long term |
| Acute risks | Typhoons, hurricanes, storm surges | Stronger and more frequent tropical cyclones cause significant damage to homes and businesses. Depending on their course, such cyclones could cause damage over a wide area. Storm surges also cause significant damage to coastal areas. | ◆Insurance claims payouts occur, particularly concerning many homes, businesses, vehicles, and other property<br>◆Returns deteriorate owing to large-scale damage affecting important business sites | H+ | ● | ● | ● |
| | Torrential rain, flooding | Increased temperatures increase the amount of water vapor in the atmosphere, causing torrential rainfall. Extensive flooding caused by improper land use or flood control conditions cause significant damage. Lack of soil stability due to deforestation and vegetation removal, or cutting and reclamation of slopes, causes landslides triggered by torrential rainfall. | | H | ● | ● | ● |
| | Hail and snow damage | Hailstorms are caused by active convective activity due to warm, moist air currents in the updrafts generated by strong solar radiation and cold air inflows into the sky. Falling hail damages vehicles and buildings. Many facilities of non-heavy snowfall areas are not strong enough to withstand, and heavy snowfall damages facilities. | ◆Insurance claims payouts occur for damage to vehicles and facilities<br>◆Not likely to lead to a significant deterioration in returns | H | ● | ● | ● |
| | Forest fires | Heat waves and extreme heat cause forest fires. Insufficient tending to forests, such as the neglect of dead trees and underbrush, increases the risk of fire. Fire spreading to surrounding urban areas, etc., will lead to significant damage. | ◆Insurance claims payouts occur for forests, as well as homes and businesses in the event of fires spreading<br>◆Returns deteriorate owing to large-scale damage affecting important business sites at the recipients of investment and financing | M | ● | ● | ● |
| | Heat wave, cold wave | Severe heat and cold waves cause human suffering, sudden strains on energy and water resources, and logistical disruptions such as traffic paralysis. | ◆Large-scale insurance payouts have not yet materialized<br>◆Not likely to lead to a significant deterioration in returns | M | | ● | ● |
| Chronic risks | High temperatures (heat) | Disruptions due to rapid increases in energy demand could occur. Data centers, power plants, and other facilities face an increased burden for cooling. Labor efficiency falls as outdoor activities, such as construction sites are restricted, and there is an impact on health, such as increased stress due to heat and the spread of infectious diseases. | ◆Large-scale insurance payouts have not yet materialized<br>◆Returns deteriorate as performance worsens at companies for which high temperatures can be a risk | M | | ● | ● |
| | Depletion of water resources, dry spells and droughts | Depletion of water resources due to excessive groundwater extraction or development in groundwater recharge areas, as well as droughts and dry spells, can lead to higher costs and losses for agriculture, food processing, and other water-intensive industries. This can include difficulties in procuring raw materials and interruptions in production processes. Interruptions in waterborne transport that relies on rivers and other waterways, and shortages of cooling water, can also affect a wide range of industries. | ◆Large-scale insurance payouts have not yet materialized<br>◆Declining returns for companies dependent on water resources | L | | ● | ● |
| | Sea-level rise | As sea levels rise, port and coastal areas may experience damage to facilities and infrastructure and land erosion caused by storm surges and high waves. | ◆Large-scale insurance payouts have not yet materialized<br>◆Not likely to lead to a significant deterioration in asset management returns | L | | ● | ● |
| | Degradation of other ecosystem services | Serious losses might occur when ecosystem services on which livelihoods and business activities depend are degraded or destroyed. This includes services such as pollination for agriculture, which can be affected by damage to natural capital. | ◆Large-scale insurance payouts have not yet materialized<br>◆Returns deteriorate at companies which operate businesses that are overly dependent on ecosystem services in areas with serious damage to natural capital | L | | | ● |

### Impacts of global warming on extreme weather

Extreme weather events have traditionally occurred as part of natural variability or fluctuations in the climate system. In the past, it was impossible to isolate the specific influence of global warming from this natural variability, making it difficult to scientifically prove a direct link between global warming and extreme weather events. However, in recent years, a groundbreaking analytical method known as event attribution has made such analysis possible. This approach has provided scientific evidence that the intensification of such external forces is attributable to climate change.

According to research conducted by two Japanese agencies—the Program for the Advanced Studies of Climate Change Projection within the Ministry of Education, Culture, Sports, Science and Technology, and the Meteorological Research Institute of the Japan Meteorological Agency—the very destructive Noto Peninsula heavy rainfall disaster of September 2024 saw total precipitation that was approximately 15% higher than in a scenario without global warming. These results suggest that rising air and sea surface temperatures associated with global warming may have contributed to the increased rainfall in the Noto region of Ishikawa Prefecture.

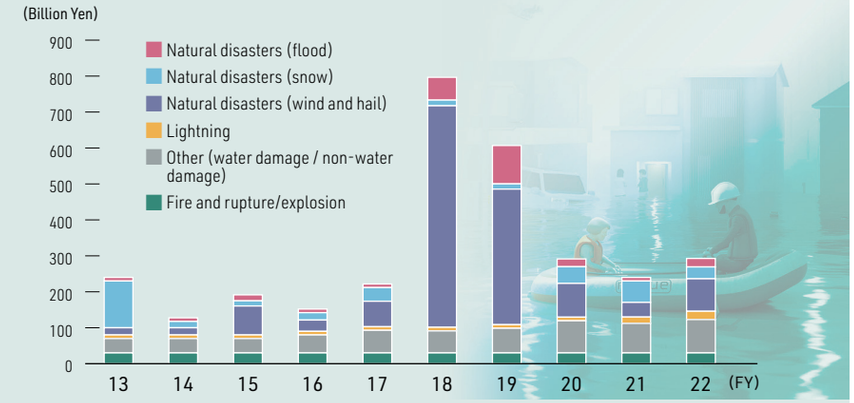
## 2. Current Situation for Natural Disasters and Non-Life Insurance

### (i) Status of insurance payouts for natural disasters in Japan

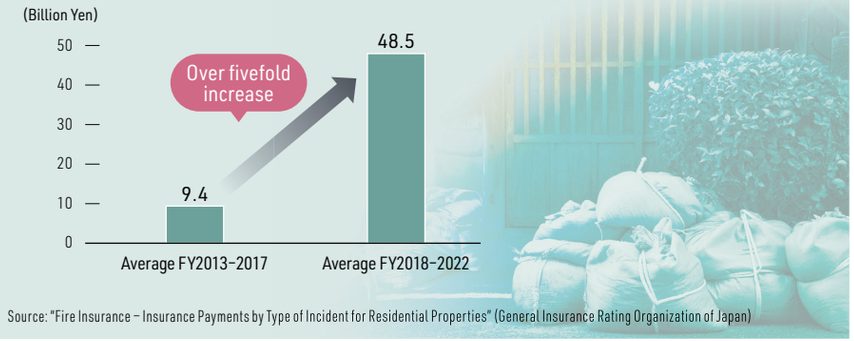
According to data on domestic insurance payouts published by the General Insurance Rating Organization of Japan, while payouts for "fire and rupture/explosion" and "other causes (such as water damage or non-water damage)" have shown a moderate upward trend within a stable range, payouts related to natural disasters have fluctuated significantly from year to year. In particular, payouts for water-related disasters have shown a substantial increase on average. This is because, in recent years, climate change has intensified the severity of natural disasters, resulting in large-scale losses from single disaster events.

Fire Insurance

**Insurance Payouts by Type of Incident for Residential Properties**




**Insurance Payouts for Water Disasters (5-Year Average - Residential Properties)**




Source: "Fire Insurance – Insurance Payments by Type of Incident for Residential Properties" (General Insurance Rating Organization of Japan)

# Contents





## (ii) Situation for Group insurance payouts due to natural disasters

The table below shows the Group' s net incurred insurance claims for natural disasters over the past five years, along with the major disaster events in each fiscal year and the corresponding payout amounts. The increasing severity and frequency of natural disasters have had a significant impact on the amount of insurance payouts, making natural disaster risk one of the key issues for us.

| | FY2020 | FY2021 | FY2022 | FY2023 | FY2024 |
|---|---|---|---|---|---|
| Net Incurred Insurance Claims from Natural Disasters | JPY 124.9 bil. | JPY 112.3 bil. | JPY 145.3 bil. | JPY 162.7 bil. | JPY 161.7 bil. |
| Incurred Insurance Claims for Major Natural Disasters (Directly Underwritten) (in billions of yen) | July Heavy Rain **37.1**<br>Typhoon No. 10 **34.7** | August Heavy Rain **18.7**<br>Fukushima Offshore Earthquake **14.9**<br>July Heavy Rain **9.1** | June Hailstorm **42.8**<br>Typhoon No. 14 **34.2**<br>Typhoon No. 15 **19.8** | Typhoon No. 2 **15.4**<br>July Heavy Rain **16.0**<br>July Gunma Hailstorm **31.9**<br>Typhoon No. 7 **14.6**<br>Noto Peninsula Earthquake **17.3** | Hyogo Hailstorm **49.6**<br>Typhoon No. 10 **18.1**<br>Tokai Region Hailstorm **11.5**<br>Tokyo Hailstorm **7.4** |

## (iii) Future trends for natural disasters

Focusing on water-related disasters—where payouts have increased particularly sharply—we examined future trends by considering the three elements of natural disaster risk: hazard, vulnerability, and exposure. "Hazard" refers to the natural phenomena that cause disasters themselves, "vulnerability" refers to the susceptibility to damage or impact, and "exposure" refers to the degree to which people or assets are subject to potential damage or impact.

Flood Risk = Hazard × Exposure × Vulnerability

- Hazard: Factors contributing to floods
- Exposure: Concentration of population, assets, etc.
- Vulnerability: Unprotected populations / disaster-vulnerable groups

### Hazard

The hazard of weather events such as typhoons and heavy rainfall is intensifying as climate change progresses.

**Progress of global warming**

The World Meteorological Organization (WMO) announced that 2024 was the hottest year on record, with the global average temperature rising by 1.55°C compared to pre-industrial levels.

**Increase in rainfall**

The number of brief but intense rainfall events has already increased by about 1.4 times compared with roughly 30 years ago. Japan's Ministry of Land, Infrastructure, Transport and Tourism (MLIT) projects further changes in rainfall volume and flood frequency as temperatures continue to rise, as shown in the table below.

| Climate Change Scenario | Rainfall Increase | River Flow Increase | Flood Likelihood |
|---|---|---|---|
| 2°C rise | Approx. 1.1 times | Approx. 1.2 times | Approx. 2 times |
| 4°C rise | Approx. 1.3 times | Approx. 1.4 times | Approx. 4 times |

Source: Ministry of Land, Infrastructure, Transport and Tourism, Technical Review Committee on Flood Control Planning in Consideration of Climate Change, "Recommendations for Flood Control Planning in Consideration of Climate Change – Reference Materials" (revised April 2021)

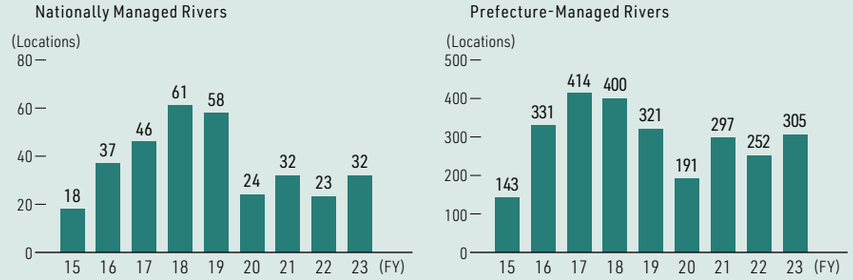
### Vulnerability

With its history of many water-related disasters, Japan has developed disaster-prevention infrastructure such as levees and dams to protect public safety. However, in recent years, rainfall has often exceeded anticipated levels, revealing growing challenges in the defensive capacity of such infrastructure.

**River conditions**

Although MLIT is systematically implementing measures to lower river water levels, such as constructing dams and flood control basins and dredging river channels, the number of locations where floodwaters have exceeded the flood danger level (i.e. the water level at which a river is at risk of overflowing its banks) has been increasing.

**Riverbank Locations Exceeding the Flood Danger Level**




Source : MLIT Technical Review Committee on Flood Control Planning in Consideration of Climate Change "Recommendations on Flood Control Planning in Consideration of Climate Change ? Reference Materials" (Revised April 2021)

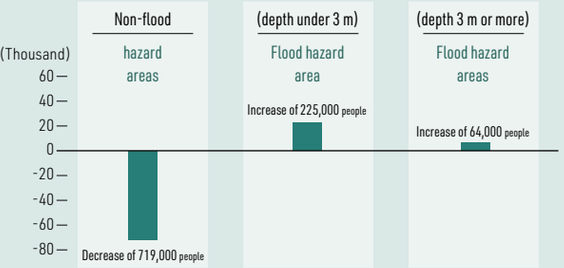
### Exposure

When people live or establish business sites in areas prone to flooding, such as near rivers or in low-lying regions, exposure to water-related disaster risk increases. Although Japan's overall population is declining, data show that residential population is shifting into higher-risk areas, which means that exposure is increasing.

**Population concentration**

Between 2010 and 2020, when Japan entered a phase of population decline, the population in areas not designated as flood-risk zones decreased by 719,000. In contrast, the population in flood hazard areas increased by a total of 289,000—of which 64,000 were living in areas designated as having a potential inundation depth of three meters or more.

**Population Living in Flood Hazard Zones of Urban Planning Areas (2010-2020)**



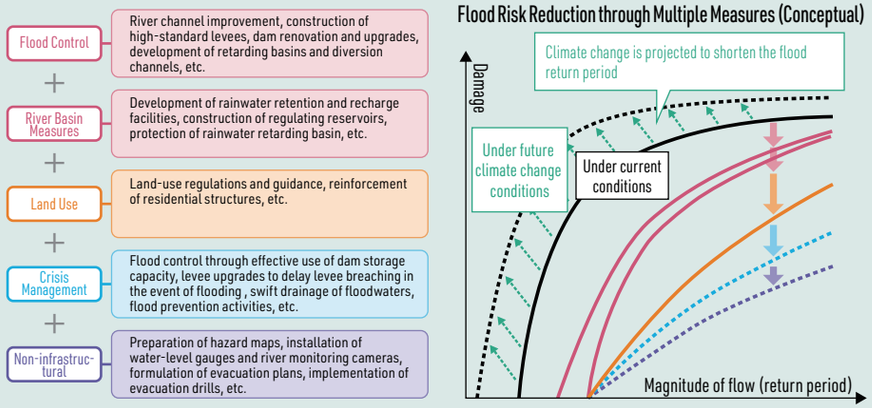

Source: Chie Nozawa, Seiya Ueda, Taiki Kakinuma, "Study on Population Trends and Residential Guidance by Land Use Regulation in Flood-prone Areas" , Reports of the City Planning Institute of Japan, No. 21, February 2023

## (iv) Japan's national approach to flood risk mitigation

In response to the rising risk of water-related disasters, has pointed out that river flood control measures alone are insufficient to address the increase in risk. The Ministry advocates for comprehensive efforts that combine basin-wide measures and land-use management. In line with Japan's national direction, the MS&AD Group will also work to promote basin-based initiatives through collaboration among industry, government, and academia. We will do this not only by providing compensation for water-related damage but also by pursuing fundamental reductions in water-related disaster risk.

[For details, see page 37.]

### Working to Reduce Flood Risks




Source : MLIT Technical Review Committee on Flood Control Planning in Consideration of Climate Change "Recommendations on Flood Control Planning in Consideration of Climate Change ? Reference Materials" (Revised April 2021)

### Nature-based Solutions in Basin-wide Flood Control

The Inbanuma River Basin once featured a traditional rural Japanese landscape known as "yatsu," where grasslands covered upland plateau areas, forests lined slopes leading down to valleys, and rice paddies were cultivated on valley floors. However, when the region started to be intensively developed for farmland, factories, and housing, river channel improvements were implemented along with retention basins, resulting in major land use change. In recent years, the increasing frequency of short-duration heavy rainfall events has again raised concerns about heightened flood risk.

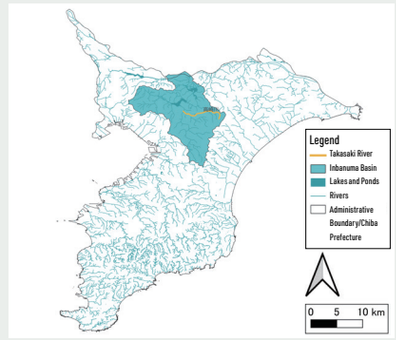
The MS&AD Group is working to implement nature-based solutions and green infrastructure in this basin, aiming to reduce water-related disaster risks through the restoration and conservation of degraded yatsu wetlands and upper grassland plateau areas. This analysis evaluates how land-use changes have affected flood risk and the associated financial losses, and considers insights for future basin-wide flood control efforts.

#### ■ Analysis of inundation depth and financial losses through flood simulation

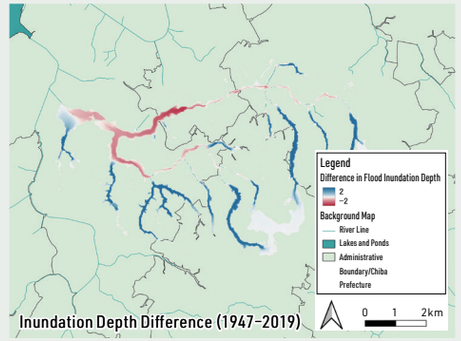
This analysis was conducted using the basin of the Takasaki River, a Class A river that forms part of the Inbanuma River Basin of Chiba Prefecture, and which has been the subject of previous research. Based on the state of agricultural drainage system development between 1947 and 2019, inundation depths were calculated through flood simulations assuming rainfall from a once-in-a-century event. In this analysis, those inundation depths were applied to fiscal 2021 building data to estimate potential damage amounts, thereby assessing how land-use changes have influenced the scale of flood-related losses.

**Figure 1: Results of Flood Simulation Based on Land Use in 1947 vs. 2019**

Takasaki River Basin

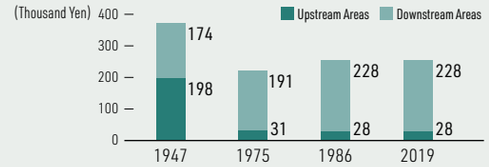



Comparison of Inundation Depths




Source: Created using resources on administrative boundaries (polygons), rivers (lines), lakes (polygons), watershed boundaries / non-catchment areas (polygons) by MLIT, available on the website of the National Land Numerical Information website:
https://nlftp.mlit.go.jp/ksj/index.html (Japanese only)

Table 2: Changes in Building Damage Losses Upstream and Downstream




#### ■ Increase in damage proportion in downstream areas

As shown in Figure 1, comparing estimated inundation depths for the waterway distributions in 1947 and in 2019 reveals that upstream areas generally show lower depths in 2019 (indicated in blue, in the figure), while downstream areas show higher depths (indicated in red). This indicates that a dense network of waterways developed has increased the flood burden downstream. Additionally, as shown in Table 2, while overall building-related losses from flooding has significantly decreased since 1947, losses in downstream areas began to rise again in 1975, and the proportion of total losses occurring in downstream areas has markedly increased since then.

#### ■ Implications for basin-wide flood control

This analysis suggests that river improvements and the development of agricultural water channels since 1947 have allowed rainwater in upstream areas to drain more quickly, enhancing safety there. However, this has also resulted in rapid accumulation of rainwater downstream, increasing flood risk in regions with concentrated housing and business sites. In recent years, some rice paddies in the upstream yatsu have been abandoned. This presents an opportunity to retain and infiltrate water across the entire yatsu area rather than discharging rainwater through agricultural water channels, thereby reducing downstream runoff and mitigating flood risk. Moving forward, refining analyses of upstream conditions and the entire basin, and quantifying both risk and risk-reduction effects, will help guide concrete basin-wide flood control measures. Furthermore, insights gained from this analysis will be utilized by the insurance industry for risk assessment as well as the development of products and services, contributing to sustainable disaster prevention and mitigation systems that utilize nature-based solutions.

This analysis was conducted based on the following references.

Ohtsuki, K., Nishihiro, J., Kato, H., and Nakamura, K.: Evaluation of the Impact of Drainage Channel on Flood Flow in the Urban-Rural Landscape, Proc. 14th International Symposium on Ecohydraulics, Nanjing, China, 2022.

## 3. Physical Risk Analysis in Underwriting

The Group believes that it is our social mission to continue to offer coverage even in a society where natural disasters are increasing due to climate change. We carry out scenario analysis to identify changes in natural disaster risk due to the escalation of climate change, and use various methods to confirm the risk analysis and the effects of risk mitigation, such as refining future risk assessment and evaluating the mitigation of damage caused by water-related disasters through the use of nature.

### (i) Scenario Analysis of the Impact of Changes in Typhoon Severity on Claims Settlements

Further global warming could increase the severity of natural disasters such as typhoons and the increased risk of resultant damage. Therefore, as a scenario analysis of physical risk, we analyzed the potential impact on insurance settlement by typhoon severity associated with global warming.

#### Climate change scenario analysis methods

The project for considering methods of analysis that examines the potential effects of climate change on underwriting was launched by the United Nations Environment Programme Finance Initiative (UNEP FI) in 2018. Over 20 insurance companies that signed on to the Principles for Sustainable Insurance (PSI), including the Group, participated in the project, and worked on developing scenario analysis methods in some working groups based on the likely impacts of climate change subject to analysis.

#### Analysis and evaluation tool for typhoon risk

The Group participated in the working group for analyzing typhoons and hurricanes that have a significant impact on underwriting and examined the impact of future global warming on the risk amounts arising from typhoons and hurricanes. Focusing on changes in the "intensity" and "frequency" of typhoons, and referring to the results of research carried out by Knutson et al. (2020) thereon, we developed an analysis and evaluation tool for 2050 in the 4°C scenario (RCP 8.5).

#### Analysis and evaluation tool for storm surge risk

Regarding storm surge changes caused by typhoons, we also developed an analysis and evaluation tool for 2030 and 2050 under the 2°C (RCP 4.5) and 4°C (RCP 8.5) scenarios, referring to the World Resources Institute (WRI)'s tool, Aqueduct Flood, for evaluating storm surge damage, etc.

#### Analysis results

Results using the two analytical evaluation tools are as follows. Scopes of analysis are domestic non-life insurance book (e.g., property, marine, personal accident and auto line) that are expected to be paid out due to typhoons.

##### > Changes in typhoons themselves

In 2050 under the 4°C scenario (RCP 8.5), insurance loss arising from typhoons could vary from approximately +5% to approximately +50% due to changes in "intensity," and from approximately –30% to approximately +28% due to changes in "frequency of occurrence".

| Scenario used | Change in "force" of typhoons (2050) | Change in "frequency" of typhoons (2050) |
|---|---|---|
| 4°C Scenario (RCP8.5) | Approx. +5 – Approx. +50% | Approx. –30% – Approx. +28% |

##### > Change in storm surge caused by typhoons

In both the 2°C (RCP 4.5) and 4°C (RCP 8.5) scenarios in 2030 and 2050, claims settlement may increase by several percent.

**Joint research on typhoon risk assessment in the industry-government-academia collaboration project with the University of Tokyo (ClimCORE)**

We have been participating since fiscal 2021 in an industry-government-academia collaborative project (ClimCORE) led by the University of Tokyo. This project aims to develop high-resolution meteorological data for the Japanese region, which is necessary to precisely assess the effects of climate change, and to promote research and development for the use of such data in society. In this project, the Group collaborated with the University of Tokyo to reproduce a real case study using a meteorological model for Typhoon No. 15 (Boso Peninsula Typhoon) in 2019 and to analyze how typhoon intensity changes with climate change. In the analysis, which takes into consideration three changes from average weather conditions due to global warming (increased water vapor in the atmosphere, increased sea surface temperatures, and increased air temperatures in the upper atmosphere), results were consistent with the UNEP FI impact analysis tool in terms of the change rate of maximum wind speed and claims settlements. In addition, the impact of each change on typhoon intensity is suggested in the table below.

| Changes due to global warming | Impacts on typhoon intensity |
|---|---|
| **Increased water vapor in the atmosphere** | An increase in water vapor in the atmosphere, which is the energy source of typhoons, contributes to the strengthening of typhoons. |
| **Increased sea surface temperatures** | Increased evaporation of water vapor from the sea surface increases the amount of water vapor in the atmosphere, contributing to the strengthening of typhoons. |
| **Increased air temperatures in the upper atmosphere** | When the temperature difference between the surface and the sky becomes smaller, the development of cumulonimbus clouds weakens, contributing to the weakening of typhoons. |

# Contents





## (ii) Scenario analysis of flooding overseas using a future flood hazard map

As global warming progresses, the risk of heavy rainfall and flooding may increase worldwide. To evaluate water-related disaster risk in regions where probability-based assessments are difficult, the Group has utilized the Global Future Flood Hazard Map developed under the Large-scale Risk Assessment of Climate change for Flood Project (LaRC-Flood® Project), a joint initiative by MS&AD InterRisk Research & Consulting, the University of Tokyo, and the Shibaura Institute of Technology. By comparing insurance payouts based on current and future climate hazard maps, we assessed how these risks may change. Leveraging the hazard map developed by the LaRC-Flood® Project enables high-precision analyses of flood inundation depths and potential losses worldwide under multiple climate change scenarios.

## (iii) Scenario analysis of hail damage in Japan

Although a causal relationship between global warming and severe hail events is not yet clear, large insurance payouts from hail damage have occurred repeatedly in Japan in recent years. The Group, in collaboration with MS&AD InterRisk Research & Consulting, conducted a scenario analysis assuming a hail disaster in an urban area similar in intensity to the largest recent event—the June 2022 hailstorm centered in northern Kanto. The results suggested potential damage comparable to that of past large-scale typhoons. Unlike wind or snow disasters, precise analysis of hail damage is challenging due to limited data on past hail distribution and available hazard maps. Nevertheless, we continue to work on improving our analytical methods.

## (iv) Other scenario analyses and research

### Scenario analysis in collaboration with the Bank of Japan and the Financial Services Agency

In fiscal 2021, referencing assumptions from scenarios discussed by the Network for Greening the Financial System (NGFS), we collaborated with the Bank of Japan and the Financial Services Agency to conduct scenario analysis exercises, examining insurance payouts from natural disasters intensified by climate change. In fiscal 2024, a second round of scenario analysis under the same framework was conducted.*

→* Reference: "Release of "2nd Scenario Analysis on Climate-Related Risks [Insurance Sector]"
https://www.fsa.go.jp/en/news/2025/20250620.html

### Scenario analysis in collaboration with academic institutions

The Group also seeks to enhance knowledge through research projects in collaboration with academic institutions, while developing analytical methods that reflect changes in the intensity of various disasters due to climate change, thereby improving the accuracy of scenario analyses.

We will continue to examine methods for assessing the impacts of climate change, while referring to the analysis methods based on UNEP FI projects and information to be published by NGFS.

## 4. Analysis of Physical Risks in Investment and Loan Portfolio

Investment/Loan

As an institutional investor, the Group makes investments and loans to many companies, and we believe that an increase in water disaster damage at key locations of our investment/loan portfolio companies due to climate change could lead to a deterioration in investment returns. To this end, we analyze the physical risks of the assets of our major investment/loan portfolio companies to identify climate change risks associated with fund management.

### Scenario analysis of physical risks for the top 500 investment/loan portfolio companies

**Key findings of our analysis**

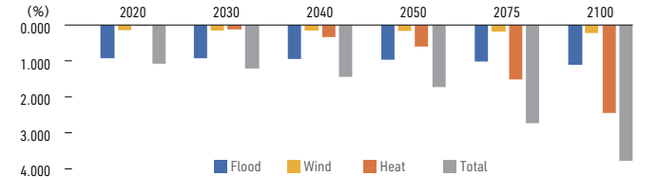
- The 4°C or higher climate change scenario would have the greatest impact on the Group's stock holdings. Under this scenario, sales and asset losses by 2050 are estimated at approximately 2% each, reflecting the combined effects of flooding, wind damage, heat stress, and other factors. However, when compared to the total sales of our portfolio companies, the overall impact on the Group's investment and loan portfolio is considered limited.
- Currently, flood risk is the main contributor to sales losses, but heat-related risk is increasing year by year and is expected to exceed flood risk after 2050.
- Under the 4°C or higher scenario, heat stress emerges as a major risk. Accordingly, the Group will strengthen support for corporate heat-stress measures, including training for heatstroke prevention, establishing response systems for heatwave events, and providing compensation.

The Group is strongly exposed to climate-related risks through its investment and loan relationships with customers. Accordingly, we conducted a quantitative assessment of how physical risks arising from climate change—such as floods, wind damage, and heat stress—could affect the sales and assets of companies in our investment and loan portfolio, which includes stocks, corporate bonds, and corporate loans. Specifically, we selected the top 500 portfolio companies and analyzed how various climate change scenarios could impact their sales and asset values.

For details, see page 59.

Stocks and Sales

| Disaster | 2020 | 2030 | 2040年 | 2050 | 2075 | 2100 |
|---|---|---|---|---|---|---|
| Flood | 0.927% | 0.928% | 0.949% | 0.965% | 1.021% | 1.107% |
| Wind | 0.150% | 0.156% | 0.161% | 0.167% | 0.190% | 0.228% |
| Heat | 0.002% | 0.124% | 0.339% | 0.601% | 1.521% | 2.449% |
| Total | 1.079% | 1.207% | 1.449% | 1.733% | 2.731% | 3.784% |



# [2] Transition Risk [Underwriting / Investment and Loan]

In the transition to a net-zero or nature-positive society, rapid changes in various areas of society, such as laws and regulations, technology, and markets, pose risks (transition risks) for corporate activities. The Group believes that such risks may lead to lower profits from underwriting and asset management. However, in terms of in underwriting, we expect that the impact will be limited because, with the exception of a few products, there are few insurance products that directly cover transition risk. We believe that technological innovation and the introduction of new laws and regulations create new opportunities for insurance provision, but it also poses risks if we are unable to respond to these needs.

H+: Very High H: High M: Medium

| Classification | Event | Examples of main impacts on policyholders and investment and financing entities | Examples of main impacts on the Group and degree of impact ◆Underwriting ◆Investment and financing | | Period of manifestation: Short term | Medium term | Long term |
|---|---|---|---|---|---|---|---|
| Technology | Advances in net zero and nature-positive technologies and changes in industrial structure | As technologies that contribute to net zero and nature positive, such as decarbonization, recycling, and pollution removal technologies, spread rapidly, could render existing technologies and infrastructure obsolete and result in loss of our share of the traditional market. | ◆Loss of opportunities to offer insurance<br>◆Decline in investment returns | M | | ● | ● |
| Market | Changes in demand for products and services that contribute to net zero and nature positivity | Increased demand to net zero and nature positivity among consumers and clients could reduce demand for products and services that lead to global warming and excessive impacts on nature. | | M | | ● | ● |
| Policies, laws, and regulations | Rising carbon prices, emission regulations, and changes in the energy mix | Additional carbon price-related costs incurred by businesses that emit large amounts of GHGs, like the imposition of carbon prices by governments, and responses to requests from customers to introduce renewable energy could lead to a loss of earnings and a decline in competitiveness. | | M | | ● | ● |
| | Strengthening of environment-related regulations and standards | The strengthening of laws and regulations, etc., as part of efforts to achieve net zero and nature positivity might not only increase regulatory compliance costs but also lead to business downsizing and suspensions, and difficulties in procuring raw materials, resulting in a loss in profitability. In addition, the burden of disclosure could increase costs, and inadequate disclosure might have a negative impact on management. | | M | ● | ● | ● |
| | Increase in climate/nature-related litigation | Errors in climate/nature-related measures have resulted in significant business losses, and there is a risk that such errors in management strategy could lead to high costs, including officer lawsuits and compensation, as well as a decline in corporate value due to brand damage. | ◆Possibility of high insurance claims payments in D&O insurance*1<br>◆Decline in investment returns | M | ● | ● | ● |
| Reputation | Criticism due to errors or delays in climate/nature-related measures | Risk that the discovery of involvement in businesses that have significant adverse effects on global warming and nature could lead to consumer boycotts and suspension of business with clients, resulting in reduced sales, brand damage, a decline in corporate value, and worsening financing costs. | ◆Possibility of insurance claims payments for brand image insurance*2<br>◆Decline in investment returns | H+ | ● | ● | ● |

*1 D&O: Directors & Officers' liability insurance. Compensation for damages, litigation expenses, etc., incurred by corporate officers because of claims for damages arising from acts (including omissions) committed by corporate officers in their capacity as officers
*2 Compensation for expenses incurred for measures necessary to restore brand image in the event of an accident requiring compensation, etc.

## Transition risk analysis in our investment/loan portfolio [Investment/Loan]

### Scenario analysis: impact of carbon costs on investment portfolios

**Key findings of our analysis**

- We analyzed the potential future carbon costs that the Group's portfolio companies may incur under different temperature-rise scenarios.
- In the high scenario, in which sufficient policy measures are implemented to limit global temperature rise to below 2°C, transition risks will increase as companies face a greater carbon cost burden.
- Analysis of the Group's investment portfolio as of March 31, 2024, indicates that under both the high and medium scenarios, portfolio companies could experience higher carbon earnings at risk by 2050.

"Carbon pricing," which assesses the costs associated with GHG emission volumes, is being considered worldwide as a policy to encourage reductions in GHG emissions, and this policy could indicate a risk of an increased carbon cost burden for companies. Therefore, we analyzed the potential future impact of increased carbon costs on the Group's investment portfolio as a transition risk scenario analysis. For the analysis, we used analysis tools developed by S&P Global Trucost, a company that researches environmental data such as carbon emissions and climate change risks, where we analyzed degrees that investee companies presently have the ability to pay the future carbon costs they would need to bear (carbon earnings at risk (EBIT at risk)*).

* Shows the financial impact on the investment portfolio for each scenario, calculated by dividing the unpriced cost of carbon (UCC) by the earnings before interest and taxes (EBIT).

# Contents





Taking into consideration that TCFD recommends scenario analysis based on the rise in temperature being maintained at 2°C or less, the Group used the following three scenarios for analysis.

| | |
|---|---|
| High scenario | Scenario in which administrative measures are implemented that are sufficient to be in line with international targets (Paris Agreement) of keeping temperature increase to less than 2°C by 2100 |
| Medium scenario | Scenario in which long-term administrative policies are enacted to keep global temperature increase to 2°C but short-term administrative policy implementation is delayed |
| Low scenario | Scenario in which each nation voluntarily implements its own targets but global temperature increase reaches around 3°C |

Our analysis covers domestic and foreign stocks of listed companies (covers approx. 98% on a market value basis) and domestic and foreign bonds (also covers approx. 97% on a book value basis) in our investment portfolio as of the end of March 2024. As for the assumption of investee companies' profits, the average value for corporate profits for the last 3 years is used to mitigate fluctuations in financial performance. Regarding GHG emission volumes, Scope 1 (directly emitted by the investee companies) and Scope 2 (indirectly emitted through the use of electric power, etc.) are examined.

### > MS&AD Group carbon earning at risk (EBIT at risk)

The results of the analysis are shown in the table right. The carbon cost and transition risk increase in the high and middle scenarios. In the Group's investment portfolio as of the end of March 20242023, it is estimated that in 2050, carbon earnings at risk may increase by approximately 158% in the low scenario, 25% in the medium scenario, and 3231% in the high and medium scenario for stocks, and 2814% in the low scenario, 48% in the medium scenario, and 6248% in the high and medium risk scenario for corporate bonds.

Stocks (as of March 31, 2024)

| | Low Scenario | Medium Scenario | High Scenario |
|---|---|---|---|
| **2030** | 10.5% | 15.1% | 16.5% |
| **2040** | 12.9% | 21.0% | 25.7% |
| **2050** | 14.5% | 25.0% | 32.1% |

Corporate bonds (as at March 31, 2024)

| | Low Scenario | Medium Scenario | High Scenario |
|---|---|---|---|
| **2030** | 21.9% | 31.1% | 32.9% |
| **2040** | 26.5% | 41.6% | 49.7% |
| **2050** | 29.4% | 48.4% | 61.6% |

This analysis is based on the current levels of greenhouse gas emissions by investee companies. If they promote decarbonization, the carbon cost allocated to them is reduced and then the future carbon earnings at risk will also be reduced. We will continue to mitigate the impact on the investment portfolio through engagement with investee companies.

## Analysis of consistency with 2°C scenario

**Key findings of our analysis**

- Analysis of the Group's investment portfolio as of March 2024 indicates that the transition path for stocks corresponds to 2–3°C, while that for corporate bonds is below 1.75°C.
- A higher transition path value signals a greater risk from delayed adaptation to the fundamental policy, technology, social system, and lifestyle changes needed to achieve net-zero by 2050. Accordingly, the Group will continue to support portfolio companies in their transition toward net-zero.

We analyzed the transition paths of our investment/loan portfolio companies for alignment with the 2°C target of the Paris Agreement, using S&P Global Trucost's analysis tools. This analysis evaluates both historical and future (medium-term) expected emissions, and determine whether emissions reductions of our investment portfolio companies over time are at an appropriate level in line with the global warming prevention targets of the Paris Agreement.
In analyzing transition pathways, S&P Global Trucost uses two calculation methods, the "Sectoral Decarbonization Approach (SDA)" recommended by the "Science Based Targets initiative (SBTi)," and the Greenhouse Gas Emissions per unit of Value Added (GEVA) approach.
By using historical data on corporate business activities and GHG emissions with 2012 as the base year and forward-looking data up to 2030, we evaluate the expected future transition paths. This aims to eliminate the uncertainty in the assessment caused by relying solely on estimated emissions data, and to ensure a sufficient time period covered to reduce the impact of year-on-year changes on the verification results.
Our analysis covers domestic and foreign stocks of listed companies (covers approx. 99% on a market value basis) and domestic and foreign bonds (also covers approx. 97% on a book value basis) in our investment portfolio as of the end of March 2024.

### > Analysis of consistency with MS&AD Group 2°C target

The results of the analysis are shown in the table below. The transition path for equities corresponds to 2–3°C, while that for corporate bonds is below 1.75°C.

| As of the end of FY2024 | Stocks | Corporate bonds |
|---|---|---|
| Transition path through 2030 | 2°C - 3°C | Below 1.75°C |

Achieving net zero by 2050 requires fundamental changes in policy, technology, social systems, and lifestyles. Countermeasures are required at the policy level in each country, including the spread of green investment, thorough energy conservation, and decarbonization of power sources using renewable energy. An increasing number of our investment/loan portfolio companies are also formulating transition plans to achieve net zero emissions. The Group will continue to support the transition of our investment/loan portfolio companies to net zero emissions.

## [3] Climate/Nature-related Opportunities

Based on the identified climate/ nature-related physical risks and transition risks, the Group is committed to resolving the social issues that cause risks, as well as to reducing the occurrence of the risks themselves.

Through our activities we will realize the creation of shared value with society, by identifying and communicating risks, preventing the emergence of risks and reducing their impact, and reducing economic burdens.

| | External Environment, Background | Impact on Our Business (Assessment) | Time Horizon | | |
|---|---|---|---|---|---|
| | | | Short | Medium | Long |
| (i) Insurance products for climate change risks | As the physical risks associated with climate change increase, the importance of insurance to protect against economic losses is increasing. Correcting the protection gap is an issue in each country. | In addition to traditional coverage for wind and water-related disasters, there is a need to provide a variety of compensation methods such as weather derivatives and weather index insurance to adapt to climate change. Opportunities are also emerging to offer coverage in collaboration with international organizations. | ● | ● | ● |
| (ii) Climate change adaptation, disaster prevention and mitigation services | With the frequent occurrence of serious losses, there is a strong need to prevent damage or limit losses, and the global adaptation business is estimated to be up to JPY50 trillion annually by 2050. Furthermore, nature-based solutions (NbS), which includes disaster prevention and mitigation that utilizes nature, is positioned as an important issue in the "European Green Deal" etc. | In addition to providing disaster prevention and mitigation services to policyholders, service targets are expected to expand to include local governments that promote disaster prevention and mitigation. There is a need for insurance companies with strengths in risk analysis to create innovative adaptation businesses. | ● | ● | ● |
| (iii) Insurance products to protect against the deterioration of ecosystem services | There are increasing calls for coverage for natural capital and ecosystem services to prevent the degradation of ecosystem services essential for people's livelihoods and businesses due to severe natural disasters, pollution, and development (e.g.; economic value of pollinators is approx. JPY470 billion). | In a Mexican marine resort area, an insurance policy was structured to protect coral reefs, an important tourist resource, from hurricanes. Similar insurance products and policies that cover the cost burdens in business activities associated with loss of ecosystem services may be considered. | | ● | ● |
| (iv) Services related to nature and biodiversity | Half of GDP is dependent on natural capital, and in order to ensure the sustainability of business activities, analysis of nature-related risks and solutions such as nature conservation and restoration to mitigate risks are required before significant losses occur. | As an insurance company that has provided disaster risk analysis and mitigation measures based on regional characteristics, there are high business synergies in analyzing and providing solutions for nature-related risks that are unique to the regions business activities. | | ● | ● |
| (v) Insurance products and services that support and promote net zero | At COP28, a goal of tripling renewable energy power generation capacity by 2030 was adopted, and investment in renewable energy continues to be strong, reaching approximately JPY2 trillion in 2040 in the Japanese market alone. In addition, growth is expected in technologies and products that contribute to low fuel consumption/electric vehicles and energy conservation. Furthermore, as the emissions trading system for high-emission industries will go into full operation from FY2026, emissions trading, including voluntary credits, will become more active. | The construction of new equipment associated with investment in renewable energy and decarbonization technology will lead to an increase in insurance demand. On the other hand, companies in high-emission industries, where reductions are extremely difficult, are expected to utilize carbon credits, which will also increase the need for coverage related to the composition and distribution of credits. | ● | ● | ● |
| (vi) New coverage and services in line with business model transformation towards nature positivity and a circular economy | The World Economic Forum estimates that as of 2030 the transition to a nature-positive economy will require approximately JPY368 trillion in annual global investment, resulting in an increase in business opportunities of JPY1,372 trillion. More than three-quarters of this estimate is also strongly related to net zero emissions and the circular economy. New technologies and business models will be created in diverse industries for major social and economic transformations. | In order to implement unprecedented technologies and mechanisms into society, insurance systems that cover risks will be important. Demand is expected for risk solutions for new businesses that contribute to nature positivity, net zero, and a circular economy in the upstream and downstream of the supply chain, such as the procurement of certified materials with low environmental impact and the promotion of recycling. | | ● | ● |
| (vii) Consulting needs to support analysis of risks and opportunities related to climate and nature and the development of business strategies | TCFD has 4,872 companies worldwide and 1,470 companies in Japan (as of October 12, 2023), and TNFD has 416 companies worldwide and 109 companies in Japan that have agreed to disclose information in accordance with the framework. In the EU and Japan, similar information disclosure of information is becoming mandatory. | There is a high need for consulting services as advanced knowledge and analysis are required to comprehensively identify climate- and nature-related risks and opportunities in business, formulate business strategies, and disclose information, including long-term risk analysis. | ● | ● | ● |

## [4] Risks and Opportunities in Six Industries Underwriting Investment/Loan

We analyzed the physical risks, transition risks, and opportunities for each of the six industries identified in the chapter on climate/nature-related dependencies/impacts. We also analyzed the risks and opportunities for the Group in these industries. Going forward, we will continue to work with our customers to create opportunities and countermeasures against climate/nature-related risks.

[For details, see page 60.]

Contents





# Strategy | Key Initiatives

## [1] Key Initiatives Based on Risks and Opportunities

The MS&AD Group works proactively to mitigate risks and create new business opportunities in the insurance business, taking into account both our dependence on and impact upon nature and climate change. As the increasing frequency and severity of natural disasters due to climate change pose major challenges to business operations, we are promoting the visualization and quantification of risks to enhance underwriting decisions. At the same time, we aim to reduce losses by strengthening loss prevention initiatives designed to avert or minimize damage, while engaging in dialogue with customers to share assessments and challenges related to climate- and nature-related risks. Through these efforts, we contribute to the realization of a sustainable society. These initiatives form an important foundation supporting the sustainability of our insurance business and the transition toward net zero and nature positive outcomes.

## [2] Enhancing Value Provision in Response to Increasing Natural Disasters

Compensation for losses caused by natural disasters lies at the core of the non-life insurance business, and natural disaster risk exerts an especially significant impact among climate- and nature-related risks. In addition to the growing severity and frequency of disasters linked to climate change, social structural changes such as declining and aging population are generating new vulnerabilities. To address this complex and evolving landscape, the Group advances the visualization and quantification of disaster risks, strengthens underwriting practices, cultivates specialized talent, and reinforces loss prevention measures to promote preparedness and prevention even during normal times. Through these efforts, we aim to provide sustainable coverage to a wide range of customers and view the enhancement of value for those facing natural disasters as a key business opportunity.

### 1. Ensuring the sustainability of insurance coverage

We strive to maintain strong financial soundness by improving the balance of income and expenses of insurance related to natural disaster insurance, while offering services that help customers visualize and mitigate their disaster risks. Our goal is to ensure the sustainable provision of insurance coverage that is affordable.

#### (i) Improving profitability and diversifying the portfolio

In response to the increasing insurance claims payments due to natural disasters, the General Insurance Rating Organization of Japan has been gradually raising the advisory in recent years.

To appropriately reflect the rising disaster risk in premiums, we have also been shortening insurance periods. Through enhanced underwriting–including reassessment of insured amounts, more sophisticated risk surveys, and appropriate setting of coverage scopes–we work to present customers with fair premium levels while ensuring stability in earnings and expenses.

To maintain a strong financial foundation, we must diversify our portfolio, including disaster risks. We are therefore advancing portfolio transformation through expansion of our overseas businesses, domestic life insurance operations, and new business domains.

#### (ii) Visualization and mitigation services for natural disaster risks

For many companies, natural disaster risks are already a tangible reality. Helping them gain an accurate understanding of future climate change impacts benefits both our customers and the Group by enhancing sustainability and corporate value. We visualize uncertain risks through collaboration with advanced scientific expertise and leverage digital transformation (DX) to support the implementation of effective risk reduction measures.

##### Risk surveys related to natural disasters

The degree of natural disaster risk depends heavily on the location and condition of business facilities. MS&AD InterRisk Research & Consulting identifies and analyzes latent risks through disaster analysis simulations and other methods. By conducting on-site investigations and engaging in dialogue with customers, we propose concrete countermeasures. Implementing these measures alongside insurance underwriting enables appropriate risk assessment and the provision of suitable coverage.

##### Assessing the impact of physical risks due to climate change

MS&AD InterRisk Research & Consulting has focused on assessing climate change risks. Accordingly, it collaborates with external organizations that possess advanced expertise in quantitatively analyzing the physical impacts of climate change. In 2020, we partnered with U.S. startup Jupiter Intelligence to launch a service that quantitatively assesses the risk of various future natural disasters worldwide with an resolution of 90 m × 90 m, based on climate change impact assessment using AI. In addition, the "Large-Scale Assessment of Flood Risks Due to Climate Change (LaRC-Flood®)" project launched in 2018, in collaboration with the University of Tokyo and Shibaura Institute of Technology, has achieved highly accurate estimation of inundation depth distribution around the world. In 2023, we began providing "Flood Risk Finder," a SaaS platform that can evaluate flood risks globally the world.

# Contents





## (iii) Building flood-resilient communities across entire river basins

Localized measures are often efficient to minimize wind or hail damage. Floods however, require coordinated, basin-wide strategies as they can submerge entire districts or valleys. Recognizing that flood control measures limited to river channels alone will not be sufficient to cope with increasing rainfall in the future, Japan's Ministry of Land, Infrastructure, Transport and Tourism (MLIT) introduced the concept of "River Basin Disaster Resilience and Sustainability by All" in 2020 to address torrential rainfall across entire watersheds. Basin-wide flood management is an approach in which not only river authorities but also private-sector entities and individuals can participate. It also contributes to urban development through the use of green infrastructure, which provides multiple benefits beyond disaster prevention.
To advance practical initiatives toward a flood-resilient society, the MS&AD Group launched a cross-organizational project in the current fiscal year focused on the theme of water-related disaster risk. Employees from across the Group are voluntarily participating to discuss medium- to long-term directions for products, services, and related initiatives. Going forward, we will continue to collaborate with local governments, regional businesses, and researchers to reduce flood risks and promote sustainable community development.

## 2. Initiatives to reduce damage in emergencies

Emergency preparedness and response, especially supporting damage reduction and safe evacuation in the face of imminent natural disasters, is a key value that the Group promotes. Leveraging the latest forecasting technologies and information and communications systems, we offer insurance products and services that enable early detection of disaster risks and help minimize damage. Our real-time damage forecasting website application, "cmap.dev," provides disaster damage forecasts to support regional disaster-prevention and mitigation activities. In addition, our "Inland Flooding Forecast System," which is currently undergoing verification trials, predicts urban flash flooding to aid evacuation and flood-prevention efforts, thereby helping to minimize damage. Through the provision and development of these emergency-response insurance products and services, we aim to enable swift action and recovery support, contributing to a safer and more resilient society.

### Hailstorm alerts

In recent years, insurance claims from hail damage have increased. Japan' s first hail forecast alert service sends push notifications to users in areas with a high probability of hail occurrence, helping them avoid or reduce damage. A new alert service has also been released that integrates hail forecast data with vehicle location information. Dashcam system alerts are sent to users driving in a high-risk area, and to the registered email addresses of users parked in the same area.


### Vehicle submersion emergency alerts

Localized torrential downpours often lead to vehicle submersion in underpasses or low-lying areas. A demonstration project is now underway to implement a new service. Using very short-term rainfall forecasts (for the immediate 30 minutes or so) and topographic data, this service sends SMS alerts to drivers in areas at risk to help reduce vehicle submersion incidents.

### Support for safe evacuation

Our "Smartphone Disaster Navigation" app supports safe behavior during large-scale disasters by guiding users to nearby evacuation centers, even pointing directions in darkness via AR functionality. Following regulatory changes requiring municipalities to develop individual evacuation plans for people requiring assistance (e.g. elderly, persons with disabilities), there remains a shortage of local people able to provide the needed help. To help address this, the Group offers insurance that covers accidents or injuries that may occur while assisting such individuals during evacuation, thereby supporting community-based mutual aid in times of disaster.


### Insurance and services to support self-help and mutual aid for disaster preparedness

The MS&AD Group provides "Disaster Response Support Insurance," which compensates for costs incurred when businesses provide supplies or personnel to local governments under disaster response agreements. This product helps alleviate the financial burden on businesses during disasters and strengthens regional disaster resilience through public–private collaboration.
In 2025, Mitsui Sumitomo Insurance and MS&AD InterRisk Research & Consulting developed "Liability Insurance for Special Needs Shelters" for municipalities. These shelters serve vulnerable populations such as the elderly, persons with disabilities, and those with illnesses. As prolonged stays after large-scale disasters can heighten the risk of occupant accidents or other issues, this insurance covers liabilities borne by shelter administrators or operators. Special needs shelters play a vital role for people requiring special care, and liability coverage is an essential mechanism for their stable operation. The Group also offers simulation training for the special needs shelter intake process, which helps municipalities assess and strengthen preparedness and management systems in advance of emergencies.
Moreover, Mitsui Sumitomo Insurance is promoting a "Disaster Prevention Partner" initiative, in which the Group collaborates with local agents who conduct disaster-prevention activities tailored to regional needs. By coordinating with municipalities and disaster relief organizations, we aim to enhance regional disaster resilience while deepening engagement with customers and creating new business opportunities.

### Business continuity support services for natural disasters

MS&AD InterRisk Research & Consulting provides comprehensive support through its business continuity management (BCM) and business continuity planning (BCP) services to help companies strengthen their preparedness for natural disasters. These services include assessing and analyzing risks and potential impacts from earthquakes, typhoons, and floods, and developing customized countermeasures and action plans suited to each company' s operations. Practical training and simulation exercises are also conducted to enhance employee readiness and ensure rapid response during actual events. Furthermore, BCPs are regularly reviewed and updated based on the latest information to maintain optimal preparedness and ensure business continuity.

## 3. Prompt insurance payouts and recovery support

We view the prompt payment of insurance claims to customers who have lost homes, offices, or valuable property due to natural disasters as one of our most important responsibilities, thereby providing reassurance and supporting recovery and reconstruction. In addition to continuous operational improvements and system upgrades, we are conducting demonstrations on the use of IoT flood depth sensors to enable swift claim payments across wide areas during large-scale flood events. We will continue striving to improve the way we handle insurance payments, develop and offer products that enable faster payouts, and provide related services to help customers recover their lives and businesses as quickly as possible.

### Damage assessment and prompt claim settlement

Large-scale natural disasters can cause widespread damage to homes and business premises. To ensure efficient claim processing, we have introduced systems that can manage and streamline the process through robotic process automation (RPA). We also deploy our own dedicated response teams immediately after disasters and leverage our network with loss adjusting firms to quickly send assessors to affected areas. A scheduling system enables efficient coordination of customer appointments, supporting both swift assessments and clear communication. Additionally, we are introducing AI-based systems that automatically calculate building damage costs, allowing claim assessments for exterior damage to be completed using only photos, without the need for repair estimates. For flood damage, a chatbot-based system is used to gather information from customers and confirm flood depth, enabling prompt insurance payments without on-site inspections or repair estimates. In addition, mechanisms are being developed to collect flood data using drones and satellite imagery. Through these advanced technologies and processes, we aim to shorten the time required for claim payments and help customers rebuild their lives as quickly as possible.

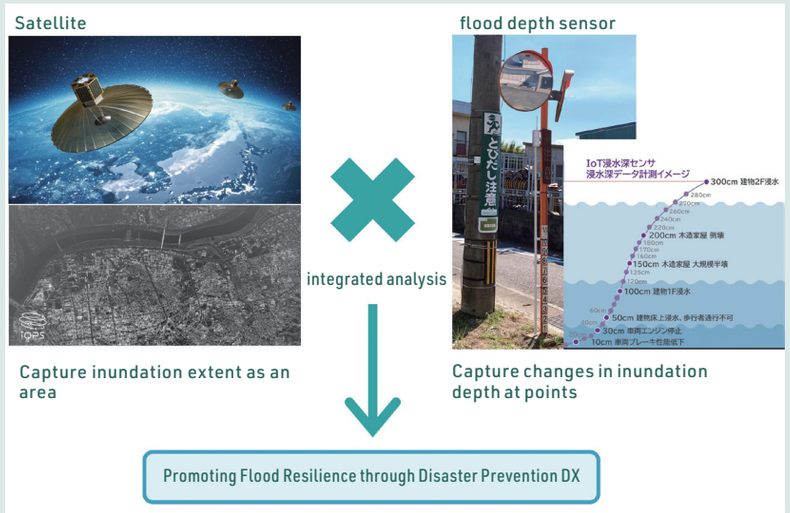
### Insurance products and services that allow for prompt payment

Timely payment of insurance claims is critically important in supporting the recovery of affected households and the business continuity of enterprises after a disaster. In addition to such indemnity coverage, weather derivatives help avoid or mitigate corporate losses arising from abnormal climate or adverse weather ? such as reduced sales or increased costs ? thereby stabilizing earnings. Weather risk is becoming more apparent across many industries, including agriculture and tourism that depend heavily on weather conditions, amid the recent increase in extreme and unstable weather events. Accordingly, weather derivatives are gaining attention as an effective option to hedge earnings volatility risks.
In Vietnam, we provide a "weather index insurance platform for farmers" leveraging insurtech that enables real-time online premium quotations, allowing farmers to obtain coverage quickly and easily. In countries where insurance markets are not sufficiently developed, large-scale disasters can cause recovery and reconstruction to take time, which may lead to worsening poverty and political instability. For this reason, we are working in collaboration with international institutions such as the World Bank to participate in public disaster risk financing schemes, thereby contributing to the prompt provision of recovery funds to affected countries through public-private partnerships.
Furthermore, we have launched domestic insurance products that make prompt payments of predefined amounts without claims investigations or claim filings. These include: (i) "weather index insurance" to prepare for business impacts caused by weather risks; and (ii) the "Earthquake Disaster Expense Endorsement (Seismic-Intensity-Linked)" for large enterprises, which is designed to prepare for business impacts in the event of a major earthquake of JMA intensity 6-lower or above. These products apply to policies commencing on or after October 1, 2025.

### Demonstration and future utilization of IoT flood depth sensors

With the growing frequency of localized torrential rainfall, it has become increasingly important not only to install water level sensors along rivers for flood monitoring, but also to understand inland flooding conditions in urban areas. Mitsui Sumitomo Insurance and MS&AD InterRisk Research & Consulting, in collaboration with iQPS Inc. and Sekisui Jushi Corporation, are conducting a demonstration project involving the development of IoT flood depth sensors for installation by roads and in buildings and the acquisition and analysis of satellite data, to enable prompt insurance payouts even during large-scale flooding events. The system integrates flood depth data–measured every five minutes in one-centimeter increments from the onset of flooding–with images obtained from SAR* satellites, overlaying the combined analysis onto a 3D city model. This makes it possible to remotely and rapidly grasp the flooding situation across an entire urban area.
Those conducting a demonstration in Kurume City, Fukuoka Prefecture since 2023, have reported that real-time understanding of flood depth is also effective for analyzing how urban flooding conditions change in response to river management actions, such as operating drainage pumps or opening and closing floodgates. Going forward, we plan to expand the demonstration areas for the IoT flood depth sensors, aiming not only to facilitate faster insurance payments but also to contribute to safer and more resilient communities through enhanced flood control measures.

* Synthetic aperture radar (SAR) is technology that uses radio waves to capture images of the Earth's surface. It is able to penetrate clouds and volcanic plumes and can be used to conduct observations day and night.




### Supporting disaster victims' recovery and municipal disaster response

Natural disasters have grown more frequent and severe, placing increasing strain on the disaster response capabilities of local governments. In 2021, Mitsui Sumitomo Insurance launched a support service to help disaster victims start the recovery process. It is the first initiative of its kind in Japan' s non-life insurance industry to assist municipalities in issuing disaster certificates to victims following water-related damage.
With customers' consent, information such as flood depth obtained during damage assessments is shared with municipalities under formal agreements to support the prompt issuance of certificates. This allows both the insurance claim process and the certificate issuance to be completed based on a single investigation. It also enables customers to rebuild their lives more quickly while significantly reducing the burden on municipal staff responsible for damage assessment.

# [3] Engagement and Risk Assessment with Customers on Climate and Nature Issues

The MS&AD Insurance Group is deeply connected with climate and nature through its insurance underwriting and investment/loan activities. We engage in dialogue with our insurance underwriters and investment and loan recipients, allowing us to share our GHG emission reduction targets and work together to address climate- and nature-related challenges. Responding to climate- and nature-related challenges requires technological innovation and capital investment, which are expected to drive growing demand for risk coverage, financing, and new financial solutions. Through active engagement with its customers, the Group seeks to share these issues and collaborate on effective solutions.

## 1. Initiatives based on dialogue with underwriting and investment/loan portfolio companies

### (i) GHG emissions reduction targets and dialog related to our underwriting and investment/loans

In November 2023, the Group set interim targets for GHG emissions reductions related to our underwriting and investment/loan portfolios by 2030. (see "Transition to 2050 Net Zero" for details.). Through engagement in dialogue with clients, we share challenges they have in reducing GHG emissions and work together to solve them.

**For details, see Products and Services Contributing to Net Zero on page 35**

| | | Interim Target |
|---|---|---|
| **GHG emissions of major domestic business partners*1 reduction rate** | Reduction targets | Reduce by 37%*2 compared to FY2019 by FY2030 |
| | Action targets | Through dialogue with customers, we will share issues in reducing GHG emissions. We will work together with customers to reduce GHG emissions by proposing solutions that contribute to resolving issues. |

*1 GHG emissions of major domestic clients (approx. 3,300 companies) selected based on premium income (related to the Group's underwriting and investments/loans)
*2 Calculated from FY2030 GHG emissions target in Japan's NDC (Nationally Determined Contribution) and the FY 2019 total emissions contained in the same report.

To achieve our goals, since FY2023, we have been holding dialogues with our policyholders on sustainability issues, including GHG emissions reduction. As part of our past CSV (Creating Shared Value) initiatives, we have proposed products and services to insurance clients aimed at addressing key sustainability issues. Beginning in fiscal 2023, we expanded these efforts by launching engagement activities focused specifically on sustainability challenges. As these dialogues with insurance clients have progressed, fiscal 2024 saw an increase not only in discussions and solution proposals related to GHG emissions reduction, but also in those addressing the enhancement of natural capital sustainability and respect for human rights. Through dialogue, we are working to understand the sustainability issues of our policyholders and propose solutions to resolve them. In promoting this initiative, we have also begun dialogue with agencies and brokers regarding proposing solutions to resolve sustainability issues.

### (ii) Solution proposals to help underwriting and investment/loan portfolio companies address their challenges

Climate- and nature-related risks have significant impacts on the business activities of our client companies (see page 22 for risk analysis results). As part of efforts for natural disaster preparedness, the MS&AD Insurance Group provides a wide range of support services, including visualization and mitigation of risks, hail and other weather alert services, and assistance with business continuity management (BCM) and business continuity planning (BCP) (see page 31 "Enhancing Value Provided Concerning Natural Disasters"). Furthermore, analysis conducted in fiscal 2024 revealed that if global temperatures continue to rise, the effects of reduced labor productivity and increased cooling costs caused by excessive heat will exceed those of flood risks (see page 27 "Analysis of Physical Risks in Investment and Loan Portfolio"). In response, we are strengthening our corporate support for heat-related mitigation measures through initiatives such as training on heatstroke prevention, establishing response systems for heat-related incidents, and providing insurance coverage. We are also expanding our offering of weather index insurance to help companies hedge against profit deterioration due to heat, while providing services that support our clients' efforts toward net-zero emissions and a nature-positive society (see page 33 "Insurance Enabling Prompt Payment" and page 35 "Products and Services Supporting Net Zero and Nature Positive").

## 2. Support for a decarbonized society through investments and loans

Aiming to help our investment and loan portfolio companies reduce GHG emissions, we promote initiatives through engagement to address climate change, and we provide investment and loans in project financing and funding related to construction of renewable energy power generation plants, such as those for solar, wind and biomass. Mitsui Sumitomo Insurance, Aioi Nissay Dowa Insurance, Mitsui Sumitomo Aioi Life Insurance, and Mitsui Sumitomo Primary Life Insurance jointly invested in the impact funds which focus on climate change, while also building expertise in this area.
With regard to initiatives through engagement with our clients on climate change, we are working to understand the organizational structures of our investee companies in relation to addressing climate change, their efforts toward reaching GHG emission reduction targets, their plans for technological innovation, and the challenges they face.

**For details, see [5] As Responsible Institutional Investor on page 44**

Contents





# [4] Insurance Products and Services that Support Net Zero, Nature Positive, and Circular Economy

The MS&AD Insurance Group recognizes that minimizing the impact on global warming is essential to reducing natural disaster risks. Accordingly, we actively support the spread of renewable energy and decarbonization technologies that underpin the realization of a net-zero society. We are also developing insurance products that contribute to advancing the circular economy through the efficient use of resources, thereby helping to achieve net zero, conserve and enhance natural capital, and build a sustainable social foundation. In addition, we support our clients in accurately assessing climate- and nature-related risks and disclosing information with greater transparency, working together with them to advance both a sustainable society and corporate value creation.

## 1. Products and Services Contributing to Net Zero

Achieving net zero requires the rapid adoption of next-generation technologies and the wider deployment of renewable energy. This transition, however, is not without challenges, and we believe insurance companies have a vital role to play in overcoming these hurdles. For example, in the United Kingdom, we are developing insurance products that partially compensate for potential losses in cases where new technologies used in renewable energy projects do not perform as expected, thereby facilitating project financing. Through a diverse range of initiatives—including risk coverage for new technologies, theft-prevention measures, and certification of environmental value—we are contributing to the transition toward net zero.

### Insurance for CCS operators

Carbon capture and storage (CCS) technology, which captures $CO_2$ emissions from their source and stores them in stable geological formations, is being introduced as a means to reduce atmospheric $CO_2$ emissions. By providing comprehensive insurance coverage for the diverse risks associated with CCS projects, we support the social implementation of next-generation energy and the realization of a net-zero society

### Theft-prevention solution for solar power plant cables

Solar power facilities are often located on expansive sites that are difficult to monitor, making them vulnerable to theft. Cables containing valuable metals such as copper are especially prone to being stolen, leading to operational shutdowns and costly repairs that can cause significant financial losses. Recognizing the importance of theft prevention for stable business operations, Mitsui Sumitomo Insurance has partnered with specialized service providers to offer an integrated solution that combines intrusion detection sensors with automated alerts to security companies and on-site response. This service helps reduce cable theft at solar power plants and supports the broader adoption of solar energy.

### Certification of renewable energy source

To realize a net-zero society, it is not enough merely to use renewable energy; proactive participation in cleaner energy systems and the concept of a Just Transition are also crucial. Source certification enhances transparency across the power supply chain and, by allowing users to choose locally generated renewable energy, contributes to regional economies, employment, and revitalization. We have established a scheme that combines I-REC certificates—which identify the region and power plant where renewable electricity was generated—with non-fossil certificates, thereby verifying the environmental, locational, and generation-source value of renewable energy.

## 2. Products and Services Contributing to the Enhancement of Natural Capital

Nature-related risks can have a profound impact on corporate management, and the loss of ecosystem services threatens regional sustainability. Accordingly, the conservation and enhancement of natural capital are strategic challenges for both companies and communities. We provide insurance products and services that cover costs and risks associated with these challenges, supporting ecosystem preservation and environmental protection initiatives.

### Special Expense Clause for Ocean Pollution

Ship collisions and groundings can cause large-scale marine pollution with serious ecological impacts. This endorsement provides coverage for restoration and conservation costs related to damage to the natural environment—costs that were previously excluded from standard policies—thereby helping vessel operators fulfill their social responsibilities.

### Endorsement for Coverage of Reforestation Expenses, etc. ("Forest Keeper")

In Japan, the number of forest fires has been rising due in part to drier conditions caused by climate change. Forest fires not only result in economic loss but also, if left unaddressed, increase the risk of landslides. This endorsement provides coverage for reforestation costs to restore and conserve forests affected by fire.

### Prescribed Fire insurance

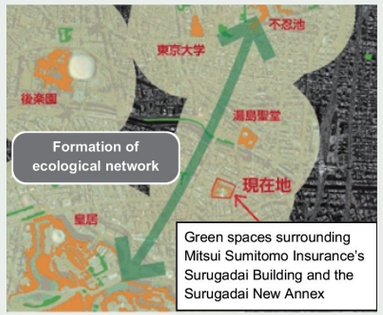
In the Aso region of Kumamoto Prefecture, noyaki (Prescribed grassland Fire) is an essential traditional practice for maintaining grassland ecosystems. By providing insurance coverage for the risk of fire spreading during noyaki activities, we help preserve this tradition, which is deeply connected to local nature and history, while supporting agriculture, livestock production, and the conservation of abundant water resources.

### Corporate Green Space Support Package

We offer this integrated package consisting of guided tours of the Group' s Surugadai Green Spaces, corporate green space consulting services, and corporate green space insurance. This package supports the green initiatives of companies that consider natural capital and biodiversity. Our Corporate Green Space Insurance provides compensation for any damage or expenses incurred due to unexpected and sudden accidents in corporate green spaces.

### Surugadai Green Spaces

Since its completion in 1984, Mitsui Sumitomo Insurance's Surugadai Building has had a high greening rate and a rooftop garden, which was unusual at the time. Since the completion of Surugadai New Annex in 2012, which has a green space centered on native species, the building has been home to a variety of living species and is highly regarded as a corporate green space that reflects consideration for biodiversity. A consortium led by MS&AD InterRisk Research & Consulting provides full support, from the planning of green spaces to the selection of tree species and subsequent utilization of the green space. It received certification as a "Nationally Certified Sustainably Managed Natural Sites," in the first year which the Ministry of the Environment started in 2023. Even in highly developed urban areas, by improving the quality of green space it is possible to develop an ecological network that connects neighboring green spaces, thereby improving the habitat of wild birds. Analysis using the LEAP approach of TNFD for urban real estate at our business sites revealed that some locations are in close proximity to priority locations in terms of biodiversity conservation. Business sites companies with such potential can contribute to the local ecosystem by maintaining their green spaces.




## 3. Products and Services for Promoting Circular Economy

Addressing climate change and resource constraints presents both risks and new growth opportunities for companies. circular economy helps reduce greenhouse gas emissions by minimizing waste and improving resource efficiency, thereby accelerating the transition to a decarbonized society. As a non-life insurance group, we not only provide compensation for losses but also offer insurance products that promote reuse and recycling, supporting sustainable business models. Through these efforts, we help enhance corporate competitiveness and facilitate the shift toward a low-carbon economy.

### Food Loss Reduction Endorsement

This endorsement provides coverage for losses and additional costs incurred in the resale or recycling of products that, although unaffected in quality, are disposed of due to reasons such as damaged packaging or delivery delays caused by disrupted logistics routes. By supporting food-related businesses in reducing food loss, we help build more sustainable supply chains.

### Coverage for Clothing Circulation Expense (Insurance for non-burning)

This insurance covers additional costs borne by businesses to recycle or upcycle clothing items that would otherwise have been incinerated as waste. By promoting clothing recycling, it contributes to the realization of a circular economy.

### Endorsement for Recycled or Reused Product Collection Expenses

Conventional product recall insurance covers collection and disposal costs for recalled products. This endorsement goes further by providing coverage for additional costs incurred when recalled products are recycled or reused instead of discarded, thereby encouraging resource circulation and supporting waste reduction and the transition to a circular economy.

## 4. Services supporting corporate information disclosure

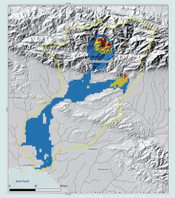
Addressing climate change and nature-related risks has become a critical management issue that directly affects corporate value. Leveraging the Group' s expertise in risk solutions, MS&AD InterRisk Research & Consulting visualizes challenges related to climate and natural capital through advanced data analytics. We support corporate disclosure aligned with international frameworks such as TCFD and TNFD, providing scientifically grounded and reliable information.

### Joint development by ADLab and NatCap

Aioi R&D Lab-Oxford has entered into a capital and business alliance with Natural Capital Research Ltd. to strengthen joint research and the development of biodiversity and natural capital risk solutions. The new natural capital and biodiversity risk disclosure support service analyzes over 1,000 risk types across business locations worldwide, supporting companies in both disclosure and risk management.

### TCFD/TNFD disclosure support service

Through consulting services that help companies identify climate and natural capital–related risks and opportunities and organize disclosures in line with international frameworks, MS&AD InterRisk Research & Consulting aims to enhance corporate value and promote a sustainable society. It provides specialized services tailored to specific sectors, including freshwater resources, urban real estate, financial institutions, and regional financial organizations.



# [5] Collaboration and Foundation Building for Green Resilience

Addressing risks and opportunities related to climate and nature requires more than providing insurance products and services—it also demands a long-term foundation for action. The MS&AD Group takes an integrated approach to climate and nature, advancing initiatives toward realizing green resilience—a concept aimed at solving local challenges, including disaster prevention, while coexisting harmoniously with the natural environment. To this end, we are working collaboratively with a wide range of stakeholders—from local partners to policymakers and academia—to promote cooperation, rule-making, policy engagement, and joint research.

## 1. Collaborative Initiatives in Individual Regions and River Basins

Climate change increases the risk of natural disasters in regions, and damage to natural capital leads to the degradation and loss of natural benefits such as disaster prevention and mitigation functions, abundant harvests, and beautiful landscapes. These impacts have wide-ranging effects throughout local communities, and are difficult issues for individuals or companies to solve alone, though there haven' t been sufficient cooperation among the efforts of local stakeholders to resolve the issues.

### Initiating efforts that utilize nature for disaster prevention and mitigation

In certain regions of Japan and other countries, our initiatives are underway to conserve biodiversity while leveraging ecosystems for disaster prevention and mitigation, decarbonization, water conservation, and the enhancement of well-being. These approaches known as Nature-based Solutions (NbS) and green infrastructure. Achieving these goals requires not only technical elements and evaluation indicators but also mechanisms that foster collaboration among industry, government, and academia.

### Shared goals and multi-stakeholder collaboration

To solve regional issues, it is essential to share clear goals at the regional or river basin level, based on an understanding of local dependence on nature and the impacts of land-use change—an approach known as the landscape approach. It is upon this foundation that effective measures can be designed and multi-stakeholder collaboration (collective action) can be promoted. Leveraging its strength in risk assessment, the Group aims to play a catalytic role as an insurer within local communities, contributing to enhanced watershed resilience and the creation of a nature-positive society through collective action.

### Kumamoto Water-Positive Action

Inauguration event photo session

Kumamoto City, with a population over 500,000, is the only city in Japan with 100% of its tap water supplied by groundwater, making it a world-class groundwater city, thanks to the blessings of nature of Mount Aso. On the other hand, in the City' s water source recharge area, in the middle reaches of Shirakawa River in Kumamoto Prefecture, there are concerns about the sustainability of water resources due to development and groundwater extraction associated with the expansion of factories. In response to this situation, since March 2024 the Group has been exploring initiatives aimed at conserving watershed and promoting a nature-positive approach. From March 2025, we have sought to further scale up these activities by implementing green infrastructure, such as "rain garden," to preserve water circulation in areas with urban development. Maintaining healthy water cycles through the use of green spaces is expected to provide multiple benefits, including groundwater recharge, mitigation of inland and river flooding, heat island mitigation, improved landscapes, and enhanced biodiversity. While supporting companies in voluntarily installing green infrastructure, we are also researching and developing an innovative financial mechanism to award credits to companies for the value of ecosystem services their efforts create, such as groundwater recharge. By leveraging these financial approaches, we aim to promote wider adoption of green infrastructure through public-private funding mechanisms.

* Last year's report included a LEAP analysis concerning "rain gardens."

For details, see page 63

# Contents





## Green Resilience Programs

In the MS&AD Green Earth Project, we promote collective actions toward nature positive through conservation and restoration activities of the natural environment at three locations across Japan, collaborating with research institutions and involving local businesses, NPOs, etc. We aim to create a safe, secure, and vibrant regional model by promoting the realization of nature positive and the resolution of issues such as disaster prevention/mitigation using nature, and the recharge of water resources.

### MS&AD Green Earth Project

#### ■"Catchment-based Flood Management for Sustainable Society Project" in Kuma River Basin, Kumamoto Prefecture


Activity in Kuma River Basin

In the Kuma River basin, in response to the severe flood disaster caused by torrential rains in July 2020, "Green Basin Flood Control" has been promoted to simultaneously pursue sustainable regional development and environmental conservation by incorporating environmental views to a new approach of "Basin Flood Control," which combines both hard and soft measures for the entire basin, not just the river. As part of this project, we have been working to preserve wetlands located on the tributaries of the Kuma River and to utilize nature for disaster prevention/mitigation and for regional development.

Partners: Prefectural University of Kumamoto, Kumamoto University, Kuma Wetland Research Group, General Incorporated Association Kumagawa NP, Sagara Village, etc.

#### ■"Cycle of Life Project" in Minamisanriku town, Miyagi Prefecture


Visit to a fishery in Minamisanriku

Minamisanriku Town, which was severely damaged by the Great East Japan Earthquake, has set a future vision as "People Forests, Villages, and Sea Town with the Cycle of Life" and is promoting the development of a town that cycles both natural resources and people. We are working to realize a nature-positive community by creating blue carbon and preserving the marine ecosystem through the restoration of seaweed beds, and by promoting the appropriate use of socio-ecological production landscapes through forest care and biochar production and other measures.

Partners: Center for Sustainability, Minamisanriku Town (Nature Center), etc.

#### ■"Satoyama and Water Cycle Project" in Inbanuma Basin, Chiba Prefecture


Activity in Inbanuma Basin

Through the preservation of valleys and grasslands that remain in the Inbanuma Basin, where urbanization and concentration of business sites are progressing, this project promotes the improvement of water quality and mitigation of water-related disasters by improving the water cycle. Through collaboration with diverse stakeholders, we aim to build a model case for the implementation of nature-based solutions (NbS) that conserve biodiversity and use ecosystems for disaster prevention/mitigation, decarbonization, water resource conservation, and well-being.

Partners: Yatamuzai Field and Forest Association (NPO), General Incorporated Association SODO, National Institute for Environmental Studies, etc.

### Nature-Positive Initiative (Pilot for "State of Nature" Metrics)

At the Seto Tsutsumi Nature Ecological Park, located in the Kuma River basin in Sagara Village, Kumamoto Prefecture, efforts are underway to conserve biodiversity and restore disaster prevention and mitigation functions through wetland restoration. As part of the MS&AD Green Earth Project, employees participate in approximately five events annually, including cutting and removing tall grasses such as reeds to prevent wetland drying, restoring shallow water areas, and conducting rice cultivation. Each event is accompanied by biodiversity surveys, confirming the presence of endangered species such as rare pipewort species and the scarlet dwarf dragonfly. Also confirmed is that habitats for aquatic species such as pond loaches, Japanese rice fish, and crucian carp have been expanding. The conservation of multiple wetlands across the Kuma River basin also contributes to reducing flood risks in the region.

For collective action, common indicators to measure the outcomes of initiatives are extremely important. In particular, achieving a nature-positive outcome has long faced the challenge of how to measure and assess biodiversity. Equally significant is how to visualize and share the value of ecosystem services, including disaster prevention and mitigation.

Against this backdrop, the Group participated in a pilot project using the State of Nature metrics developed under the Nature-Positive Initiative,* which was launched in autumn 2024. Working with teams of researchers from the Catchment based Flood Management for Sustainable Society Project and Tohoku University Nature Positive Sustainable Development Hub, we are measuring the state of nature in the ecological park and across the landscape units of the Kuma River basin—including mountains, wetlands, rivers, and basins—and evaluating the relationship between wetland conditions and flood risk reduction. This represents a new approach to scientifically demonstrate both biodiversity and disaster resilience.

*Nature-Positive Initiative: An international initiative established by diverse stakeholders, including conservation organizations and research institutions such as the IUCN (International Union for Conservation of Nature), BirdLife International, Global Reporting Initiative (GRI), and Taskforce on Nature-related Financial Disclosures (TNFD), as well as framework for companies and financial institutions, to promote and implement the concept of nature-positive.

# Contents





## 2. Rule-Making and Standardization through Initiatives and Alliances

Challenges related to climate and nature extend beyond individual corporate efforts and have progressed through international rule-making and standardization frameworks. The MS&AD Group actively participates not only in corporate and financial institution alliances but also in non-profit initiatives led by governments, UN agencies, and NGOs, contributing to the creation of a shared foundation for addressing cross-cutting climate, nature, and social challenges.
Aiming for a net-zero and nature-positive future, the Group leverages scientific knowledge to drive societal transformation. Through innovative research in collaboration with academic institutions, we seek a resilient and sustainable society. Furthermore, by actively engaging in climate- and nature-related initiatives and alliances and collaborating with diverse stakeholders, we aim to translate research outcomes into policy-level activities, further advancing pathways to solving these pressing challenges.

### Japan Business Initiative for Biodiversity (JBIB)

With the aim of actively promoting biodiversity conservation, the MS&AD Group has participated as the chair (currently: representative director) company of the Japan Business Initiative for Biodiversity (JBIB) since its founding in 2008. JBIB has advanced research on disclosure and impact assessment, developed tools and guidelines, and, through participation in COP meetings and collaboration with government ministries, has engaged in pioneering initiatives as a leading Japanese biodiversity initiative. Additionally, JBIB conducts joint research on biodiversity conservation from an international perspective and, based on the results, engages in dialogue with corporate members and other stakeholders to promote initiatives that make a genuine contribution to biodiversity conservation

### TNFD Consultation Group Japan

The TNFD Consultation Group Japan was established in 2022 to promote understanding and awareness of the TNFD disclosure framework. The MS&AD Holdings, the Keidanren Nature Conservation Council (KNCC), and the Norinchukin Bank serve as Japan' s conveners, providing a forum for discussions and supporting companies and organizations participating in TNFD efforts. To raise awareness of TNFD' s mission and the progress of its activities, the Consultation Group actively hosts webinars and in-person events, encourages participation in global capacity-building events, and facilitates local information sharing. Furthermore, in collaboration with the TNFD Secretariat, the Consultation Group disseminates information on nature-related issues.

**GX League**
The Group participates in and supports the basic principles of the GX League, which engages in discussions aimed at transforming Japan's entire economic and social system and putting new markets into practice. We also participate in the GX Management Promotion Working Group, which is part of the GX League's efforts to form rules for new market creation.

**Japan Climate Initiative (JCI)**
JCI brings together companies, local governments, and NGOs actively engaged in climate change measures to strengthen climate action across Japan and communicate these efforts globally. The Group has participated since JCI's founding in 2018.

**Carbon Accounting Adviser Institute**
This institute is developing professionals capable of assessing GHG emissions across entire supply chains and formulating concrete reduction plans. As a board member and special supporting member of the initiative, Aioi Nissay Dowa Insurance is helping to advance corporate efforts toward achieving carbon neutrality.

**Principles for Financial Action for the 21st Century**
This initiative aims to provide guidance for financial institutions to take responsibility for environmental and social issues and contribute to their resolution. Having signed on in 2015, the Group has been supporting the sustainability of local communities and the global environment through initiatives such as addressing environmental challenges and investing in projects with positive social impact.

**Japan Consortium for Adaptation Finance**
Established in 2024 by Mitsui Sumitomo Insurance and NEC Corporation, this initiative aims to advance adaptive finance that mitigates the impacts of climate change. By leveraging digital technologies to predict and analyze adaptation value–such as disaster-risk-reduction and environmental benefits–it seeks to promote the development of financial instruments including insurance, bonds, and loan schemes, and to realize their implementation in society.

**30by30 Alliance for Biodiversity**
To contribute to the realization of "30by30," an international goal to protect and conserve more than 30% of the world's land and oceans by 2030, we are participating in the 30by30 Alliance for Biodiversity, run by Japan's Ministry of the Environment.

**Finance Alliance for Nature Positive Solutions (FANPS)**
Established in 2023 by four financial institution groups–the MS&AD Group, Sumitomo Mitsui Financial Group, Inc., Development Bank of Japan, Inc., and The Norinchukin Bank–this Alliance aims to support corporate nature-positive initiatives and foster momentum within Japan. The Alliance publishes a Solution Catalogue and engages in dialogue and collaboration with companies toward a nature-positive transition.

**Association for Business Innovation in Harmony with Nature and Community (ABINC)**
Based on the Business site coexistence with nature Promotion Guidelines created by the Japan Business Initiative for Biodiversity (JBIB), the Association was established in 2013 with the aim of encouraging businesses to work toward a society in harmony with nature. Its activities include the certification of corporate green spaces (ABINC certification). As of August 2025, the number of certified business sites has reached 200.

**Japan Water Stewardship Leadership Group**
In 2025, five Japanese companies, including MS & AD Group, launched JWS as a working group in collaboration with the Alliance for Water Stewardship (AWS), headquartered in Scotland, with the aim of promoting responsible water resource management at the river basin level. It seeks to create an environment that enables companies to collaborate across industries in conserving water resources within their watersheds.

**Official Supporter of River Basin Flood Control**
We have registered as an official supporter of the Japanese government's River Basin Disaster Resilience and Sustainability by All initiative–a new approach to flood management aimed at protecting people's lives and livelihoods from increasingly severe and frequent water-related disasters.

**Rainwater Infiltration Project Ambassador**
We support the Tokyo Metropolitan Government's "Rainwater Infiltration Project," which promotes urban rainwater retention and infiltration into the ground (rainwater runoff control) to help mitigate flood damage caused by extreme rainfall events linked to climate change. As a project ambassador, we work with the metropolitan government and conduct awareness-raising activities to build flood-resilient communities. Notably, the Mitsui Sumitomo Insurance Surugadai Building is equipped with a 3,500-ton rainwater storage tank, contributing to local rainwater retention efforts.

**CDP**
CDP is an independent nonprofit organization that maintains the world's largest database on corporate climate change initiatives. Through CDP, companies and other organizations around the world disclose their greenhouse gas emissions and measures taken to address climate change. The Group supports this initiative and continues to share information with CDP on an ongoing basis.

**United Nations Environment Programme Finance Initiative (UNEP FI)**
To explore and promote best practices for insurance and financial institutions that take environmental and social sustainability into account, we participate in the UNEP FI. We have also signed the UNEP FI Principles for Sustainable Insurance (PSI) and the Principles for Responsible Investment (PRI).

**Partnership for Carbon Accounting Financials (PCAF)**
Since 2021, the Group has been a member of the PCAF, participating in the development of methodologies for measuring and disclosing GHG emissions from investment, loan, and insurance portfolios. Through involvement in working groups worldwide, we are helping to advance GHG emissions management across the financial sector, thereby contributing to the realization of a sustainable society.

# Contents





## 3. Participation in Policy Creation

Government policies related to climate, nature, and disaster prevention form a vital foundation that shapes both the direction of society as a whole and the business environment of the Group. The Group participates as a member in various government committees that contribute to national policy discussions, providing expertise accumulated through our experience as an insurance company in risk assessment and disaster response. Through these efforts, we aim to incorporate practical perspectives into the policy design process and contribute to the advancement of disaster prevention and mitigation policies addressing climate change and biodiversity loss. In addition, by engaging in dialogue with government bodies and private-sector organizations through these committee activities, we seek to foster collaboration that enhances the resilience of society as a whole.

| | |
|---|---|
| Sustainability Standards Board of Japan (SSBJ) | Following the establishment of the International Sustainability Standards Board (ISSB), the SSBJ was founded in Japan in 2022. Since its inception, the Group has provided the members to serve on the board and has contributed to the development of domestic sustainability disclosure standards. |
| Taskforce on Nature-related Financial Disclosures (TNFD) | With the Group employee participating as a member since its inception, TNFD is a framework for assessing and disclosing nature-related risks and opportunities. In addition, the Group is cooperating in pilot testing for the development and trial of the beta version of the open-access integrated database, the Nature Data Public Facility (NDPF), which aims to improve the quality and accessibility of nature-related data. |

### Japanese government committees and councils in which we participate

- Green Infrastructure Public-Private Partnership Platform – Planning and Public Relations Subcommittee, and Finance Subcommittee (Ministry of Land, Infrastructure, Transport and Tourism)
- Expert Committee on Evaluation Standards for Securing High-Quality Urban Green Spaces through Private Investment (Ministry of Land, Infrastructure, Transport and Tourism)
- Nature Positive Economy Study Group (Ministry of the Environment)
- Study Group on Economic Incentives for Achieving 30by30 (Ministry of the Environment)
- Committee on the Economic Valuation of Biodiversity (Ministry of the Environment)
- Support Certificate Model Thinking Working Group (Ministry of the Environment)
- Committee on Nature-Related Financial Disclosures Concerning the Multifunctional Roles of Forests (Forestry Agency)
- Committee on Impact-Creation Certificates in Ministry Projects (Ministry of Agriculture, Forestry and Fisheries)
- Study Group on the Promotion of Nature-based Solutions (NbS) (Ministry of the Environment)
- Program Director for the Initiative to Promote Strategy Development for Rulemaking and Market Creation in Each Sector Based on the Transition Strategies toward Nature Positive Economy (Cabinet Office)

## 4. Collaborative Research with Academic Institutions

Addressing challenges related to climate and natural capital requires linking the latest research findings with practical experience. The Group leverages not only its core business, which is closely connected to climate risk, but also the knowledge accumulated through years of initiatives on biodiversity, to conduct joint research with universities and research institutions. By incorporating the latest scientific findings while feeding practical, on-the-ground experience back into research, we contribute to the development of new methodologies, including quantitative assessment of disaster risks and ecosystem services. Through such academic collaboration, we aim to translate these insights into practical solutions for society, and use them to address climate- and nature-related risks.

| | |
|---|---|
| LaRC-Flood® Project (The University of Tokyo, Shibaura Institute of Technology) | Since 2018, this project has conducted research on the impact assessment of flood risks due to climate change and sought to share research results with society by publishing the "Map of Predicted Flood Frequency Changes Due to Climate Change." Subsequently, the project has led to the development of the Future Flood Hazard Map and the SaaS-type "Flood Risk Finder" (page 31). |
| Climate Change Actions with Co-Creation Powered by Regional Weather Information and E-technology (ClimCORE) (The University of Tokyo) | The ClimCORE Project has developed high-resolution "weather reanalysis data for the Japanese region" to reproduce atmospheric conditions across Japan from the past to the present, providing a homogeneous, four-dimensional long-term representation of the overall atmospheric conditions. It also researches the utilization of such climate and weather big data and the establishment of a system for this purpose. The Group participates in joint research on typhoon risk assessment within this project. |
| "Catchment-based Flood Management for Sustainable Societies" The Regional Co-Creation Center | Focusing on the Kuma River basin, which suffered significant damage during the July 2020 torrential rainfall, the project examines the social implementation of "Catchment-based Flood Management," which combines river improvement with coexistence with nature to achieve comprehensive safety and resilience across the basin. As part of the MS&AD Green Earth Project, the Group participates in research on enhancing flood control through wetland restoration. It also explores insurance and financial products, as well as regional digital transformation (DX) initiatives, that promote basin-wide flood control and support disaster prevention. |
| Nature Positive Sustainable Development Hub (Tohoku University) | Under the concept of nature positive, this initiative promotes the visualization and sustainable enhancement of the value of nature, the creation of a mechanism for financial flow toward nature positive, and human resource development. The Group is engaged in the development of biodiversity assessment and certification and aims to implement financial flow toward nature positive. |
| Development and Demonstration Project of Nature Footprint for Promoting Nature-Related Financial Disclosures by Investors and Financial Institutions and International Standardization (Waseda University) | Aiming to develop the Nature Footprint method, which quantitatively evaluates the impact of corporate activities on nature, this project collaborates with financial institutions and others to conduct pilot experiments and promote initiatives toward international standardization. |
| "Nature on the Balance Sheet" Initiative (The University of Tokyo) | This industry-academia collaboration platform, involving the University of Tokyo and four private companies including the Group, aims to develop a roadmap for incorporating the value of natural capital into economic decision-making and reflecting it in corporate balance sheets. It promotes Japanese participation in international rule-making processes and seeks to ensure that the construction of a nature-positive economy reflects the perspectives of Japan and, more broadly, Asia. |

## Contents





Our Preparedness for Climate and Nature Risks

# Risk Management



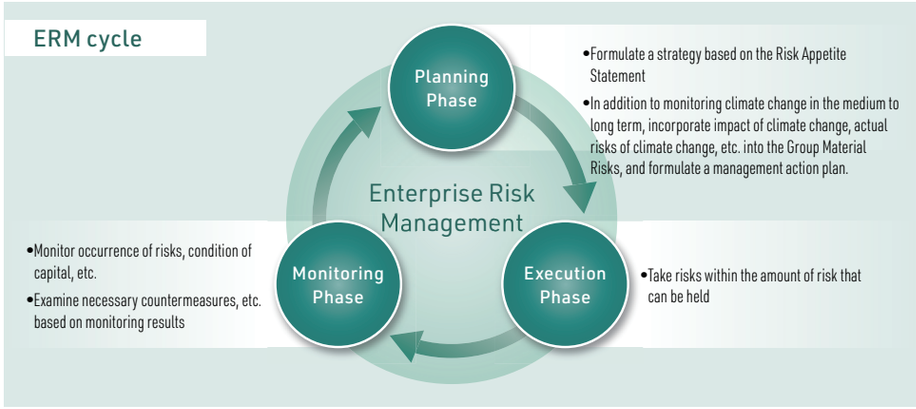
# Risk Management

## Contents



## [1] Risk Management

Based on the MS&AD Insurance Group Risk Appetite Statement, we have determined to clarify the amount of risk that can be held under normal conditions and to take risks based on its capital policy in order to realize its management vision. We develop a Group medium-term management plan as a vision to be achieved over the medium term in line with our Risk Appetite Statement. Also, we aim to ensure soundness and improve capital efficiency and RoR based on the ERM cycle.




### Underwriting risk

As for underwriting risk, we are working to advance growth strategies and assertively take on risks, while also striving to set appropriate insurance conditions, control natural catastrophe risks, and expand our returns.

### Asset management risk

With regard to asset management risk, we strive to implement comprehensive asset and liability management that takes into account the characteristics of liabilities, and the reduction of strategic equity holdings, and to expand our returns while securing the soundness and liquidity of assets.

### Risk management at the Group

In terms of risk management at the Group, based on the MS&AD Insurance Group Basic Policy on Risk Management, we recognize risks including climate-related risks, quantitatively determine the magnitude and possibility of their occurrence, and optimize their scope and extent. We also process risks by possession, transfer, and avoidance, verify their effects, and improve the processing method based on the results. The status of risks is reported to the Management Committee. Matters concerning climate-related risks are also reported to the Group Management Committee and the Board of Directors after discussing by the ERM Committee.

### Assuming risk occurrence scenarios

The Group selects risks to be controlled by management as Group Material Risks, and formulates Management Action Plans after assuming their occurrence scenarios, taking into account factors such as "climate change", and regularly monitors the status of risks. Thus, the Group has been working to control risks.

#### Group material risks and key scenarios for climate change

| Group Material Risks Related to Climate Change | "Key scenarios" related to climate change |
|---|---|
| Occurrence of large-scale natural catastrophe | Increase in insurance payments due to occurrence of large-scale natural catastrophe in Japan and overseas such as wind/flood disasters, wildfires, snow/hail disasters, and drought |
| Significant increase in credit risk | Deterioration in the performance and default positions of our investment/loan portfolio companies due to factors such as strengthening of regulations in relation to transition to decarbonization and delays in response thereto. |
| Occurrence of behavior that is detrimental to the corporate value of the Group, loss of social credibility | Deterioration in reputation and financial burden due to deficient responses to disclosures and issues concerning sustainability, such as those relating to climate change and associated lawsuits, etc. within the Group |
| Pandemic of new influenza and other diseases | Occurrence of a situation where the Group is unable to properly execute its business/services due to a pandemic of new infections influenced by global warming and other factors. and their prolonged impacts, etc. |
| Changes in insurance market | New insurance product in relation to responses to climate changes, such as decarbonization technologies and increase in claims payment due to development of a recycling-oriented society, etc. |

### Monitoring based on risk scenarios

Shown in the table above are the key scenarios for individual Group Material Risks established focusing on climate change. We conduct regular medium- to long-term monitoring based on these scenarios. In addition, because "depletion of natural capital (exhaustion of resources, deterioration of and crises of ecosystems, and human-induced pollution and accidents that cause major damage to the environment)" could have impacts on Group management over the medium and long terms, we conduct regular status monitoring as one of the Group Emerging Risks.

## [2] Identification Process of Dependencies/Impacts on Nature and Risks

The Group is using TNFD recommendations and the catalog introduced by TNFD to identify dependencies and impacts on nature through its underwriting, investments and loans, and business operations, as well as the risks associated with these activities.

### Understanding and assessing impacts

Since dependencies and impacts on nature vary according to the nature of the business, we classify our underwriting and investment/loan portfolio companies by industry based on the GICS code, and strive to understand the overall dependencies and impacts in each industry. Since natural conditions differ from region to region, we identify specific regions where our underwriting and investment/loan portfolio companies are involved in their business, and proceed with evaluating overlaps with sensitive locations and dependencies/impacts.

### Refining evaluation scope

This fiscal year, we analyzed the overlap of sensitive locations with respect to the operating sites of our top 500 investment/loan portfolio companies. There is a lack of data and tools to evaluate nature in specific areas such as our underwriting/other investment/loan portfolio companies, and the entire supply chain of our portfolio companies. We intend to increase the scope and granularity of the evaluation while closely monitoring technological progress and data expansion.

### Initiatives thereof

As the process related to nature-related risks in underwriting and investment is a new field, the Corporate Sustainability Department plays a central role in coordinating with the corporate risk management division, investment and loan division, and underwriting division.

## [3] Management of Natural Catastrophe Risks

The Group manages natural disaster risks through measuring and understanding the risk levels for covered events by geography and type of disaster, using a model which incorporates engineering knowledge, mainly that relating to meteorology and architecture. Of these risks, those subject to the impacts of climate change include typhoons, floods and forest fires.

### Setting maximum risk levels

In addition to carrying out stress testing of large-scale natural disasters, for wind/flood disasters in Japan with large risks and wind/flood disaster risks in the U.S.A, we aim to maintain financial soundness by setting the maximum risk levels (risk limits) for the Group and for each company, using the levels of risk that occur once every 200 years as a basis.

### Controlling risks across the Group

The Group has established a basic policy regarding net retention of natural disaster risks, and based on this policy, each Group company strives to appropriately underwrite and procure reinsurance (outward and inward). We are thus working to control natural disaster risks throughout the Group. Through these efforts, we aim to improve the financial soundness of the Group as a whole and reduce the risk of fluctuations in profit and loss during a given period.

### Working with external organizations and refining model

The Group has been working to further refine the model based on the latest academic knowledge and the status of occurrence of natural disasters, in collaboration with external organizations that are conversant with natural disaster risks. Additionally, we are working on such topics as incorporating the effects of climate change into stress tests and having the uncertainties of climate change reflected in the risk levels for the entire Group.

#### Stress testing

We conduct stress tests to confirm the impact of various stress events on capital and risk levels. In order to complement the limitations of statistical methods for risk measurement, stress testing identifies portfolio vulnerabilities and assesses the need for and urgency of countermeasures, using scenarios that take account of significant changes in the external environment and other factors selected based on the Group's portfolio and risk profile.
We have been conducting tests based on assumptions of more severe stress, such as "consecutive typhoons," and "consecutive hurricanes in North America," and making estimates based on assumptions of the impact of long-term climate change on "domestic typhoons."

## [4] Litigation Risks in Underwriting

As lawsuits related to climate change are becoming more frequent, claims for liability insurance covering litigation risks may increase. Liability insurance is a product which covers such payouts as damages for which our customers (hereinafter, "Insured") are liable and legal costs incurred in lawsuits. Major liability insurance products covering litigation risks with respect to climate change include the following:

| Product | Coverage | litigation Risks Related to Climate Change |
|---|---|---|
| Property Owner's (Manager's) Liability Insurance | Damages, legal costs, etc. for which the insured becomes liable as a result of injuries or damage to a third party or its property shall be paid as insurance benefits. Covered by this insurance are such bodily injuries and property damage as have a causal relationship with the insured's business activities, etc. | The insured may face litigation for such reasons as omitting to take measures for prevention or mitigation of damage due to climate change in the course of the insured's business activities. |
| Directors' and Officers' Liability Insurance (D&O Liability Insurance) | Paid as insurance benefits will be damages, legal costs, etc. for which an insured company director becomes liable in a claim for damages filed for its act (or omission of act) while performing its duties as a director. | It is possible that a lawsuit is brought against an insured company director for such reasons as delay or deficiency in taking measures against climate change, or insufficient disclosure of information by the company, etc. We sometimes observe such lawsuits being filed for the purpose of encouraging behavior modification in relation to climate change issues. |

With regard to litigation risk relating to climate change in underwriting, the Group ascertains the risk situation through confirming factors such as the state of underwriting of relevant insurance products and the litigation occurrence status under the management control of Group Material Risks. We also define "depletion of natural capital (exhaustion of resources, deterioration of and crisis over ecosystems, and human-induced pollution and accidents that cause major damage to the environment)" as one of the Group Emerging Risks and monitor the situation thereof in order to fully understand the medium- to long-term trend of relevant risk events.

## [5] As Responsible Institutional Investor

The "Japan' s Stewardship Code," a set of principles for "responsible institutional investors," published by Financial Services Agency, is a code of conduct for institutional investors who invest in listed shares, etc. in Japan. As an asset owner, the Group supports its intent.

### Policy

The Group has a policy of conducting "constructive dialogue (engagement) with investee companies, focusing on management issues, shareholder returns policy, and other non-financial information such as ESG from the perspective of enhancing the corporate value of the investee and promoting sustainable growth over the medium to long term, in accordance with Japan's Stewardship Code. In addition, toward realization of a decarbonized society, we are encouraging them to reduce GHG emissions and disclose information based on TCFD recommendations. Specific matters to be confirmed include organizational structures in relation to addressing climate change, their efforts toward reaching GHG emissions reduction targets, their plans for technological innovation, and any challenges they face.

#### Examples of initiatives for engagement in relation to climate change

| Example 1 | Example 2 |
|---|---|
| The Group engaged in dialogue with investee companies in sectors with high GHG emissions to understand industry-specific challenges, verify the status of GHG emission reduction target setting and related issues, and exchange views. We confirmed that these companies are working to establish data collection systems to facilitate disclosure of information such as their carbon footprint (the amount of GHG emissions from business activities converted to $CO_2$ equivalents). | To collect data on Scope 3* GHG emissions, the Group confirmed initiatives by investee companies in industries such as chemicals and metals. We explained that Scope 3 enables a comprehensive assessment of environmental impacts across the entire supply chain and provides important information for climate risk management and investor evaluations. We also shared examples of companies that have been advancing the calculation and disclosure of emissions with external support, and recommended that promoting such disclosure can help enhance corporate credibility. |

* Indirect GHG emissions from a company's business activities other than Scope 2 emissions (those indirectly emitted through the use of electricity and other forms of energy).

## [6] Considering Sustainability in Business Activities

The Group aims to enhance corporate value by contributing to solutions for sustainability issues with profound understanding through stakeholder engagement.
In underwriting, we provide products and services that respond to the demands of society, while also considering issues and risks that could have negative impacts on society and the global environment. Our investment considers ESG factors in pursuit of medium-to long-term returns and contribution to solutions of sustainability issues.
Our business activities take into account dependencies and impacts on the environment and society, including climate change and natural capital, and an overview of our policies and initiatives is published on our official website as the Group's approach to ESG issues; these activities are incorporated into our underwriting and investment and loan practices.

### 1. ESG Guidelines

| Sector | Classification | Guideline |
|---|---|---|
| Coal | To be excluded | Coal fired power plant, coal mine development and operation" (mainly producing thermal coal)*1 |
| | To be excluded | Energy mining projects by companies whose primary business is coal*2 |
| Oil/Gas | To be excluded | Oil sand mining, oil & gas extraction in the Arctic region*3 |
| | To be reviewe | Oil fired power plants and oil fields, oil and mining, and gas fields |
| Controversial weapons | To be excluded | Controversial weapon manufacturer (cluster munitions, anti-personnel mines and chemical weapons) |
| Agriculture,Forestry and Fisheries | To be reviewed | New agriculture, forestry and fisheries project involving large-scale development in unexplored areas |
| Hydroelectric power | To be reviewed | Construction of new hydroelectric power plants |
| Solar power | To be reviewed | New construction projects for domestic solar power plants |
| Onshore wind power | To be reviewed | New construction projects for domestic onshore wind power plants |
| Biomass power | To be reviewed | New construction projects for domestic biomass power plants |
| Nature Conservation Areas | To be reviewed | Projects that may destroy natural or cultural heritage sites protected under the UNESCO World Heritage Convention or wetlands protected under the Ramsar Convention |
| Human rights | To be reviewed | Businesses which may violate human rights of indigenous people or local communities |

*1 Existing coal fired power plants and thermal coal mines with technologies and techniques aiming to achieve the goals of the Paris Agreement might be handled after careful consideration.
*2 Companies that derive at least 25% of their revenues from coal-fired power generation, thermal coal mines or companies that generate at least 25% of their energy from coal.
*3 Projects and companies planning to decarbonize to achieve the goals of the Paris Agreement are exempted.

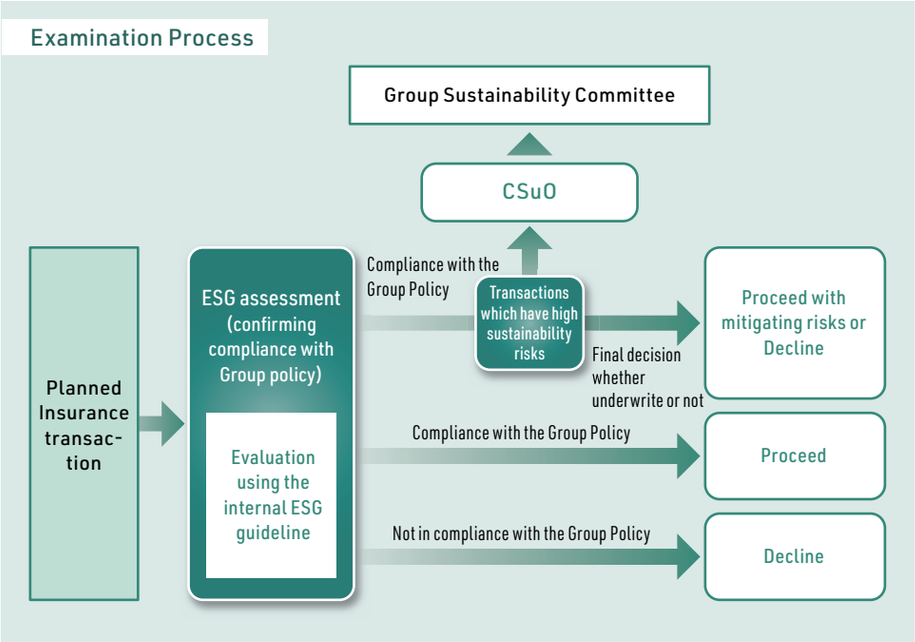
# Contents



## 2. Underwriting

### Examination process

After confirming that projects are in compliance with the Group's policies, we accept only those cases that fall under our policy. For projects that are considered to be in compliance with the Group's policies but are deemed to have high sustainability risks (ESG risks), we have established an escalation process and report such transactions to the Group Sustainability Committee.




## 3. Investment and Loan

### (i) ESG investment and loan initiatives

Making initiatives for incorporation of ESG factors into the investing and financing decision-making (integration), constructive dialogue (engagement), and investment and loan projects that contribute to sustainability (positive impact) as the pillars, we implement investments and loans.

#### ESG investment and loan initiatives

| ESG investment and loan initiatives | Content | Target assets |
|---|---|---|
| **Integration** | | |
| Reflection of the response to the Group's "business activities considering sustainability" | Screening specific uses of funds and industries without investments and Loans, and making prudent decisions on whether to engage in transactions from the perspectives of responding to climate change, improving the sustainability of natural capital and respecting human rights. | All assets undermanagement |
| Incorporation of the Group's priority issues into the research | Focusing on "$CO_2$ emissions." "deforestation." "water risk." and "human rights violations." evaluations by ESG evaluation companies and international initiatives(such as CDP) are used for investment decisions monitoring. | Corporate bonds, stocks, and loans |
| **Engagement** | | |
| Engagement | Conduct dialogue centered on stewardship activities | Shares |
| **Positive Impact** | | |
| Sustainable / thematic investing | ESG issues, investments, and loans in themes such as renewable energy (e.g... solar, wind, hydrogen), green transition finance (greenhouse gas reduction), and regional revitalization | Bonds, stocks, loans, and private equity |
| Impact investing | Investment in themes such as healthcare and education, focusing on climate change | private equity |

*Applies to active investment and passive investment management, as well as to entrusted investment management companies.

### (ii) Systematic incorporation of ESG factors into the investment/loan processes

In addition to conventional financial and non-financial analysis, in asset classes such as stocks, corporate bonds, loans, and private assets that are managed by the Group, we systematically incorporate into our investment and loan decisions business activities that take into account sustainability of the Group, and risk assessment and analysis of Group ESG issues using external assessment organizations.
We also send questionnaires on an annual basis, in principle, to the investment management companies that we commission to manage our corporate bond and stock investments, to confirm their ESG initiatives.

## Contents



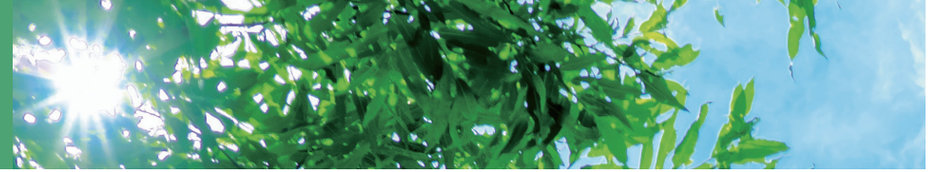


Indicators and Targets of Our Initiatives

# Metrics and Targets



# Metrics and Targets



## Contents



## [1] Metrics for Dependencies and Impacts

The Group has defined six sectors – consumer staples, materials, consumer discretionary, industrials (transportation), industrials (including semiconductors used in manufacturing), and utilities – as having significant nature-related dependencies and impacts. The percentages of our underwriting portfolio companies*1 and investment/loan portfolio companies*2 in these sectors in FY2024 were 60.5% and 60.2%, respectively.

In addition, the exposure (investment and loan ratio) to businesses in sensitive locations of high importance from a biodiversity perspective was 1.29% for stocks, 1.34% for corporate bonds, and 0.76% for corporate loans (our top 500 investment/loan portfolio companies).

*1 Corporate insurance policies for automobile insurance, fire insurance, casualty insurance (excluding construction insurance), cargo insurance, marine insurance, and aviation insurance
*2 Listed shares, corporate bonds, and corporate loans

## [2] Metrics for Risks and Opportunities

### Metrics for products/services that contribute to climate change responses / improvement of sustainability of natural capital

Annual average premium growth rate of 18% in years to 2025 in insurance products that contribute to "Symbiosis with global environment – Planetary Health" as KPI of our medium-term management plan in order to accelerate the provision of products and services covering risks related to climate change.

| Item | Scope | Target | FY2024 |
|---|---|---|---|
| **Products and services which contribute to "Symbiosis with global environment – Planetary Health"** | Group companies (Japan) + and other affiliates | 18% of annual average revenue increase | 20.6% |

### Metrics for products which help improve the resilience of society

We aim to increase the number of underwritten policies for products which help improve the resilience of society by an average of 20% per year until 2025.

| Item | Scope | Target | FY2023 | FY2024 |
|---|---|---|---|---|
| **Rate of increase in the number of underwritten policies for products which help improve the resilience of society** | MS/AD | 20%% of annual average | 17.6% | 25.0% |

### Insurance premium income from products which contribute to decarbonization, circular economy and improvement of the resilience of society

| Item | Scope | Unit | FY2024 |
|---|---|---|---|
| **Insurance premium income from products which contribute to decarbonization, circular economy and improvement of the resilience of society** | MS/AD | JPY million | 300,695 (6.4%) |

### Metrics for natural catastrophe risk levels in underwriting

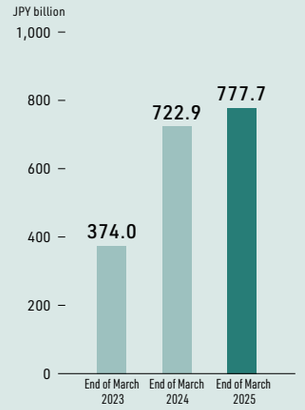
Risk levels that occur once every 200 years.

### Metrics for ESG thematic investing including climate change responses / improvement of sustainability of nature capital

Zero carbon transition requires technological innovation and capital investment toward a drastic reduction of greenhouse gas emissions. Factors such as growth of demand for funding and needs for new financial products and services will likely bring about opportunities for financial institutions. The Group is working on ESG thematic investing aimed at leading to solutions for various social issues on the premise of ensuring profitability.

#### Regarding ESG Thematic Investment

**Balance trend of ESG thematic investing**




**Breakdown of Investment Balance** (JPY billion)

| Example of Topics | End of March 2025 Outstanding balance of investment and loan |
|---|---|
| Investment in funds with ESG themes | 234.0 |
| Support for initiatives designed to reduce GHG emissions | |
| Renewable/Next Generation energies (solar power, wind, hydrogen, etc.) | 94.8 |
| Transition-/Sustainability-linked finance | 37.8 |
| Green finance | 165.9 |
| Support for global sustainable development | |
| Social sustainability (including supranational bonds) | 214.2 |
| Impact investment* for regional revitalization and healthcare, and other investments | 31.2 |
| **Total** | **777.7** |

Note: Of the investment amount commitment to the fund, only the amount already invested is included.

### Metrics for investment in venture business including climate change responses/improvement of sustainability of nature capital

We are promoting cooperation and collaboration with innovation partners that contribute to resolving social issues, such as such as Jupiter Intelligence, a company which offers AI-based climate change risk assessment that responds to TCFD

| Item | End of March 2025 |
|---|---|
| Number of the Group climate/nature-related investments through MS&AD ventures (all cases) | 8 (123) |

## [3] Environmental Impact of Our Business Activities

### Greenhouse gas emissions and energy consumption from our Group's business activities

### Water consumption, waste emissions, etc. from our Group's business activities

→ESG data/materials: ISO26000 Core Subjects (Environment)
https://www.ms-ad-hd.com/en/csr/data.html#012

## [4] Metrics and Targets for Reduction of Environmental Impact of the Group's Business Activities

### Targets

#### GHG emissions reduction targets

| Target | | FY2030 Target | FY2050 Target | Actual Result |
|---|---|---|---|---|
| Scope 1, 2*1 | | -50%% compared to basic fiscal year (FY2019) | Net zero | FY2024 -40.0% |
| Scope 3*2 | Categories 1, 3, 5, 6, 7 and 13 | -50%% compared to basic fiscal year (FY2019) | | FY2024 -26.9% |
| | Underwriting portfolio/Investments/Loans portfolio companies | -37%% compared to basic fiscal year (FY2019) (Key Japanese domestic corporate clients) In order to work with clients to reduce GHG emissions, we will deepen dialogue, identify issues for reduction, and propose solutions to resolve these issues. | | FY2022 -18.3% |

*1: Scope 1 refers to direct emissions from our Group, such as gasoline from company-owned vehicles. Scope 2 refers to indirect emissions from consumption of purchased electricity, etc.
*2: Indirect emissions through the Group's business activities other than Scope 2. Category 1 refers to purchased products and services (covered by paper and mail). Category 3 refers to fuel and energy activities other than Scope 1 and Scope 2. Category 5 refers to waste from operations. Category 6 refers to business trips by employees. Category 7 refers to employee commuting. Category 13 refers to leased assets
*3: GHG emissions of our major Japanese corporate clients (approx. 3,300) selected based on premium income (related to our underwriting and investment/loan portfolios)

#### Renewable energy usage rate

| Target Year | Usage Rate | FY20242023 Actual |
|---|---|---|
| FY 2030 | 60% | -27.0% |
| FY 2050 | 100% | |

## [5] GHG Emissions of Underwriting Portfolio Companies

| Item | Scope | FY2022 Actual |
|---|---|---|
| Insurance Underwriting | Major domestic clients of Mitsui Sumitomo Insurance and Aioi Nissay Dowa Insurance*1 | 1153 thousand tons-$CO_2$ |

*1: Major Japanese corporate clients (approx. 3,300) selected based on premium income

# [6] Greenhouse Gas Emissions in Our Investment and Loan Portfolio Companies

The following table shows the carbon footprints (CO2 equivalent of greenhouse gas emissions from business activities) of our investment and loan portfolio companies. Scope 1 and Scope 2 greenhouse gas emissions of our investment and loan portfolio companies are measured using Trucost's tool for calculating greenhouse gas emissions using a proprietary modeling approach, and PCAF estimates when there is not enough information disclosed by our investment and loan portfolio companies or publicly available. Assets subject to the analysis are domestic and foreign stocks of listed companies (covering approx. 99% on a market value basis), domestic and foreign bonds (covering approx. 99% on a book value basis), and domestic and foreign corporate loans (covering approx. 99% on a book value basis) out of the Group's investment and loan portfolio as at the end of March 2024. We are adopting PCAF standards for measuring greenhouse gas emissions in our investment and loan portfolio companies.

→ ESG data/materials: Underwriting and investment/loan portfolios
https://www.ms-ad-hd.com/en/csr/data.html#underwriting_investment

## GHGs emissions of our investment and loan portfolio companies (Scope 1 and Scope 2)

### By asset

(Unit: kt-$CO_2e$)

| Asset | FY2022*1 | FY2023*2 | FY2024*3 |
|---|---|---|---|
| Stocks | 2,302 | 2,111 | 2,111 |
| Corporate Bonds | 2,400 | 1,944 | 1,463 |
| Corporate Loans | 286 | 225 | 199 |

*1: Calculated in FY2022 using portfolio as of end of March 2022. Stocks 99%, Corporate Bonds 67%, Corporate loans 48%, totaling 98.4%.
*2: Calculated in FY2023 using portfolio as of end of March 2023. Stocks 99%, Corporate Bonds 97%, Corporate loans 95%, totaling 97.6%. GHG emissions from commercial real estate totaled 61,000 t-CO2e out of our investment and loan portfolio companies as at the end of March 2023.
*3: Calculated in FY2024 using portfolio as of end of March 2024. Stocks 99.2%, Corporate Bonds 99.5%, Business loans 99.9%, totaling 99.3%. GHG emissions from commercial real estate totaled 67,000 t-CO2e out of our investment and loan portfolio companies as at the end of March 2024.

### By industry (FY2024)

(Unit: kt-$CO_2e$)

| Industry* | Our Investment and Loan Portfolio Companies (Scope 1 and Scope 2) |
|---|---|
| Energy | 335 |
| Materials | 1,314 |
| Industrials | 729 |
| Consumer Discretionary | 285 |
| Consumer Staples | 213 |
| Healthcare | 13 |

| Industry* | Our Investment and Loan Portfolio Companies (Scope 1 and Scope 2) |
|---|---|
| Finance | 53 |
| Information Technology | 64 |
| Communication Services, | 15 |
| Utilities | 736 |
| Real Estate | 17 |
| Total | 3,773 |

* GIGS sector classification is adopted

# [7] Weighted Average Carbon Intensity (WACI) in Our Investment and Loan Portfolio Companies

Weighted average carbon intensity (WACI)* is used as metrics of the carbon intensity of our investment/loan portfolio. Scope 1 and Scope 2 for our investment/loan portfolio companies are calculated through information disclosed by the companies, S&P Global Trucost analysis tool, and estimated value provided by PSAF. Subject assets are same as those of "[6] Greenhouse Gas Emissions in Our Investment and Loan Portfolio Companies" (stocks, corporate bonds and corporate loans).

* An indicator which is a weighted average of "the ratio of GHG emissions vs. sales amount" in each of our investment/loan portfolio companies and "percentage of holding in the Group' s investment/loan portfolio companies."

### Weighted average carbon intensity (WACI) in our investment and loan portfolio companies (Scope 1 and Scope 2)

(Unit: t-$CO_2e$/US$ million)

| Asset | FY2022*1 | FY2023*2 | FY2024*3 |
|---|---|---|---|
| Stocks | 114.5 | 100.1 | 99.6 |
| Corporate Bonds | 221.5 | 152.2 | 135.4 |
| Corporate Loans | 273.2 | 184.3 | 217.3 |

*1: Calculated in FY2022 using portfolio as of end of March 2022. Stocks 99%, Corporate Bonds 67%, Corporate loans 48%, totaling 98.4%
*2: Calculated in FY2023 using portfolio as of end of March 2023. Stocks 99%, Corporate Bonds 97%, Corporate loans 95%, totaling 97.6%
*3: Calculated in FY2024 using portfolio as of end of March 2024. Stocks 99.2%, Corporate Bonds 99.5%, Business loans 99.9%, totaling 99.3%

## Relevant information disclosed

### Strategy

→ Medium-to Long term Targets
https://www.ms-ad-hd.com/en/csr/summary/kpi.html#link-list-4

→ ESG integration and sustainability approach
https://www.ms-ad-hd.com/en/csr/summary/esg.html

### Risk Management

→ ERM and Risk Management
https://www.ms-ad-hd.com/en/group/value/risk_management/erm.html

### Metrics and Targets

→ Targets and Results
https://www.ms-ad-hd.com/en/csr/summary/kpi.html

→ SG data/materials ISO26000 Core Subjects (Environment)
https://www.ms-ad-hd.com/en/csr/data.html#012)

## Contents



# 1 | TNFD General Requirements

Back to report

### [1] The application of materiality

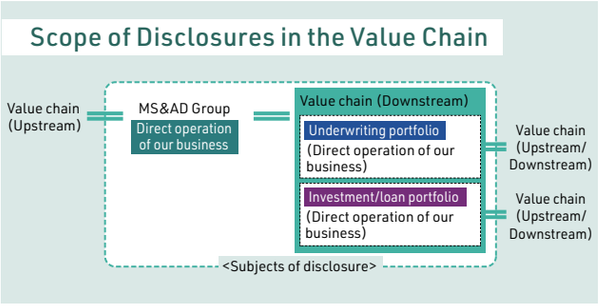
The Group evaluates the impact on stakeholder' s evaluation and decision-making and the impact on the Group' s business, and identifies our materialities. Based on the materialities identified, determining "Planetary Health (Symbiosis with the global environment)," "Resilience (Safe and secure society)," and "Well-being (Happiness of diverse people)" as priority issues, the Group has been working to resolve them.

* For the details, refer to "Identifying Materiality" in the Sustainability Report of the MS&AD Insurance Group.

→ "Identifying Materiality" on MS&AD Corporate Website
https://www.ms-ad-hd.com/en/csr/summary/businessmodel.html

### [2] The scope of disclosures and location of nature-related issues

This report analyzes climate/ nature-related risks/opportunities for the Group' s domestic and overseas activities (direct operation of our business, underwriting and investments/loans), and also provides a risk analysis of climate/ nature-related risks for each industry sector among our underwriting and investment/loan portfolio clients.




### [3] The location of nature-related issues

The Group analyzes regional nature-related risks associated with the direct operation of our business and downstream in the value chain (underwriting portfolio companies and investment/loan portfolio companies). It will continue research on analysis tools and databases to further expand the scope of our analyses.

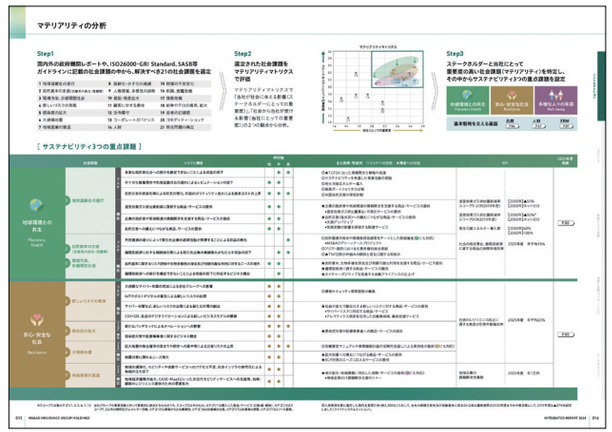
### [4] Integration with other sustainability-related disclosures

As stated at the beginning, the Group is working on initiatives, taking an integrated approach to action on climate changes, enhancement of sustainability of natural capital, and preservation/recovery of biodiversity. Following the framework recommended by the Task Force on Climate-related
Financial Disclosures (TCFD) and the Task Force on Nature-related Financial Disclosers (TNFD), we provide disclosures on both factors in an integrated manner. Initiatives related to sustainability other than climate/nature-related issues are disclosed in the MS&AD Sustainability Report.

*For details, please refer to the following:
*Section 10, "Identifying Materiality" in MS&AD Integrated Report (Annual Report).
→"Identifying Materiality" in MS&AD Sustainability Report
https://www.ms-ad-hd.com/en/csr/summary/businessmodel.html

*Section 13, "Identifying Materiality" in MS&AD Integrated Report (Annual Report).
[URL]

* Access our Sustainability Report at the URL below:
https://www.ms-ad-hd.com/en/csr.html




### [5] The time horizons considered

The time horizons for the disclosures in this report are as follows: Short-term: 2025 (End of the Medium-Term Management Plan); Medium-term: 2030 (Target year for the interim targets); Long-term: 2050

### [6] The engagement of Indigenous Peoples, Local Communities and affected stakeholders in the identification and assessment of the organization' s nature-related issues

With regard to underwriting, we provide insurance to companies and individuals throughout Japan. Together with our insurance agencies, we actively engage with local stakeholders including municipalities and local businesses in various regions on climate/ nature-related risks, particularly in the context of adaptation to climate change for disaster prevention and mitigation. We are also promoting collective action toward a nature-positive transition by involving local stakeholders and research institutions, aiming to mitigate damage caused by natural disasters, recharge water resources, conserve biodiversity, and revitalize primary industries.

See page 37

We have just begun analyzing the regional climate/ nature-related risks associated with the direct operations and value chains of individual companies in our underwriting, investment and financing, and have not yet reached the level of precise assessment needed for effective engagement. We will continue to work hard to identify the issues.
We will continue to engage in dialogue with NPOs/NGOs about what risks may be associated with the local natural environment, although they are not specific local stakeholders, and will consider how risk assessment should be conducted. In addition, we are exchanging opinions with relevant organizations on the topics of greenhouse gas emissions and loss of biodiversity, which may pose significant risks to the local climate and environment.

# 2 | Mapping of TCFD/TNFD Disclosure Recommendations (4 Pillars and 14 Recommended Disclosures) to the Group's Analyses

## 1 Governance

Disclose the organization's governance of nature-related dependencies, impacts, risks and opportunities.

### Recommended Disclosures

**A** Describe the board's oversight of nature-related dependencies, impacts, risks and opportunities.

P.08 Supervisory Framework by the Board of Directors

**B** Describe management's role in assessing and managing nature-related dependencies, impacts, risks and opportunities.

P.09 Role of Senior Management

**C** Describe the organization's human rights policies and engagement activities, and oversight by the board and management, with respect to Indigenous Peoples, Local Communities, affected and other stakeholders, in the organization's assessment of, and response to, nature-related dependencies, impacts, risks and opportunities.

P.08 Supervisory Framework by the Board of Directors
P.50 TNFD General Requirements

* Represents TNFD-specific recommended disclosure

## Contents



# 2 Strategy

Disclose the effects of nature-related dependencies, impacts, risks and opportunities on the organization's business model, strategy and financial planning where such information is material.

## Recommended Disclosures

### A

Describe the nature-related dependencies, impacts, risks and opportunities the organization has identified over the short, medium and long term.

P.11 Climate/Nature-related Dependencies/Impacts
P.22 Physical Risk
P.28 Transition Risk
P.30 Climate/Nature-related Opportunities
P.60 Risks and Opportunities in Six Industries

### B

Describe the effect nature-related dependencies, impacts, risks and opportunities have had on the organization's business model, value chain, strategy and financial planning, as well as any transition plans or analysis in place

P.11 Climate/Nature-related Dependencies/Impacts
P.15 Customer Dependencies and Impacts on Climate and Nature by Industry
P.22 Physical Risk
P.28 Transition Risk

### C

Describe the resilience of the organization's strategy to nature-related risks and opportunities, taking into consideration different scenarios.

P.22 Physical Risk
P.28 Transition Risk

### D

Disclose the locations of assets and/or activities in the organization's direct operations and, where possible, upstream and downstream value chain(s) that meet the criteria for priority locations.

P.20 Interface with Sensitive Locations Identified Under the TNFD Framework

* Represents TNFD-specific recommended disclosure

## Contents



# 3 Risk & Impact Management

Describe the processes used by the organization to identify, assess, prioritise and monitor nature-related dependencies, impacts, risks and opportunities.

## Recommended Disclosures

**Ai** Describe the organization's processes for identifying, assessing and prioritizing nature-related dependencies, impacts, risks and opportunities in its direct operations.

P.20 Interface with Sensitive Locations Identified Under the TNFD Framework

**Aii** Describe the organization's processes for identifying, assessing and prioritizing nature-related dependencies, impacts, risks and opportunities in its upstream and downstream value chain(s).

P.43 Identification Process of Dependencies/Impacts on Nature and Risks

**B** Describe the organization's processes for managing nature-related dependencies, impacts, risks and opportunities.

P.43 Management of Natural Catastrophe Risks
P.43 Litigation Risks in Underwriting
P.44 As Responsible Institutional Investor
P.44 Considering Sustainability in Business Activities

**C** Describe how processes for identifying, assessing, prioritizing and monitoring nature-related risks are integrated into and inform the organization's overall risk management processes.

P.42 Risk Management

* Represents TNFD-specific recommended disclosure

## Contents



# 4 Metrics & Targets

Disclose the metrics and targets used to assess and manage material nature-related dependencies, impacts, risks and opportunities.

## Recommended Disclosures

**A** Disclose the metrics used by the organization to assess and manage material nature-related risks and opportunities in line with its strategy and risk management process.

P.47 Metrics for Risks and Opportunities

**B** Disclose the metrics used by the organization to assess and manage dependencies and impacts on nature.

P.47 Metrics for Dependencies and Impacts

**C** Describe the targets and goals used by the organization to manage nature-related dependencies, impacts, risks and opportunities and its performance against these.

P.48 Environmental Burden of Our Business Activities
P.48 Metrics and Targets for Reduction of Environmental Burdens of the Group's Business Activities
P.48 GHG Emissions from Underwriting
P.49 Greenhouse Gas Emissions in Our Investment and Loan Portfolio Companies
P.49 Weighted Average Carbon Intensity (WACI) in Our Investment and Loan Portfolio Companies

* Represents TNFD-specific recommended disclosure

# 3 | Detailed Analyses (Appendix)

## [P.18] LEAP Analysis of Marine Insurance

In this section, we analyze nature-related issues in connection with marine insurance—one of the Group's core insurance businesses—and its primary coverage target, the shipping industry, which is closely interrelated with nature. This industry is important to the Group both as insurance underwriting and investment/loan portfolio companies. At the same time, it relies on ecosystem services provided by the ocean as a natural capital, while its operations and logistics activities exert multifaceted impacts on nature. We recognize that a deep understanding of the relationship between the shipping industry and nature is essential for sustainable growth together with the shipping industry.

### Dependencies and Impacts of the Shipping Industry on Nature

To understand the shipping industry's dependencies and impacts on nature from direct operations, we primarily used the online tool ENCORE to assess materiality.

#### [1] Major Impacts of the Shipping Industry

The following activities were assessed as having significant impacts on nature:

**Vessel operations**

- **Use of marine areas:** Movement of ships, coastal ecosystem damage from grounding, and seabed disruption/destruction due to anchoring and dragging
- **Climate change:** GHG emissions
- **Disturbance:** Noise and light pollution from operations, collisions with large marine animals such as whales
- **Introduction of invasive species:** Spreading invasive species via ballast water and hull-fouling organisms
- **Air pollutants:** Emissions of air pollutants during operations
- **Harmful contamination of soil and water:** Release of toxic substances from cleaning agents and antifouling paints

**Maintenance and repair**

- **Harmful contamination of soil and water:** Use of antifouling paints
- Disturbance: Adverse effects on organisms and habitat fragmentation due to noise and odors

#### [2] Major Dependencies of the Shipping Industry

The assessment identified the following dependencies:

**While docked, loading/unloading, and entering ports**

- Flood mitigation functions: Coastal protection provided by mangroves, coral reefs, and other structures that mitigate storm surges and floods
- Storm mitigation functions: Reduction of impacts from wind, sand, and other storm events
- Rainfall regulation functions: Reduction of flood risk

**During navigation**

- Global climate regulation functions: Mitigation of changes in ocean currents and sea-level rise
- Water purification functions: Reduction of ship damage caused by chemical substances in the ocean
- Water flow regulation functions: Ensuring adequate water levels for transport in canals during dry seasons and stable water supply

#### [3] Key Dependencies Relevant to Insurance

Among the ecosystem services the shipping industry depends on, the following are considered relevant to insurance.

- Insurance covering cargo: Dependence on flood mitigation and storm mitigation functions during loading/unloading and temporary storage at ports
- Insurance covering vessels: Dependence on climate regulation functions that help prevent ship damage, human casualties, third-party damages, ship salvage in case of a sunken coastal vessel, and marine pollution such as oil spills in both international and coastal shipping

**Detailed Assessment of Impacts**

In conducting the detailed impact assessment, we first identified the species affected by each impact factor based on the results of literature surveys. We then overlaid data on the global distribution of relevant species, areas of high biodiversity importance such as protected areas (see table below), and global vessel traffic data to identify marine areas vulnerable to impacts.

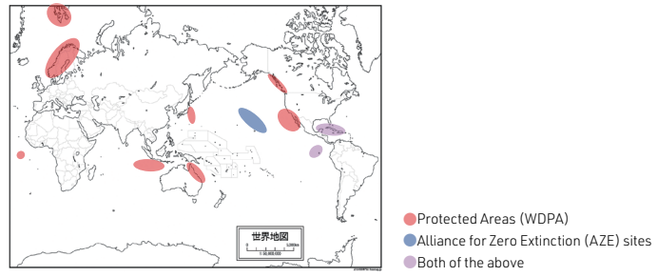
**Evaluation Indicators Used in the Analysis**

| Theme | Category | Indicator | Data Source |
|---|---|---|---|
| Biodiversity Importance | Marine areas important from the perspective of protected areas and biodiversity | Protected Areas (WDPA) | ・UNEP-WCMC and IUCN. (2021a). Protected Planet Report 2020. |
| | | AZE sites | ・IBAT<br>・Alliance for Zero Extinction |
| | | Ecologically or Biologically Significant Marine Areas (EBSAs) | ・Convention on Biological Diversity |
| | | MARPOL Convention Areas | ・IMO |
| | | Important Marine Mammal Areas (IMMAs) | ・IUCN MMPATF (2020) |
| | Species data | Distribution of mangroves, corals, algae, and seagrass | ・IUCN、UNEP—WCMC |
| Importance of Ecosystem Service Provision | | Important areas for mammals, fish, birds, and reptiles | ・Jenkins, C.N. & K. Van Houtan. (2016). |
| | | Fisheries yield (commercial/non-commercial) | ・Sea Around Us |
| | | Economic value of coral reefs | ・Spalding et al., 2018 |

The analysis revealed that the following marine areas are experiencing significant impacts:

**Areas Important from the Perspective of Protected Areas and Biodiversity**

Colored areas indicate regions where shipping traffic exceeds a certain threshold and that are either subject to strict protection requirements or located near habitats of endangered species. In these areas, impacts from marine use, pollution, and the introduction of invasive species are considered significant.



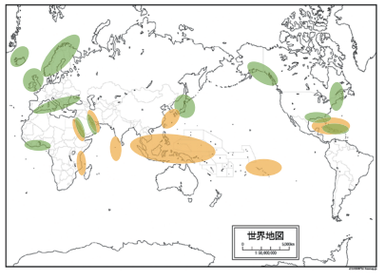

### Important Marine Areas by Impact Factor (a)

The orange areas represent marine zones where coral reefs are located, considered important due to impacts such as ship grounding. The green areas are marine zones with seagrass and seaweed, considered important due to the potential introduction of invasive species via hull fouling or ballast water.

# Contents



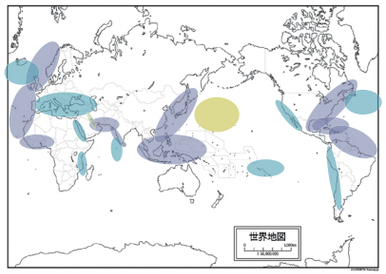




Key Impact Factors
- Introduction of invasive species
- Marine area use (grounding/ship stranding)

### Important Marine Areas by Impact Factor (b)

Marine areas with high shipping traffic that are considered significant from a pollution perspective were identified.
Blue areas are those with coral reefs along with habitats for endangered fish and reptiles, where oil spills and container losses are considered major impacts. Yellow areas are those inhabited by endangered bird species, where light pollution and oil spills are considered major impacts. Purple areas are those inhabited by coral, fish, reptiles, and additionally endangered mammals, where collisions and similar impacts may be significant.



Key Impact Factors
- Pollution (oil spills, container loss)
- Pollution (light pollution, oil spills)
- Pollution (collisions, oil spills, container loss)

Through this analysis, we were able to deepen our understanding of the relationship between the shipping industry and nature, as well as its implications for the insurance business. Correctly identifying dependencies and impacts on nature is not only essential for understanding the sustainability of the shipping industry, but also provides important insights for the Group's insurance underwriting and investment activities. Going forward, we will not only identify risks and opportunities based on this analysis but also further deepen our assessment along the value chain. In parallel, we will participate in discussions on the TNFD sector guidance to enhance understanding together with the industry.

## [P.19] LEAP Analysis of Renewable Energy Projects

Back to report

### The Need for Renewable Energy Deployment and Environmental & Social Risk Assessment

As global decarbonization progresses in response to climate change, the adoption of renewable energy has become essential. In Japan, achieving carbon neutrality by 2050 requires a substantial increase in the share of electricity coming from renewable energy, including solar and wind power. However, the construction and operation of power plants can have diverse impacts on the natural environment and local communities. Rapid deployment of renewable energy therefore requires more advanced environmental and social risk assessments than in the past. While operators conduct legally mandated environmental assessments and implement measures to reduce environmental impacts, it remains challenging to fully cover potential risks, such as cumulative impacts or future risks. In response to this situation, as an insurance company, we investigate potential biodiversity and natural disaster risks that are difficult to address through environmental assessments and communicate these findings to client companies, thereby supporting the sustainable deployment of renewable energy.

### Purpose of LEAP Analysis for Onshore Wind Power

In fiscal 2023, the MS&AD Group added renewable energy projects to the scope of its environmental and social risk assessments. In fiscal 2024, we entered into a partnership agreement with the Nature Conservation Society of Japan (NACS-J). For onshore wind power, in particular, suitable locations are limited due to Japan's geography and wind conditions, making cumulative environmental impacts more likely. Therefore, to achieve more effective risk management and provide enhanced solutions to insurance portfolio companies and local communities, we conducted a LEAP analysis in accordance with the TNFD disclosure recommendations.

### Analysis and Results (L: Sensitive Locations, E: Dependencies & Impacts, A: Risks & Opportunities)

#### *Locate: Assessment of Sensitive Locations*

Based on the locations of onshore wind power projects, we assessed sensitive locations in accordance with TNFD guidelines, covering the four themes including biodiversity importance and ecosystem integrity (see page 19 for indicators and information used). As a result, all 6 projects examined were found to be either adjacent to protected areas or key biodiversity areas (KBA), or located in areas with high scores on the Biodiversity Intactness Index (BII), and were therefore classified as sensitive locations. These areas serve as habitats for rare raptors, migratory birds, and bat species, and present a range of potential risks, including forest modification, impacts on wetlands, and landslide risks.

#### *Evaluate: Dependencies and Impacts Analysis*

Dependencies and impacts of onshore wind power projects were analyzed using ENCORE* (2024 edition) and the TNFD sector guidance. The results are summarized in Table 1. When it comes to dependencies, these projects have high reliance on natural ecosystem services, such as climate regulation, flood control, and soil retention. In terms of project impacts, they are manifested in changes to land and freshwater areas, noise and vibration, bird strikes (disturbance/collisions), introduction of invasive species, and effects on local communities' living environment and landscape.

* An international online tool for companies and financial institutions to evaluate the dependencies, impacts, and materiality of their business activities on natural capital (ecosystem services).

### Major Impacts, Dependencies and Materiality of Onshore Wind Power Generation Projects

Very High VH High H Medium M Low L Very Low VL

| Impact Driver | ENCORE Materiality Level | Construction & Development | Operation & Maintenance | Theme | Description of Impact |
|---|---|---|---|---|---|
| Use of Terrestrial Ecosystems | H | ● | ● | Land and Freshwater Area Modification/Occupation by Project Facilities | Land modification/occupation for wind farm and related infrastructure construction, habitat alteration for animals and plants (including fragmentation, degradation)<br>Adverse effects on ecosystem services, including cultural services, caused by land modification or occupation |
| Use of Freshwater Ecosystems | | ● | ● | | Habitat fragmentation caused by transmission lines, disruption of wildlife movement, and impacts on species' foraging or reproduction<br>Facilitation of invasive species intrusion due to habitat conversion, ecosystem disturbance, and biodiversity loss |
| Pollution (Including Disturbance) | M | | ● | Community Impacts | Impacts on local communities and tourism due to wind turbine installation |
| | | | ● | Noise Generation | Impacts of operational noise from wind farms on marine ecosystems, fish, aquatic organisms, and bird reproduction |
| | | | ● | Disturbance & Collision | Collisions with turbine blades causing harm, especially to birds (raptors, migratory birds) and bats<br>Disruption of birds' breeding or foraging behavior due to turbine construction<br>Habitat destruction caused by poorly sited installations |
| | | | ● | | Bird mortality from collisions or electrocution from transmission lines<br>Harm to animals due to vegetation management under transmission lines<br>Effects on reproduction and individual survival of species from prolonged exposure to electromagnetic fields from transmission lines |
| Climate Change | VL | | ● | GHG Emissions | GHG emissions from transmission lines |
| Introduction of Invasive Species | N/A | ● | | Invasive Species Introduction | Potential introduction of invasive species (plants, etc.) due to construction activities<br>Establishment opportunities for invasive plant communities due to vegetation removal for transmission lines<br>Promotion of invasive species and disturbance of native ecosystems due to habitat conversion |

| Ecosystem Services | ENCORE Materiality Level | Nature of Dependency |
|---|---|---|
| Climate Regulation | VH | Transmission and distribution infrastructure depend on climate regulation to protect infrastructure from the impacts of unstable rainfall patterns and temperature fluctuations. |
| Soil and Sediment Retention | M | Infrastructure depends on ecosystem services of soil and sediment retention, provided by diverse vegetation and environmental assets. |
| Rainfall Pattern Regulation<br>Storm Mitigation<br>Flood Control | M～H | For stable operations, infrastructure depends on ecosystem services that regulate and mitigate extreme weather events, such as typhoons and floods. |

### *Assess: Risks and Opportunities*

Three categories of risks were identified: physical, reputational, and regulatory. Physical risks include damage from typhoons and other extreme weather events, as well as increased landslide and flood risks caused by soil and vegetation loss. Reputational risks involve potential opposition from local residents and NGOs, leading to reputational damage. Finally, regulatory risks relate to the possible tightening of development restrictions. On the other hand, careful consideration of potential effects on the natural environment and local communities was found to create opportunities, such as improved reputation and reduced disaster risk.

**Table 2: Risks and Opportunities Associated with Onshore Wind Power Generation**

| Category | | Risks and Opportunities for the Operator |
|---|---|---|
| Risks | Physical | Damage to facilities or operational stoppages due to typhoons or abnormal weather during construction or operation |
| | | Increased risk of soil instability, landslides, or sediment disasters due to vegetation loss |
| | | Facility damage or operational stoppages caused by intensified flooding from climate change and vegetation loss |
| | | Reduced power generation due to changes in wind patterns caused by climate change |
| | Policies & Regulations | Increased constraints on new development projects due to changes in nature-related regulations, such as limitations on areas available for development |
| | | Requests from authorities to halt projects because of adverse impacts on nature or local communities |
| | Reputation | Opposition from local residents and criticism by NGOs due to noise, vibration, visual impacts, or impacts on nature and biodiversity |
| Opportunities | Reputation | Enhanced reputation by conducting operations with consideration for nature |
| | Resilience | Avoidance or mitigation of natural disaster risks through appropriate site selection and risk countermeasures |

## Efforts by Developers, Limits of Environmental Assessment, and the Need to Address Cumulative Impacts

Developers have undertaken advanced measures, including environmental assessments, stakeholder engagement, and bird-strike mitigation (e.g., marking wind turbine blades, operational restrictions, and monitoring). However, current environmental assessment methods alone cannot fully capture cumulative impacts from multiple projects or the long-term increase in natural disaster risks arising from changes in ecosystem services (e.g., increased landslide risk due to vegetation alteration).

Back to report

### *Prepare: Direction for Response*

For the impacts of onshore wind power, it is important to monitor whether appropriate impact and risk management measures are implemented during development, construction, and operations, in addition to measures such as those summarized in the table below. The Group communicates biodiversity and natural disaster risks identified through environmental and social risk assessments to its portfolio companies, and provides solutions–including measures to address nature-related risks and improve resilience–to support their operations. This is done in collaboration with the Nature Conservation Society of Japan (NACS-J) and through information provision.
Moving forward, we will deepen collaboration with local communities and specialized institutions, advance joint monitoring of cumulative impacts and information sharing, and strengthen governance frameworks. Through insurance and risk solutions, we aim to contribute to the sustainable deployment of renewable energy while achieving both carbon neutrality and nature-positive outcomes, and enhancing long-term green resilience in society.

**Table 3: Countermeasures/Response Directions by Onshore Wind Power Operators**

| Impact | Operator Countermeasures / Response Directions |
|---|---|
| General | Conduct post-construction surveys and environmental monitoring for significant potential impacts identified in environmental impact assessments, and consider additional measures as needed based on the results.<br>Publicly disclose the results of post-surveys and monitoring to ensure transparency. |
| Cumulative Impacts with Other Projects | Share environmental impact assessment findings, post-survey, and monitoring results with other operators and conduct joint investigations as necessary to fully understand cumulative impacts. |
| Alteration, Fragmentation, or Movement of Animal and Plant Habitats | Define siting criteria to avoid ecologically important or sensitive areas, such as national parks, areas with a high degree of natural vegetation, and areas that are important or sensitive from a nature perspective, such as habitats for rare or endemic birds and organisms.<br>Configure equipment placement within the development area to minimize impacts on animal and bird movement. |
| Noise & Vibration<br>Infrasound Generation<br>Wind Turbine Shadow / Shadow Flicker | Conduct surveys, predictions, and evaluations of noise, considering cumulative effects with other projects, and implement mitigation measures such as operational adjustments.<br>Provide thorough and sufficient prior explanations to affected residents and promote stakeholder engagement. |
| Impacts on Birds & Bats | During site selection, avoid areas inhabited by or used by rare or endemic birds or bats, or areas along their migratory routes.<br>Locate equipment within the development area to avoid the migratory routes of birds and bats (including height considerations).<br>Place restrictions on facility operation during bird migration periods.<br>Carry out monitoring and follow-up surveys for bird and bat strikes after operation begins, and if a significant impact is found, implement measures in accordance with the opinions of experts, such as painting eye marks on the blades to increase visibility to flying creatures.<br>Determine in advance appropriate measures and response systems to minimize impacts of any bird or bat strikes (such as injured animal rehabilitation and cause analysis). |
| Introduction of Invasive Species | Implement measures to prevent the introduction of invasive species during the construction phase, such as washing vehicles before entering the site. |
| Impacts on Ecosystem Services Used by the Community | Consider the location, design, and color of facilities so that they harmonize with the surrounding landscape.<br>During site selection, avoid areas that are important for the provision of ecosystem services, such as conservation forests and water source and recharge preservation forests. |

## [P.21] Interface with Sensitive Locations and Key Watersheds

Back to report

In this section, based on the TNFD's additional guidance for financial institutions,* we examine the downstream value chain, which is important to us as a financial institution. We analyzed sensitive locations associated with both the Group's own operational sites and the investee companies within this value chain. Analyzing the extent to which a company operates in areas where significant nature-related issues exist or where biodiversity is particularly vulnerable is useful not only for enhancing corporate resilience to nature-related issues, but also for exploring initiatives toward nature-positive outcomes.

Note: Under the TNFD's disclosure Strategy D, organizations are advised to: "Disclose the locations of assets and/or activities in the organization's direct operations and, where possible, upstream and downstream value chain(s) that meet the criteria for priority locations." The analysis of sensitive locations corresponds to L4 ("Locate the interface with nature") in the LEAP approach recommended by the TNFD. L4 requires identifying areas in the value chain where medium to high dependencies and impacts exist, and confirming the interface with sensitive locations.

## [P.20] Assessment of TNFD Sensitive Locations for in our Top 500 Investment/Loan Portfolio Companies

Back to report

In order to investigate interface with sensitive locations in the downstream value chain of the Group, MS&AD InterRisk Research & Consulting, one of the Group companies, conducted an analysis, using the location data of the direct operating bases of the 500 companies which are globally distributed companies. This assessment is based on four themes: "Importance of Biodiversity," "Integrity of Ecosystem," which looks at the degree of integrity of an ecosystem (integrity refers to a complete and intact state), "Importance of Ecosystem Service Provision," which looks at the attributes of stakeholders who depend on nature, and "Water-related Physical Risks," which looks at risks associated with water resources in the areas.
Going forward, we will focus on investigating points of contact with sensitive locations in the sectors that have significant contact points with these locations and each of our investment/loan portfolio companies, identify risks arising from such contacts, and provide support for nature-positive initiatives by our investment/loan portfolio companies.

### [1] Percentage of Sites Operating in Sensitive Locations by Sector and Assessment Theme "Importance of Biodiversity" x "Integrity of Ecosystem"

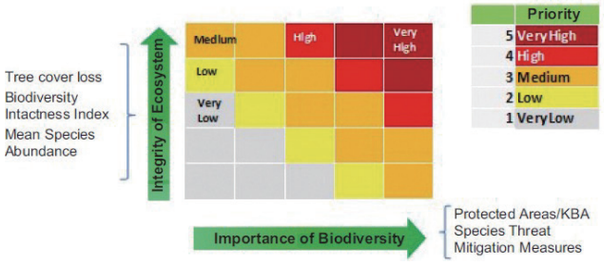
In order to analyze the "Importance of Biodiversity," we rated the direct operation sites of our investment/loan portfolio companies on a 5-point scale from 5 (Very High) to 1 (Very Low) in descending order of the number of operations in areas such as KBAs (Key Biodiversity Areas), protected areas, areas with a high presence of endangered species, areas that have significant socioeconomic functions for many businesses. In order to analyze the "Integrity of Ecosystem,"

# Contents



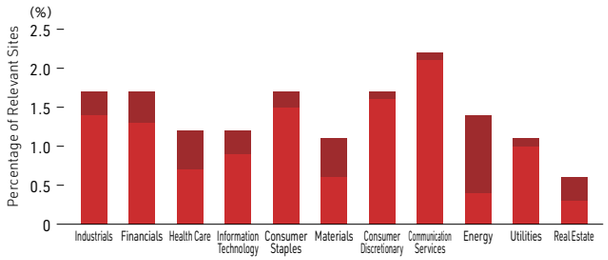


we also rated areas where deforestation is occurring, biodiversity is deteriorating, and species are being lost on the same 5-point scale. The results of these two analyses are then placed in a matrix as shown in the figure below, and areas with 4 (High) or higher in both two ratings are designated as sensitive locations. We calculated the percentage of operation sites in sensitive locations by company, and the average percentage of companies was computed by industry.




For a given company, when averaging the percentage of sites operating in sensitive locations in terms of "Importance of Biodiversity" and "Integrity of Ecosystem" by industry, the percentage is small, with even the highest industries barely exceeding 2%. However, we found that the industries such as "communication services," "consumer discretionary," "consumer staples," "industrials" and "financials" lean toward higher percentages.

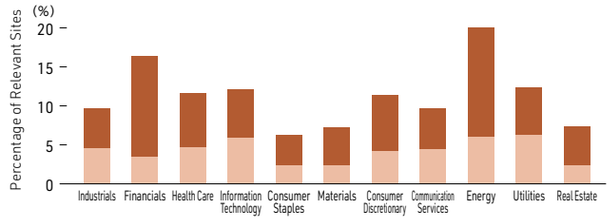
### "Importance of Biodiversity" x "Integrity of Ecosystem" Assessment




### Importance of ecosystem service provision

Local residents and businesses are in some way dependent on the ecosystem services in the location, but indigenous peoples, in particular, often lead self-sufficient lives closely tied to the local natural environment, making the importance of ecosystem service provision significantly greater for them compared to the general local people and businesses. Accordingly, for this theme (importance of ecosystem service provision), in order to analyze by industry the negative impacts on local stakeholders related to nature, we incorporated both the percentage of operating sites located within 500 meters of indigenous territories and ecosystem service indicators reflecting the benefits that nature provides.
The result shows that the sectors with high percentages were the energy sector, which involves extensive land use and heavy dependence on natural resources, and the finance sector, which operates globally.

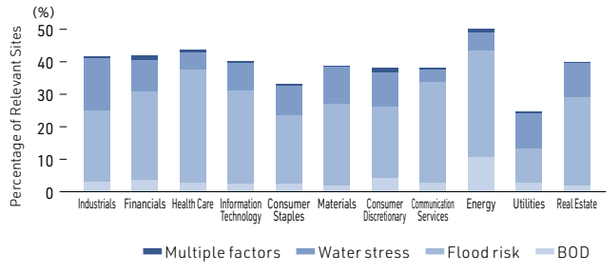
### Assessment of the Importance of Ecosystem Service Provision




### Water-related physical risks

For this theme, water-related physical risks are analyzed using three indicators (water stress, flood risk, and BOD-water pollution index). Bases rated 4 or 5 out of 5 for each of the three indicators, or bases rated 4 or 5 for multiple risks (combined factors), are designated as sensitive locations.
The water-related physical risk exceeded 20% for all industries, indicating that it is a high priority.

### Assessment of Water-related Physical Risks

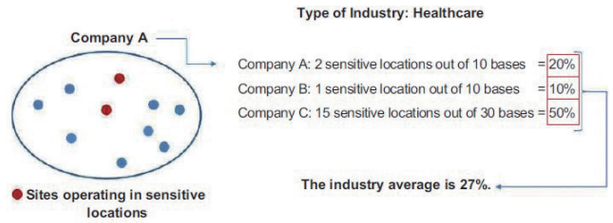



Regarding water stress, we focused on seven industries with particularly high dependence on water resources. Sites with a score of 4 or higher were examined by watershed boundaries, and the results showed that they were concentrated in the United States (California and Florida) and China (Shanghai). Approximately half of the sites in all 3 watersheds belong to the consumer goods and services sector, indicating that these watersheds require careful attention to the risk of water resource depletion.
Regarding flood risk, we closely examined the distribution of sites scoring 4 or higher within Japanese watersheds. The largest concentrations of sites with high flood inundation risk were found in watersheds spanning Tokyo, Kanagawa, and Shizuoka; Osaka, Wakayama, and Nara; and the San'in (northern Chugoku) region. In these watersheds, sites in the capital goods and services sector accounted for approximately 40%, representing the largest share. In these watersheds, special attention is needed for flood inundation risk. Through support such as disaster prevention and mitigation measures and the provision of insurance coverage, we aim to contribute to enhancing disaster resilience.

## [2] Summary of overall indicators

For each of the above themes, the following table provides a summary of the sector-averaged figures for the percentage of companies operating in sensitive locations.

| GICS Sector | Importance of Biodiversity | Integrity of Ecosystem | Importance × Integrity | Importance of Ecosystem Service Provision | Water-related Physical Risk |
|---|---|---|---|---|---|
| Industrials | 4.4% | 8.0% | 1.7% | 9.7% | 41.5% |
| Financials | 6.4% | 13.7% | 1.6% | 16.4% | 41.8% |
| Health Care | 5.7% | 12.4% | 1.2% | 11.7% | 43.8% |
| Information Technology | 4.8% | 9.6% | 1.1% | 12.1% | 40.4% |
| Consumer Staples | 7.3% | 8.0% | 1.7% | 6.3% | 33.1% |
| Materials | 6.0% | 8.1% | 1.0% | 7.2% | 38.7% |
| Consumer Discretionary | 7.2% | 9.9% | 1.8% | 11.4% | 38.1% |
| Communication Services | 8.9% | 12.4% | 2.2% | 9.6% | 38.0% |
| Energy | 4.1% | 21.5% | 1.4% | 20.1% | 50.1% |
| Utilities | 4.9% | 10.8% | 1.2% | 12.2% | 24.7% |
| Real Estate | 2.1% | 6.3% | 0.6% | 7.3% | 39.9% |



## Evaluation Indicator

| | Theme | Name of Indicator | Data Source |
|---|---|---|---|
| Evaluation Indicator | Importance of Biodiversity | Protected Areas/KBA (Key Biodiversity Area)) | IBAT |
| | | Species Threat Abatement and Restoration Matrix (STAR_t) | IBAT |
| | Integrity of Ecosystem | Tree cover loss | Global Forest Watch |
| | | Mean Species Abundance | GLOBIO |
| | | Biodiversity Intactness Index | Natural History Museum |
| | Importance of Ecosystem Service Provision | Indigenous and Community Lands | Land Mark |
| | | Contribution of nature to people (Biodiversity Intactness Index) | Chaplin-Kramer et al.(2023) |
| | Water-related Physical Risk | Water Stress (Baseline Water Stress) | WRI (Aqueduct) |
| | | Flood Risk | Flood Risk Finder |
| | | BOD Index (water pollution) | World Bank Group Data Catalog |

# [P.27] Analysis of Physical Risks in the Investments and Loans Portfolio

## Analysis of Physical Risks in Investments and Loans Portfolio

As an institutional investor, the Group makes investments and loans to many companies, and we believe that an increase in water disaster damage at key locations of our investment/loan portfolio companies due to climate change could lead to a deterioration in investment returns. To this end, we analyze the physical risks of the assets of our major investment/loan portfolio companies to identify climate change risks associated with fund management. We also analyze the relationship between the business locations of our investment and loan portfolio companies and sensitive locations.

See page 27

## Scenario Analysis: Evaluation of Physical Risks for Our Top 500 Investment/Loan Portfolio Companies

The Group has a strong relationship with climate change risks through transactions with customers, and here we quantitatively evaluated the physical risk under climate change scenarios for our investment and loan (stock, corporate bonds, and corporate loans) portfolio.
An increase in physical risks such as floods and wind disasters due to climate change may affect the sales and assets of our investment/loan portfolio companies. Therefore, we selected our top 500 investment/loan portfolio companies and analyzed the impact of flood and wind disaster risk* due to climate change on both sales impact and asset impact for stocks, corporate bonds, and corporate loans (for details of the analysis, see "Analysis Models, Methods, etc." on the right).

* In addition to the risks of floods and wind damage, we also analyze the impact on sales by taking into account heat risks (i.e. decreased labor productivity and increased cooling costs due to abnormally high temperatures and heat waves).

## Analysis Models, Methods, etc.

**Model used**
Jupiter intelligence*1 Climate Score Global (CSG) model

**Scope**
Direct operation sites of Top 500 companies in our investment/loan portfolio (stocks, corporate bonds, corporate loans) (Total 108,600 assets)

**Target hazards**
Floods (river flooding/storm surge), wind, extreme heat, wildfires

**Evaluation metrics**
Weighted average of <annual average loss/annual sales> for each portfolio company in terms of the Group's share of stocks, corporate bonds, and corporate loans*2

**Time horizons**
2020, 2030, 2040, 2050, 2075, 2100

**Scenarios**
SSP1-2.6: (less than2°C scenario)*3
SSP5-8.5: (more than 4°C scenario)*4

*1 U.S. climate-tech startups with which the Group has partnership
*2: Weighted averages follow the Partnership for Carbon Accounting Financials (PCAF) methodology
*3 Scenarios that limit global average temperature increase to less than 2°C above pre-industrial levels under sustainable development
*4 Scenario in which global average temperature increase exceeds 4°C above pre-industrial levels under fossil fuel-dependent development

**Analytical Methods for Evaluation Matrix**

**[STEP1]** Calculate damage to each site using a model

**[STEP2]** In order to calculate the impact on profitability, calculate the damage to sales and asset at each time horizon: 2020, 2030, 2040, 2050, 2075 and 2100

**a. Sales damage due to business suspension: Calculate the loss at each site using the following formula:**
Expected annual loss ratio due to flood, wind or other damage at each site [(%)] x [sales amount per location].
Then, aggregate the results of each company to calculate the amount of sales damage

**b. Property damage due to flood, wind or other damage: Calculate [annual average loss due to flood, wind or other damage] for each site.**

**[STEP3]** Divide sales loss and asset loss in each company by gross sales amount to calculate the percentage of total amount of annual sales damaged in each company.
Aggregate by company and calculate the amount of asset damage.

**[STEP4]** Calculate weighted averages for each attribute (stocks, corporate bonds and corporate loans) based on PCAF methodology. Calculate the percentage of portfolio damage for each attribute, and calculate the sales impact and asset impact for each of a. and b.

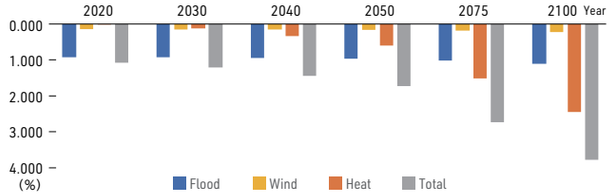
**[STEP5]** Carry out the procedures STEP 1 through STEP 5 at each time horizon using two scenarios, SSP1-2.6 and SSP5-8.5, and compare the results to identify the increase in percentages of portfolio damage caused by the impacts of climate change.

## Analysis results

The results of the analysis reveal that in the higher than 4°C scenario for stocks, which is considered to have the greatest impact on the Group, projected impacts on sales damage and asset damage by 2050 are each approximately 2% (total damage for floods, windstorms, extreme heat, etc.). However, the overall impact on the investment and loan portfolio as a whole is considered to be limited in terms of the sales of the investment and loan portfolio companies.
Currently, the impact on sales is primarily driven by flood risk, but heat-related risk is expected to increase year by year and surpass flood risk after 2050. Under the higher than 4°C scenario, extreme heat would likely become the main risk. In response, we will strengthen support for corporate measures to cope with heat, including training on heatstroke prevention, preparation of response systems for heat-related incidents, and provision of compensation.

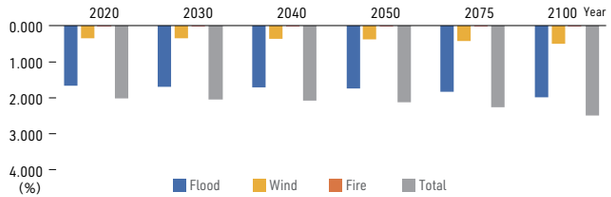
### Stocks / Sales

| Disaster Type | 2020 | 2030 | 2040 | 2050 | 2075 | 2100 |
|---|---|---|---|---|---|---|
| Flood | 0.927% | 0.928% | 0.949% | 0.965% | 1.021% | 1.107% |
| Wind | 0.150% | 0.156% | 0.161% | 0.167% | 0.190% | 0.228% |
| Heat | 0.002% | 0.124% | 0.339% | 0.601% | 1.521% | 2.449% |
| Total | 1.079% | 1.207% | 1.449% | 1.733% | 2.731% | 3.784% |




### Stocks / Assets

| Disaster Type | 2020 | 2030 | 2040 | 2050 | 2075 | 2100 |
|---|---|---|---|---|---|---|
| Flood | 1.676% | 1.692% | 1.713% | 1.740% | 1.840% | 1.994% |
| Wind | 0.341% | 0.352% | 0.362% | 0.375% | 0.419% | 0.497% |
| Fire | 0.010% | 0.010% | 0.010% | 0.010% | 0.012% | 0.013% |
| Total | 2.027% | 2.054% | 2.085% | 2.126% | 2.271% | 2.504% |



# 4 | Risks and Opportunities in Six Industries

| | Companies in the automotive/parts industry<br>Risk: ◆Upstream ■The company itself ◇Downstream<br>Opportunity: ◆Upstream ■The company itself ◇Downstream | The Group<br>Risk: ●Underwriting ○Investment/Loan ◎Consulting service<br>Opportunity: ●Underwriting ○Investment/Loan ◎Consulting service |
|---|---|---|
| Physical Risk | ◆Supply chain disruptions such as damage to suppliers and manufacturing contractors and suspension of logistics functions due to natural disasters<br>◆Increase in costs of materials caused by reduced yields and quality deterioration of natural rubber and other raw materials due to temperature rise, drought, and ecosystem deterioration<br>■Losses and decreased sales incurred by damage to facilities and equipment production suspension due to natural disasters<br>■Increase in energy costs and employee health risks, and decrease in productivity associated with deterioration of quality, factory operation rate and cooling efficiency of air conditioning equipment due to due to extreme temperature rise<br>◇Loss of customers due to damage, shutdown of operations and disruption of store operations caused by natural disasters and delays in taking countermeasures for business partners and delivery destinations<br>■Gaining customer trust and increasing orders by strengthening BCP response to large-scale disasters caused by extreme weather<br>■Increase profits through added value by enhancing the durability of products that can withstand rising temperatures, precipitation, and changes in weather patterns | ●Increase in claims settlement due to natural disasters<br>●Decline in premium income due to poor business performance<br>○Decrease in asset value or deterioration of business performance in our investment/loan portfolio companies due to damage from natural disasters<br>◎Support for developing business continuity plans in preparation for natural disasters, extreme temperature rises, water shortages, etc.<br>◎Increase in revenue by providing services related to adaptation measures, disaster prevention and mitigation, and environmental preservation. |
| Transition Risk | ◆Increase in nature-related due diligence in procurement of mineral resources, etc. and procurement costs of sustainable raw materials<br>◆■Increase in costs due to introduction of carbon tax<br>■Decrease in demand for conventional internal combustion engine vehicles due to increased environmental awareness among consumers<br>■Increase in the cost of responding to stricter environmental regulations such as exhaust gas regulations, EV battery recycling, fuel efficiency standards, GHG emissions, and water resources and waste management, and an increase in the burden of capital investment for energy conservation and renewable energy<br>■Loss of revenue due reputational damage caused by air pollution, water pollution, plastic pollution, and emissions associated with business operations<br>■Decline in reputation and sales from stakeholders and investors due to delays in responding to climate change measures and ESG information disclosure<br>■Increase in sales due to increased demand for EVs and FCVs<br>■Gain in market share through successful introduction of technologies with lower environmental impact, such as use of renewable energy and reduction of water and plastic use<br>■Increase in sales through cost reduction and value appeal by using recycled materials and reusing resources<br>◇Reduction of transportation costs and GHG emissions by improving logistics efficiency (shared transportation, modal shift) | ●Decline in premium income due to business downturn in the relevant companies and markets<br>●Decrease in insurance premiums due to stricter underwriting standards and conditions as a result of tightening of environmental regulations<br>○Decline in investment returns due to business turndown in companies and markets that are not adequately addressing climate and natural issues<br>●○Reputational damage due to involvement in businesses that lead to global warming and destruction of nature<br>●Increase in sales by providing insurance products that support new technologies such as EVs and FCVs, value chain probability, and introduction of new business models such as recycling<br>○Business leap forward in the relevant companies and markets that have made progress in addressing climate- and nature-related issues<br>◎Increased revenue from intermediaries such as credits to offset GHG emissions<br>◎Development and provision of new services that mitigate negative impacts on the natural environment related to raw material procurement, etc.<br>◎Increase in revenue by providing services related to information disclosure and business strategy based on climate- and nature-related risks |

| | Companies in the transportation industry<br>Risk: ◆Upstream ■The company itself ◇Downstream<br>Opportunity: ◆Upstream ■The company itself ◇Downstream | The Group<br>Risk: ●Underwriting ○Investment/Loan ◎Consulting service<br>Opportunity: ●Underwriting ○Investment/Loan ◎Consulting service |
|---|---|---|
| Physical Risk | ◆■Serious impact on transportation infrastructure and flight schedules and increased risk of accidents due to natural disasters<br>◆■Impact on operations due to changes in turbulence frequency due to climate changes and changes in wind and ocean current patterns<br>◆■Decrease in labor productivity under harsh working conditions due to temperature rises, and increase in labor costs due to shortage of workers<br>■Increase in energy costs associated with deterioration of the durability of vehicles and infrastructure, increase in maintenance costs and decrease in cooling efficiency of air-conditioning equipment due to extreme temperature rises<br>■Increase in transportation costs due to depletion of fossil fuels and other natural resources<br>■Increased risk of accidents due to collisions with large creatures such as whales, deer and bears<br>◇Damage to business partners or suspension of operations due to natural disasters, increase in costs of alternative logistics, and loss of business opportunities<br>◇Decrease in the number of passengers due to damage to natural tourism resources<br>■Increase in revenue through services that respond to increase in transportation demand through rapid response in the event of disasters | ●Increase in claims settlement due to natural disasters<br>●Decline in premium income due to poor business performance<br>○Decrease in asset value or deterioration of business performance in our investment/loan portfolio companies due to damage from natural disasters<br>◎Increase in revenue by providing services related to adaptation measures, disaster prevention and mitigation, and environmental preservation |
| Transition Risk | ■Increased operational and technology development costs due to stricter regulations on emissions, fuel efficiency standards, and ecosystem protection<br>■Decreased demand for traditional transportation methods due to rising environmental awareness among consumers and businesses<br>■Increased costs associated with the introduction of carbon taxes, credit purchases, and the shift to sustainable biomass and SAF (Sustainable Aviation Fuel) fuels<br>■Loss of market share due to the failure to implement environmentally friendly technologies such as renewable energy usage and GHG emissions reduction<br>■Reputation damage due to air pollution, water contamination, and waste generation associated with business operations<br>■Fines, compensation costs, and expenses for pollution removal and habitat restoration, as well as reputation damage, resulting from transportation accidents<br>■Decline in stakeholder and investor evaluations and sales due to delays in addressing climate change measures and ESG information disclosures<br>■Increased sales through the development and introduction of decarbonized transportation methods utilizing energy sources such as EVs and FCVs<br>■Cost reduction and creation of new market opportunities through the provision of environmentally and nature-conscious transportation services and joint transport<br>■Cost reduction and increased sales through the use of recycled materials and the promotion of resource re-use, emphasizing value<br>◇Reduction in transportation costs and GHG emissions through logistics efficiency improvements (joint transport, modal shift) | ●Decrease in insurance premium income due to the business downturn of the company or market<br>●Reduction in insurance premium income due to stricter underwriting standards and conditions following the enhancement of environmental regulations<br>○Decline in investment returns due to the business downturn of companies or markets that inadequately address climate and natural challenges<br>●○Reputation damage due to involvement in businesses contributing to global warming and environmental destruction<br>●Increased demand for new types of coverage due to support for business transformations, such as new energy sources and transportation methods<br>○Significant business advancements for companies or markets that have adequately addressed climate and natural challenges<br>◎Increase in income through the intermediaries of credits that offset GHG emissions<br>◎Development and provision of new services that mitigate negative impacts on the natural environment<br>◎Increase in income through the provision of services related to information disclosure and business strategies that consider climate/ nature-related risks |

# Contents



| | Companies in the food/beverage industry<br>Risk: ◆Upstream ■The company itself ◇Downstream<br>Opportunity: ◆Upstream ■The company itself ◇Downstream | The Group<br>Risk: ●Underwriting ○Investment/Loan ◎Consulting service<br>Opportunity: ●Underwriting ○Investment/Loan ◎Consulting service |
|---|---|---|
| Physical Risk | ◆Damage to raw material production areas (farmland/aquaculture farms) due to natural disasters, instability in raw material procurement, and suspension of logistics functions<br>◆Reduced yield and quality of raw materials, depletion of natural resources; increased costs for maintaining quality, changing procurement regions, and developing alternative raw materials due to heatwaves, droughts, water shortages, and the degradation of ecosystems such as water quality and soil.<br>◆■Decrease in labor productivity under harsh working conditions due to temperature rises and increase in labor costs due to shortage of workers<br>■Incurrence of recovery costs due to damage to factories, production stoppages, and disruption of logistics due to extreme weather and natural disasters<br>■Increase in energy costs due to deterioration of cooling efficiency of air conditioning equipment due to extreme temperature changes<br>■Increase in costs to respond to landslides and flood disasters due to sea level rise and extremely severe weather disasters<br>◇Damage to business partners or suspension of operations due to natural disasters, increase in costs of alternative logistics, and loss of business opportunities | ●Increase in claims settlement due to natural disasters<br>●Decline in premium income due to poor business performance<br>○Decrease in asset value or deterioration of business performance in our investment/loan portfolio companies due to damage from natural disasters<br>◎Increase in revenue by providing services related to adaptation measures, disaster prevention and mitigation, and environmental preservation. |
| Transition Risk | ◆Relocation of production area/procurement area and burden of relocation costs associated with the expansion of natural conservation areas, stricter regulations on land use, the use of pesticides and fertilizers, etc., and instability in raw material procurement<br>◆Increase in procurement costs due to enhanced traceability, expectations for sustainable raw materials for regenerative agriculture, etc., and competition with raw materials for biofuels, etc.<br>■Increase in cost of responding to stricter environmental regulations, including GHG emissions, water management, waste management, air pollution, soil contamination and increase in burden of capital investment for energy conservation and renewable energy<br>■Decrease in sales associated with brand image deterioration and suspension of handling at retail stores due to inability to respond to growing consumer awareness on climate-related and environmental issues.<br>■Loss of market share due to failure to introduce technologies with lower environmental impact, such as renewable energy use, reduced GHG emissions, reduced water use, and environmentally friendly packaging<br>■Increase in energy costs due to introduction of carbon tax<br>■Decline in evaluation from stakeholders and investors, decline in corporate value and stock prices, and increase in response costs due to delays in responding to climate change measures, biodiversity considerations, and ESG information disclosure<br>■Loss of revenue brought about by reputational damage due to air pollution, water pollution, plastic pollution, and emissions associated with business operations<br>◆Increase in profits by establishing sustainable production methods for raw materials, improving added value through environmental conservation in production areas, and stabilizing procurement costs<br>■Ensuring stable yields by developing raw materials and varieties in response to climate change (raw materials resistant to extreme heat, pest-resistant varieties), improvement of water use efficiency, and switching to land use with reduced environmental impacts<br>■Increase in development and sales of new products in response to increased demand and changes in consumer preferences due to climate change (products to prevent heat stroke and infectious diseases)<br>■Reduction of transportation costs and GHG emissions by improving logistics efficiency (shared transportation, modal shift)<br>■Gain of market share due to success in introduction of renewable energy use, reduced GHG emissions, reduced water use, and technologies for raw materials and packages with lower environmental impacts | ●Decline in premium income due to business downturn in the relevant companies and markets<br>●Decrease in insurance premiums due to stricter underwriting standards and conditions as a result of tightening of environmental regulations<br>●○Loss of reputation due to involvement in businesses that lead to global warming and destruction of nature<br>○Decline in investment returns due to business turndown in companies and markets that are not adequately addressing climate and natural issues<br>●Development of new insurance products that address climate change risks and environmental risks<br>○Business leap forward in the relevant companies and markets that have made progress in addressing climate- and nature-related issues<br>◎Increased revenue from intermediaries such as credits to offset GHG emissions<br>◎Development and provision of new services that mitigate negative impacts on the natural environment related to raw material procurement, etc.<br>◎Increase in revenue by providing services related to information disclosure and business strategy that take climate- and nature-related risks into consideration |

| | Companies in the materials industry (petrochemical)<br>Risk: ◆Upstream ■The company itself ◇Downstream<br>Opportunity: ◆Upstream ■The company itself ◇Downstream | The Group<br>Risk: ●Underwriting ○Investment/Loan ◎Consulting service<br>Opportunity: ●Underwriting ○Investment/Loan ◎Consulting service |
|---|---|---|
| Physical Risk | ◆Decrease in yield and quality of raw materials and increase in quality maintenance costs, due to deterioration of ecosystem such as heat, drought, water shortages, and deterioration of water quality<br>◆■Decrease in labor productivity under harsh working conditions due to temperature rises and increase in labor costs due to shortage of workers<br>◆◇■Increase in costs due to supply chain disruptions, instability in raw material procurement, and suspension of logistics functions, caused by natural disasters<br>■Increase in energy costs due to deterioration of cooling efficiency of air conditioning equipment caused by extreme temperature changes<br>■Incurrence of costs associated with damage to factories, production stoppages, and disruption of logistics due to extreme weather s and natural disasters such as drought<br>◇Decrease in sales due to damage, shutdown of operations due to extreme weather or natural disasters in business partners and delivery destinations | ●Increase in claims settlement due to natural disasters<br>●Decline in premium income due to poor business performance<br>○Decrease in asset value or deterioration of business performance in our investment/loan portfolio companies due to damage from natural disasters<br>◎Increase in revenue by providing services related to adaptation measures, disaster prevention and mitigation, and environmental preservation. |
| Transition Risk | ◆Increase in nature-related due diligence in procurement of mineral resources, etc. and procurement costs of sustainable raw materials<br>◆■Loss of revenue brought about by damage to reputation due to environmental destruction in raw materials procurement and air pollution, water pollution, waste pollution and plastic pollution associated with business operations<br>◆■Incurrence of fines, damages, pollution removal and habitat restoration costs, etc. due to environmental accidents, and loss of reputation<br>■Increase in cost of responding to stricter environmental regulations, including GHG emissions, water management, waste management, air pollution, soil contamination and increase in burden of capital investment for energy conservation and renewable energy<br>■Loss of revenue as a result of demand restraint for virgin materials due to the acceleration of the circular economy<br>■Customer loss due to brand image deterioration caused by inability to respond to growing consumer awareness on climate- and nature-related issues<br>■Loss of market share due to failure to introduce technologies with lower environmental impact, such as renewable energy use, reduced GHG emissions, reduced water use, and environmentally friendly packaging<br>■Increase in energy costs due to introduction of carbon tax<br>■Decline in evaluation from stakeholders and investors, decline in corporate value and stock prices, and increase in response costs due to delays in responding to climate change measures, biodiversity considerations, and ESG information disclosure<br>◆Enhancement of added value and stabilization of procurement costs by switching to raw materials with less environmental impact, such as utilization of sustainable biomass materials and recycled materials<br>■Market expansion for products resistant to environmental changes such as rising temperatures and droughts<br>■Capturing of new markets by focusing on waste reduction and products with low environmental impact<br>■Loss of customers due to damage, shutdown of operations at business partners and delivery destinations caused by extreme weather or natural disasters<br>■◇Creation of new markets through product design that responds to the circular economy and the establishment of recycling systems and systems for resource recycling<br>◇Reduction of transportation costs and GHG emissions by improving logistics efficiency (shared transportation, modal shift) | ●Decline in premium income due to business downturn in the relevant companies and markets<br>●Decrease in insurance premiums due to stricter underwriting standards and conditions as a result of tightening of environmental regulations<br>●○Loss of reputation due to involvement in businesses that lead to global warming and destruction of nature<br>○Decline in investment returns due to business turndown in companies and markets that are not adequately addressing climate and natural issues<br>●Development of new insurance products that address climate change risks and environmental risks<br>●Developing new insurance products that address risks associated with new schemes to reduce environmental impacts, such as promoting sustainable raw material procurement and recycling, and coverage for losses related to shared delivery, etc.<br>○Business leap forward in the relevant companies and markets that have made progress in addressing climate- and nature-related issues<br>◎Increased revenue from intermediaries such as credits to offset GHG emissions<br>◎Development and provision of new services that mitigate negative impacts on the natural environment related to raw material procurement, etc.<br>◎Increase in revenue by providing services related to information disclosure and business strategy that take climate- and nature-related risks into consideration |

# Contents



| | Companies in the technology/Hardware industry (Electronic Equipment, Devices & Components/Semiconductors)<br>Risk: ◆Upstream ■The company itself ◇Downstream<br>Opportunity: ◆Upstream ■The company itself ◇Downstream | The Group<br>Risk: ●Underwriting ○Investment/Loan ◎Consulting service<br>Opportunity: ●Underwriting ○Investment/Loan ◎Consulting service |
|---|---|---|
| Physical Risk | ◆Decrease in yield and quality of raw materials and increase in quality maintenance costs due to ecosystem deterioration such as heat, drought, water shortages and deterioration of water quality<br>◆Increase in nature-related due diligence in procurement of mineral resources, etc. and procurement costs of sustainable raw materials<br>◆■Decrease in labor productivity under harsh working conditions due to temperature rises and increase in labor costs due to shortage of workers<br>◆◇Increase in costs due to supply chain disruptions, instability in raw material procurement, and suspension of logistics functions, caused by natural disasters<br>■Recovery costs incurred as a result of business suspension due to damage to factories and decrease in sales due to extreme weather and natural disasters<br>■Disruption of production and services and increase in costs due to depletion of water resources<br>■Increase in energy costs due to deterioration of cooling efficiency of air conditioning equipment due to extreme temperature changes<br>◇Loss of customers due to damage, shutdown of operations at business partners and delivery destinations caused by extreme weather or natural disasters<br>◇Loss of customers due to disruption or delayed response associated with damage or shutdown of operations at business partners and delivery destinations caused by extreme weather or natural disasters | ●Increase in claims settlement due to natural disasters<br>●Decline in premium income due to poor business performance<br>○Decrease in asset value or deterioration of business performance in our investment/loan portfolio companies due to damage from natural disasters<br>◎Increase in revenue by providing services related to adaptation measures, disaster prevention and mitigation, and environmental preservation. |
| Transition Risk | ◆Burden of cost of moving and relocating procurement areas for minerals, etc. due to expansion of nature conservation areas, and instability of raw material procurement<br>◆■Loss of revenue caused by reputational damage due to environmental destruction during raw materials procurement and air pollution, water pollution and waste pollution associated with business operations<br>◆■Increase in cost due to restrictions on available land resulting from the expansion of nature conservation areas and stricter regulations on land development<br>■Increase in cost of responding to stricter environmental regulations, including GHG emissions, water management, waste management, air pollution, soil contamination throughout the product value chain, and an increase in the burden of capital investment for energy conservation and renewable energy<br>■Decrease in sales associated with brand image deterioration and suspension of handling at retail stores due to inability to respond to growing consumer awareness on climate-related and environmental issues.<br>■Loss of market share due to failure to introduce technologies with lower environmental impact, such as renewable energy use, reduced GHG emissions, reduced water use, and packaging with less environmental impact, including the establishment of recycling technologies<br>■Increase in energy costs due to introduction of carbon tax<br>■Decline in evaluation from stakeholders and investors, decline in corporate value and stock prices, and increase in response costs due to delays in responding to climate change measures, and ESG information disclosure<br>■Loss of revenue brought about by damage to reputation due to air pollution, water pollution, plastic pollution and emissions associated with business operations<br>■Increase in opportunities to create and offer climate change-related products and services in response to changes in technology and markets<br>■Development of new markets through the design and construction of zero-energy buildings and green infrastructure<br>■Reduction of transportation costs and GHG emissions by improving logistics efficiency (shared transportation, modal shift)<br>■Gain of market share through successful introduction of technologies with lower environmental impact such as use of renewable energy, reduction of GHG emissions, reduction of water use, and environmentally friendly packaging | ●Decline in premium income due to business downturn in the relevant companies and markets<br>●○Loss of reputation due to involvement in businesses that lead to global warming and destruction of nature<br>○Decline in investment returns due to business turndown in companies and markets that are not adequately addressing climate and natural issues<br>●Developing new insurance products that address risks associated with new schemes to reduce environmental impacts, such as promoting sustainable raw material procurement and recycling, and coverage for losses related to shared delivery, etc.<br>○Business leap forward in the relevant companies and markets that have made progress in addressing climate- and nature-related issues<br>◎Increased revenue from intermediaries such as credits to offset GHG emissions<br>◎Development and provision of services to mitigate negative impacts on the natural environment related to raw material procurement, water use, etc.<br>◎Increase in revenue by providing services related to information disclosure and business strategy that take climate- and nature-related risks into consideration |

| | Companies in the electricity/gas industry<br>Risk: ◆Upstream ■The company itself ◇Downstream<br>Opportunity: ◆Upstream ■The company itself ◇Downstream | The Group<br>Risk: ●Underwriting ○Investment/Loan ◎Consulting service<br>Opportunity: ●Underwriting ○Investment/Loan ◎Consulting service |
|---|---|---|
| Physical Risk | ◆Unstable procurement of raw materials due to poor harvest of biomass fuels, etc. due to extreme weather conditions<br>◆■Supply chain disruptions, instability in raw material procurement, and suspension of logistics functions caused by natural disasters<br>◆■Decreased hydroelectric power sales and increased cooling costs due to water shortage<br>◆■Decrease in labor productivity under harsh working conditions due to temperature rises and increase in labor costs due to shortage of workers<br>■Increase in costs in the event of extensive damage to power plants, substation and transmission equipment, etc. due to extreme weather or natural disasters, resulting in long-term shutdowns or large-scale power outages, etc.<br>■Increase in costs to deal with the destruction of the natural environment due to the construction of power plants and gas extraction facilities, fragmentation of ecosystems due to the construction of power lines and pipelines, and changes in river ecosystems due to hydroelectric dams | ●Increase in claims settlement due to natural disasters<br>●Decline in premium income due to poor business performance<br>○Decrease in asset value or deterioration of business performance in our investment/loan portfolio companies due to damage from natural disasters<br>◎Increase in revenue by providing services related to adaptation measures, disaster prevention and mitigation, and environmental preservation. |
| Transition Risk | ■Increase in costs in response to stricter environmental regulations, such as GHG emissions, water management, waste management, air pollution, and soil contamination<br>■Incurrence of costs due to the cancellation or reduction of business plans due to opposition movements by indigenous peoples, local communities, NGOs, etc., or orders by authorities from the perspective of nature conservation, or litigation results<br>■Loss of customers due to a decline in brand image caused by the impacts on biodiversity and ecosystem services in the construction and operation of power plants and emergence of risks to the region (e.g., bird strikes, slope disasters caused by deforestation, etc.)<br>■Increase in costs of procuring sustainable biomass fuels due to land competition and increased demand<br>■Loss of market share due to failure to introduce technologies with low environmental impact, such as reducing GHG emissions and water usage<br>■Increase in energy costs due to introduction of carbon tax<br>■Decrease in value of existing assets due to energy transition<br>■Decline in evaluation from stakeholders and investors, decline in corporate value and stock prices, and increase in response costs due to delays in responding to climate change measures, biodiversity considerations, and ESG information disclosure<br>■Loss of revenue brought about by loss of reputation caused by air pollution, water pollution and waste pollution associated with business operations<br>■Increased opportunities to create and provide climate change-related products and services in response to changes in decarbonization and energy technologies and markets that coexist with the natural environment<br>■Gain of market share through successful introduction of technologies with lower environmental impact such as use of renewable energy, reduction of GHG emissions, reduction of water use, and environmentally friendly packaging | ●Decline in premium income due to business downturn in the relevant companies and markets<br>●Decrease in insurance premiums due to stricter underwriting standards and conditions as a result of tightening of environmental regulations<br>●○Loss of reputation due to involvement in businesses that lead to global warming and destruction of nature<br>○Decline in investment returns due to business turndown in companies and markets that are not adequately addressing climate and natural issues<br>●Development of new insurance products that address climate change risks and environmental risks<br>○Development of new insurance products that address climate change risks and environmental risks<br>◎Increased revenue from intermediaries such as credits to offset GHG emissions<br>◎Development and provision of services to mitigate impacts on the natural environment at business locations such as power plants<br>◎Development and provision of services to mitigate impacts on the natural environment at business locations such as power plants |

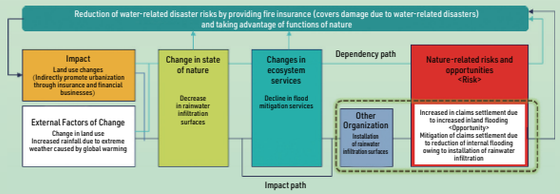
# 5 | LEAP Analysis of Green Infrastructure Published in Fiscal Year 2024

Column

## ~LEAP Approach: to reduce economic losses from flood-related disasters through the introduction of green infrastructure*1~

As analyzed in the Chapter "Climate/Nature-Related Risks and Opportunities," we recognize that, for non-life insurers, "Prevention of floods/storms" rooted in nature is an important ecosystem service that enables damage mitigation. As short-term heavy rains increase due to global warming, urbanization leads to an increase in paved surfaces as a change in land use, a key impact defined by the TNFD, and the loss of rainwater infiltration function by soil is considered to be a factor that increases the flood disaster risk for non-life insurers.
Therefore, in order to promote measures to reduce the risk of water-related disasters through green infrastructure*1 that exhibits flood prevention functions rooted in nature, we have organized risks and opportunities associated with changes in land use (increasing paved surfaces/installation of rainwater infiltration surfaces), using the chart of "dependencies and impacts on nature, and relationship between risks and opportunities" outlined in the TNFD' LEAP approach. We conducted a quantitative evaluation in accordance with the procedures of the approach, and confirmed a reduction in the amount of flood-related damage.

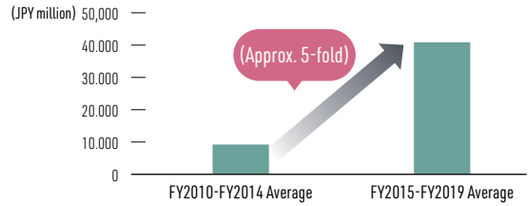
*1: An approach to utilize diverse functions of the natural environment for infrastructure development




## Scoping

Domestic fire insurance, which accounts for a large percentage of the Group's premium income, has seen a rapid increase in the number of claims settlement due to water-related disasters in recent

**Claims settlement due to water-related disasters(5-year average, Residential properties)**




Source: General Insurance Rating Organization of Japan

On the other hand, in terms of rainfall conditions in Japan, the frequency of heavy rainfall (50 mm or more of rainfall per hour) increased by approximately 1.5 times between 2014-2023 and 1976-1985*2, and the occurrence of water-related disasters increased proportionally. In recent years, the amount of damage caused by inland flooding in urban areas, etc. accounts for about 40% of all water-related disasters, and in Tokyo, it has reached approx.70%*3. In addition, it is believed that inland flooding has increased as the increase in paved surfaces due to urbanization is preventing rainwater from penetrating into the ground, and rainwater that exceeds the treatment capacity of drainage facilities flows into rivers and sewers all at once. Therefore, identifying "land use change" due to increased impermeable surfaces as a key impact, we decided to analyze the mitigation of flood damage by introducing green infrastructure that temporarily stores and infiltrates rainfall and suppresses runoff.

*2 Japan Meteorological Agency website, "Past Changes in Heavy Rainfall and Extreme Heat Days (Extreme Phenomena).
*3 Ministry of Land, Infrastructure, Transport and Tourism, "Recent Rainfall and Inland Water Damage, and Current Status of Sewerage System Development".

## Locate

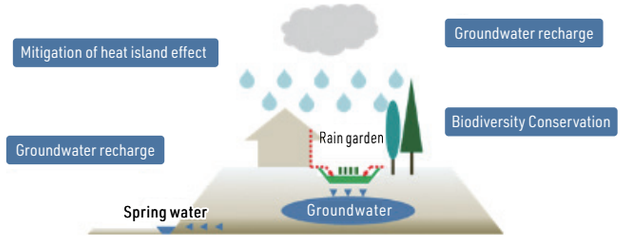
Because the Group provides domestic fire insurance coverage without significant regional bias, the regions analyzed in this case focused on the high risk of damage due to water-related disasters, rather than on sales by region. In recent years, northwestern Kyushu has already experienced severe flooding, and is regarded as one of the regions where rainfall will increase the most (rainfall increases by 1.4 times in a 4℃ rise scenario)*4 according to survey results by the Ministry of Land, Infrastructure, Transport and Tourism (hereinafter "MLIT"). Accordingly, we decided to conduct LEAP analysis on specific areas that meet the following conditions in northwestern Kyushu.

- **Regions with damage caused by inland flooding in recent years**
- **Small and medium-sized river basins in cities to verify damage caused by inland flooding.**
- **Basins with significant land use alteration in recent years**

*4 MLIT 's "Ideal Flood Control Plan Based on Climate Change" Recommendation (revised April 2021) "Concept for setting rainfall change multipliers for each regional classification "

## Evaluate

Effective measures to control inland flooding include drainage to outside waterways through the construction of pumping stations, drainage through underground discharge channels, as well as storage and infiltration of rainwater at various locations. For rainwater storage and infiltration, there are infiltration systems such as rainwater infiltration basins and rainwater tanks, but recently green infrastructure such as "rain gardens" that utilize natural functions have been attracting attention. These approaches to storage and infiltration is in line with the concept of "River Basin Disaster Resilience and Sustainability by All," promoted by MLIT, which calls for flood control in entire river basins, not just river areas.
In addition to mitigating flood damage, "rain gardens" are expected to provide a variety of ecosystem services to the region, such as enhancing biodiversity, conserving water basins, and mitigating the heat island effect. However, until now, the accumulated effects of "rain gardens" in basins have not been quantitatively evaluated. In order to clarify the effect of "rain garden" development on reducing the amount of damage caused by flood-related disasters, we carried out a quantitative analysis using the RRI model at actual locations.




## Assess

| Target | Details |
|---|---|
| Public//Commercial facilities, Residences | ● Collect rainwater from the roof into a rain garden (20 cm deep) with a base area of 1/5 of the roof area.<br>● Permeation capacity from base layer: 100 mm/hr |
| Parks | ● Storage facility with the same area of the base as the park (20 cm deep)<br>● No infiltration from the park is expected. |

### Target area/basin

Small- to medium-sized river in a core city in northwestern Kyushu, which has been subject to continuous flood damage in recent years. The river basin is (7.8km²)

### Infiltration/storage case setting

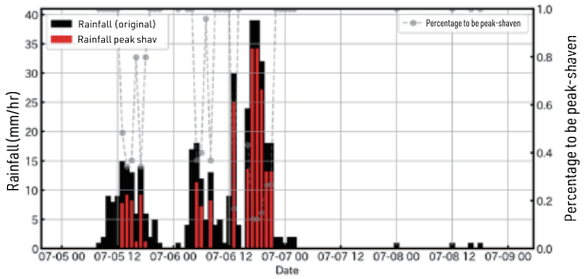
### Target rainfall

- Actual rainfall amount during heavy rains in July 2018
- Rainfall amount in 2050 based on SSP1-2.6 and SSP5-8.5 scenarios

### Analysis method

(i) The effect of installing a rain garden is reflected in the simulation by subtracting "the amount of rainfall stored and infiltrated into the rain garden" from the actual rainfall amount.
(ii) To calculate the inundation depth, time series of rainfall peak shaven (red bar graph) is fed into the RRI model

**Rainfall time series before vs. after peak shaving at representative AMeDAS points in the city concerned**

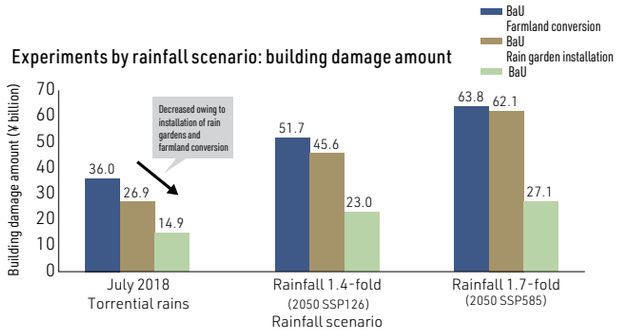



The difference between actual rainfall (black) and rainfall after peak shaving (red) is the storage and infiltration effect of the rain garden.

### Analysis results

- In the case of the torrential rainfall in July 2008, the amount of damage was reduced by JPY910 million by converting land to farmland, and by JPY2.11 billion by installing rain gardens.
- In both rainfall scenarios, the rain garden installation measure reduces the amount of damage the BaU .

**Experiments by rainfall scenario: building damage amount**




Regarding the amount of building damage, we calculated asset values by multiplying the total floor area (3D urban model data) by the house asset table value per unit area for 2018, and then applied the house damage function from the Manual for Economic Evaluation of Flood Control Investment (2020) of the MLIT

These calculation results are based on a partial modification of the Rainfall Runoff Inundation (RRI) model program of the Public Works Research Institute.

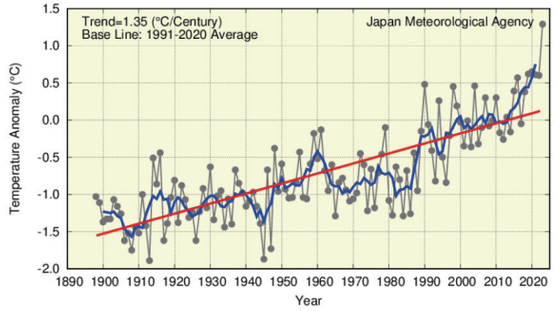
### Preparation (to be continued)

We found that the installation of "rain gardens" has a certain effect on mitigating flood damage. This time, we conducted an analysis based on the assumption of 100% introduction, but in the future we would like to further refine our analysis by examining the effect of reducing the risk of flood-related disasters based on the percentage of systems installed, as well as the locations where the systems can be installed to achieve higher effects.
On the other hand, the installation of rain gardens cannot be expected to have any significant disaster prevention effects without the cooperation of not only public spaces managed by local governments, but also homes, businesses, and various stakeholders within the basins. Incentive mechanisms and collaboration with local governments, research institutes, and NPOs are required to determine the details such as onto whom the burden should be placed for installing equipment that can provide disaster prevention effects. Along with research on green infrastructure such as "rain gardens," the Group is promoting in various regions to create models of collective action that will encourage safe and secure community development and the transition to nature-positive local communities.

# 6 | Analysis of Climate/ Nature-related Risks and the Non-life Insurance Industry Published in Fiscal Year 2024

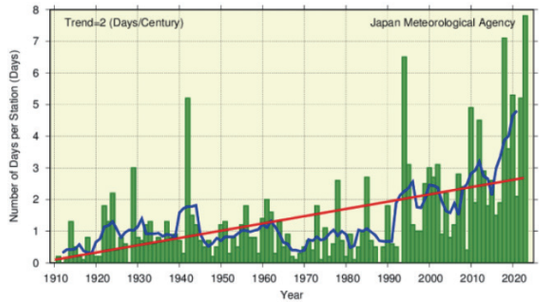
Changes in risks related to future climate change and biodiversity loss will have a significant impact on the non-life insurance industry. For example, as climate change progresses, disasters such as heat waves, droughts, and forest fires caused by global warming will become more frequent and increase in magnitude. Furthermore, the risk of heavy rainfall and flooding will increase as precipitation patterns are affected, and the risk of flooding of coastal areas will increase as sea levels rise due to melting glaciers and thermal expansion of ocean waters.
In Japan, the annual average temperature is expected to rise and the number of extremely hot days and torrential rains are expected to increase. The above-mentioned risks are expected to materialize and supply chain disruptions are expected to affect corporate activities.

### Secular changes in annual average temperature in Japan



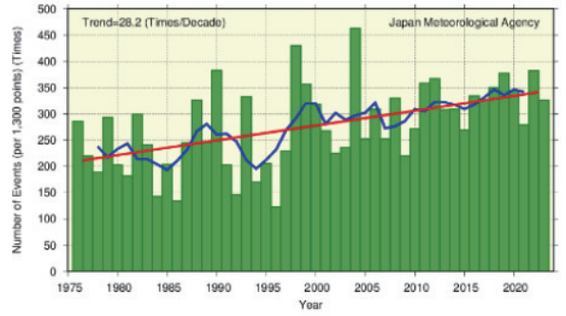

(Source: Japan Meteorological Agency, Climate Change Monitoring Report 2023, p.51)

### Secular changes in the annual number of extremely hot days (daily maximum temperature of 35°C or higher) in Japan




(Source: Japan Meteorological Agency, Climate Change Monitoring Report 2023, p.52)

### Changes in the Number of Short-Duration Intense Rainfall Events in Japan




(Source: Japan Meteorological Agency, Climate Change Monitoring Report 2023, p.60)

As climate change becomes more severe, the number of endangered species has increased from about 1,500 to more than 7,000 over the past 10 years, raising concerns about the loss of biodiversity. When biodiversity is lost, the ecosystem services that nature provides, such as soil stability, will decrease, which increases the risk of floods and landslides and decreases water purification ecosystem services. This is expected to have an impact on many corporate activities, including agriculture and industry, such as water resource depletion and water quality deterioration.

### (i) Examples of impacts on non-life insurance industry

The increasing frequency and magnitude of these natural disasters will result in increased claims settlement and may affect the profitability of non-life insurance companies, as the reinsurance market, which the companies use to diversify risk, is also exposed to similar risks, and this could result in higher reinsurance premiums paid by non-life insurance companies.

### (ii) Existence of uncertainties in risk assessment

While the above-mentioned risks have been identified through various scientific validations, the prediction models used to estimate these risks also contain uncertainties. This section describes the Group's perception of these uncertainties.

### a.Uncertainties in climate prediction models

The Coupled Model Intercomparison Project (CMIP), an international project that aims to advance scientific understanding of climate change by comparing and evaluating multiple climate projection models and integrating their results, also provides data for climate projection and scenario analysis in the IPCC assessment report. Its climate prediction models contain the following uncertainties:

| | |
|---|---|
| a.Structural Uncertainty of the Model | Because each model uses different parameters, results may vary among models. In particular, greenhouse and parasol effects of the clouds associated with global warming differ from model to model, and this is the biggest factor* in the uncertainty of climate change predictions. |
| b.Uncertainty of external forcing | Uncertainty also exists regarding future changes in external forcing, such as solar radiation, volcanic activity, and anthropogenic GHG emissions. |
| c.Uncertainty of internal variability | In the climate system there is natural internal variability (such as El Niño events), which can affect model predictions. |
| d.Uncertainty of data | Uncertainty exists in the accuracy of the observed data used to validate models and set initial conditions. The JMA report on changes in the frequency of short-duration intense rainfall events in Japan mentioned above also suggests that future data accumulation is needed to reliably capture these long-term changing trends, due to the low frequency of extreme heavy rainfall events and the relatively short observation time of AMeDAS. |
| e.Uncertainty of scale | The model is grid-based, which limits its spatial resolution, limiting its ability to predict regional climate change in detail. |

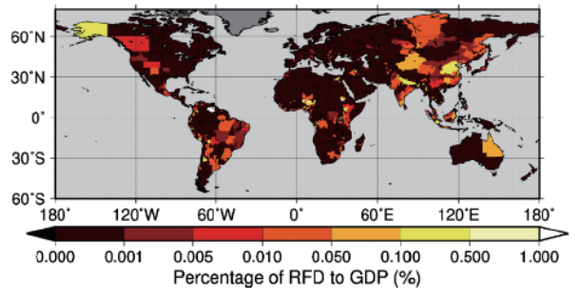
*Zelinka et al., Causes of Higher Climate Sensitivity in CMIP6 Models,

As such, we recognize that there are multiple uncertainties in the climate models provided in the IPCC assessment reports, and that even in the analysis results for the scenario in which global warming progresses the most (RCP8.5/SSP5-8.5) the impact could be higher than expected.

### b.Uncertainty regarding the damage amount after taking flood control measures

Floods are a natural disaster that has a particularly significant impact on the Group's portfolios. Even after implementing adaptation measures (measures to prevent floods), depending on climate change and socioeconomic development conditions, "limits of adaptation," may occur in which flood damage will increase beyond the current damage amount. This is due to the significant flood damage that occurs during the construction of structures to protect against floods, and it has become clear that it is important to make a decision to implement adaptation measures as early as possible and to secure funding for this purpose.
Taking these points into consideration, the Group has developed the "Endorsement covering emergency evacuation of vehicles in the event of disasters," and other products, that cover the costs incurred to avoid damage in the event of a natural disaster,.

### Increase in the amount of flood damage over current damage amount when adaptation measures are implemented

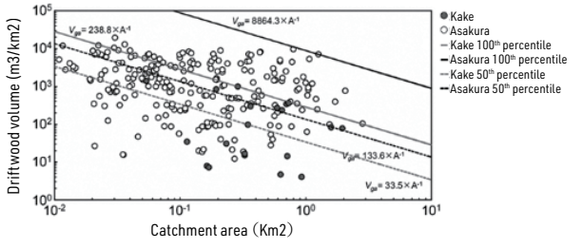



(Source: Tanoue et al., Residual flood damage under intensive adaptation,)
(Tanoue, M., Taguchi, R., Alifu, H. et al. Residual flood damage under intensive adaptation. Nat. Clim. Chang. 11, 823–826 (2021).https://doi.org/10.1038/s41558-021-01158-8)

### c.Uncertainty regarding the damage amount caused by landslides,

Diverse ecosystems provide us with ecosystem services such as flood mitigation and soil and sediment retention. If there is a future loss of biodiversity, however, there is a risk that these services will not be available and damage will occur. For example, forests have the function of preventing landslide disasters by suppressing the occurrence of surface landslides during rainfall. This function increases or decreases as the forest matures or degrades. In addition, compared to young forests, although mature forests are able to prevent landslides from larger-scale heavy rains, in mature forests the driftwood volume in the event of a landslide may be greater.
In Japan, forests cover 67% of the land area, of which approximately 40% are man-made forests in a mature state, and as mentioned above, heavy rainfall is expected to increase due to climate change. As a result, although the amount of damage caused by landslides is expected to increase in the future, the magnitude of the risk may not have been anticipated.

### Increases in driftwood volumes in forests with different maturity

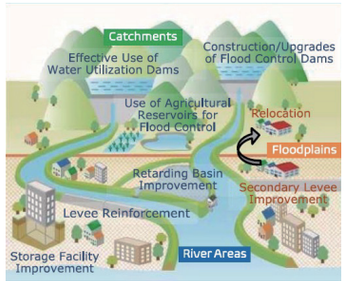



(Source: Sato et al., Evaluation of influences of forest cover change on landslides by comparing rainfall-induced landslides in Japanese artificial forests with different ages )

Figure. Comparison of driftwood volume in Kake and Asakura disasters
The Asakura (city in Fukuoka) disaster (solid black line in the figure), the damage is 30-fold larger than that at Kake. Similarly, comparing the 50th percentile lines of the Kake (city in Hiroshima) disaster (gray dotted line) and of the Asakura disaster (black dotted line), the damage at Asakura is four-fold larger than that at Kake.

Believing in the importance of river basin flood control, including forest maintenance that takes these conditions into consideration, the Group has been promoting "Green Resilience" initiatives such as the "Green River Basin Flood Control Initiative" in the Kuma River basin and the "Initiative for realizing water positivity in Kumamoto," which contribute to preventing and mitigating landslide disasters

### Image of River Basin Disaster Resilience and Sustainability by All




see page 37

# 7 | Appendix: Terms Related to Heat Map

## Dependency Heat Map: ecosystem services

| Term | Explanation |
|---|---|
| Animal energy | Labor provided by domesticated animals such as cattle, horses, donkeys, goats, and elephants, used in agriculture, etc. |
| Bioremediation | Natural processes whereby organisms such as microorganisms, plants, algae, and some animals decompose, reduce, and detoxify pollutants. |
| Mass flow rate mitigation | Sediment transport and storage functions in rivers, lakes, oceans, etc. through buffering and attenuating mass flows |
| Climate adjustment | Function of nature to moderate the climate. Global climate adjustment is achieved through long-term storage of carbon dioxide in soil, plant biomass, and oceans. At the regional level, ocean currents and winds adjust climate. At the regional and micro levels, vegetation adjusts temperature, humidity, and wind speed. |
| Dilution by the atmosphere and ecosystem | The function of nature, such as fresh and ocean water and the atmosphere, to dilute gaseous, liquid, and solid wastes produced by human activities. |
| Suppression of infectious diseases | Disease control functions in plants, animals, and humans |
| Textiles and other materials | Fibers, etc. collected from plants, algae, and animals that are used directly or processed for various purposes. In addition to wood and further unprocessed fibers, this includes production materials such as cellulose, cotton, and dyes, as well as plant, animal, and algae materials for use in production of feed and fertilizers. |
| Filtration | Filtration, sequestration, storage, and accumulation of pollutants by various organisms, including algae, animals, microorganisms, vascular plants, and non-vascular plants. |
| Prevention of floods/storms | Flood and storm suppression functions provided by the sheltering, buffering, and damping effects of natural and planted vegetation. |
| Genetic materials | DNA derived from all living organisms, including plants, animals, and algae. |
| Underground water | Water stored underground in aquifers composed of permeable rock, soil, and sand. Water contributing to groundwater sources is derived from rainfall, snowmelt, and water flow from natural freshwater sources. |
| Habitat maintenance | Function to maintain habitats that contribute significantly to reproduction of individual members of a particular species. These include places where larvae occur in high numbers, where they are protected from predators, and where they grow faster than in other places. |
| Stabilization/Erosion prevention | Large-scale stabilization and erosion control functions performed by vegetation that protect and stabilize terrestrial, coastal, and marine ecosystems, coastal wetlands, and sand dunes. Slope vegetation helps prevent avalanches and landslides, while mangroves, seagrasses, and macroalgae help prevent beach and sediment erosion. |
| Mitigation of sensory impacts | Functions that reduce impacts on human health and the environment, such as noise and light pollution reduction provided by plants. |
| Pest control | Pest control and invasive alien species management functions provided by the introduction and maintenance of predators against insect pests and invasive alien species, landscaping to reduce pest invasion, and natural toxins against pests. |
| Pollinators | Pollinator functions provided primarily by three elements: animals, water, and wind. The majority of plants self-propagate, depending on pollinators such as insects, and the pollen-carrying functions of water flow and wind. |
| Soil quality | Soil quality, such as fertility and soil structure, maintained by processes such as weathering, nitrogen fixation, nitrification, and mineralization |
| Surface water | Water flowing over the surface of the ground, such as river water |
| Ventilation | Ventilation function of nature and planting, which is essential for improving indoor air quality. Without this, accumulation of volatile organic compounds (VOCs), airborne bacteria, and mold could pose the risk of long-term health damage to building occupants. |
| Water cycle | Circulation of water that flows through the Earth's atmosphere, land, and oceans. The hydrologic cycle is involved in [replenishment] [recharging] of groundwater sources (aquifers) and maintenance of surface water flow. |
| Water quality | Quality of water provided by maintaining the chemical states of fresh and salt water, such as rivers, streams, lakes, and groundwater sources, and ensuring a favorable living environment for biota. |

## Impact Heat Map: Impact drivers

| Term | Explanation |
|---|---|
| Utilization of terrestrial ecosystems | Modification of terrestrial ecosystems associated with development of agricultural land, commercial forests, and mines |
| Utilization of freshwater ecosystem | Impacts on freshwater ecosystems such as wetlands, ponds, lakes, streams, rivers, and peatlands through modifications associated with the construction of bridges, dams, seawalls, etc. |
| Utilization of marine ecosystem | Modification of marine ecosystems associated with aquaculture and mining development |
| Use of water | Impacts from groundwater and surface water use |
| Utilization of other resources | Mining minerals and capturing wild fish, wild mammals, etc. |
| GHG emissions | Emissions of greenhouse gases such as carbon dioxide ($CO_2$) and methane ($CH_4$) |
| Air pollution | Air pollution due to substances other than GHG |
| Water pollution | Impacts of discharging of pollutants into bodies of water |
| Soil contamination | Contamination of soil by wastes, etc. |
| Wastes | Impacts of various types of waste emissions |
| Disturbance | Effects of high-intensity or prolonged noise or light pollution |
| Introduction of alien species | Biological changes and interference due to introduction of alien species. |