

# Opportunities and Challenges in Biodiversity Risk Management for Insurance Institutions



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## "Biodiversity Risk" Emerges as a New Focus for Financial Institutions

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*In April 2024, the National Financial Regulatory Administration issued the "Guiding Opinion on Promoting the High-Quality Development of Green Insurance," outlining key goals for risk management spanning two phases. By 2027, efforts will focus on refining risk reduction services and management mechanisms in green insurance. By 2030, there will be a notable improvement in both the level of risk protection provided by green insurance and the extent of green investments made by insurance funds. Besides environmental risks, biodiversity risk, which is closely intertwined with climate risk in sustainable development, is gaining increasing attention in the realm of green insurance. This paper aims to examine the pivotal aspects of biodiversity risk for insurance institutions. It will delve into various dimensions including the necessity of addressing biodiversity risk, mechanisms of risk transmission, opportunities for risk management, and potential challenges. The objective is to provide valuable insights to enhance risk management practices within insurance institutions.*

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Biodiversity, covering species, ecosystem, and genetic diversity, stands as a pivotal element inherent in the operational processes of various enterprises, including financial institutions. From a comprehensive standpoint, biodiversity issues intricately intertwine with the United Nations' seventeen Sustainable Development Goals (SDGs), encompassing direct aspects like natural resource abundance and the provision of natural capital, alongside indirect dimensions relating to potential influences on product life cycles, value chains, and industrial networks. According to the "Nature Risk Rising" report released by the World Economic Forum (WEF), approximately \$44 trillion of the global economic value generation – over half the world's total GDP – is moderately or highly dependent on nature and ecosystem services. This includes industries such as pollination, water quality control, and raw materials.

As significant market participants fostering a healthy economic cycle and promoting structured social development, financial institutions will either directly incur or indirectly transfer capital losses arising from biodiversity risk. The Global Risks Report 2024, issued by the World Economic Forum



**FIGURE 1: GLOBAL RISKS RANKED BY SEVERITY OVER THE SHORT AND LONG TERM**  
**SOURCE: WORLD ECONOMIC FORUM. THE GLOBAL RISKS REPORT 2024. 19TH EDITION**

(WEF), highlights "loss of biodiversity and ecosystem collapse" as the third most significant risk humanity will encounter in the coming decade (Figure 1). Financial institutions have already recognized the significance of these related risks. At the strategic level, global conventions and national policies are reinforcing the focus of financial institutions on biodiversity. In December 2022, during the Fifteenth meeting of the Conference of the Parties (COP15), the "Kunming–Montreal Global Biodiversity Framework" was adopted. The 15th action target underscores the importance for financial institutions to regularly monitor, evaluate, and transparently disclose their impacts on biodiversity, including risks, dependencies, and effects across their operations, supply chains, and portfolios. In January 2024, China's Ministry of Ecology and Environment unveiled the "China Biodiversity Conservation Strategy and Action Plan (2023–2030)," advocating for robust development of green finance. It also encourages the incorporation of biodiversity considerations into the green financial system to facilitate financial support for biodiversity.

## The Necessity of Biodiversity Risk Management for Insurance Institutions

**It aligns with the sustainable development goals of insurance institutions.** Serving as a fundamental instrument for risk management in modern economies and financial markets, the sustainable development of insurance institutions extends beyond operational dimensions. It encompasses a unique role in averting, mitigating, and managing financial risks associated with market participants. Therefore, the high-quality development of insurance institutions relies not solely on the efficacy of sustainable top-tier strategic planning, institutional governance, risk management, and performance target execution, but also on the integration with liability-side underwriting risks and asset-side investment objectives.

As the significance of biodiversity risk exposure rises, affected industries and economies can face varying levels of asset impairment losses, either directly or indirectly. The adoption of biodiversity risk management by insurance institutions becomes imperative for insurance institutions to support enterprises in managing and mitigating associated risks. Furthermore, insurance institutions can utilize risk underwriting and investment tools to channel funds into high-risk areas with high biodiversity sensitivity and low resilience. This enables them to consistently refine financial resource allocation and strengthen their sustainable risk resilience.

**It aligns with the principles of green insurance development.** The "Guiding Opinions on Promoting the High-Quality Development of Green Insurance" underscores the objective of advancing "green, low-carbon, and circular" progress in the economy and society. It emphasizes addressing both liabilities and assets, highlighting the importance of compensating losses, reducing risks, and guiding funds to facilitate comprehensive and high-quality transformations. Strengthening insurance institutions' risk management capabilities, reinforcing their commitments, increasing resource allocation, and enhancing service structures are pivotal measures to further enhance the capacity building of green insurance. Biodiversity risk, as a crucial component of sustainable risk, is closely intertwined with environmental and climate risks, significantly impacting the stability of green insurance effectiveness. Hence, incorporating biodiversity into the risk assessments of insurance institutions is essential for promoting the advancement of green insurance. Moreover, this integration can create beneficial feedback loops in sustainable risk management across multiple dimensions.

**It enhances the variety of biodiversity risk management tools in the financial market.** Similar to climate risk, biodiversity risk includes both physical

Figure 1.1. Biodiversity, the economy and the financial system

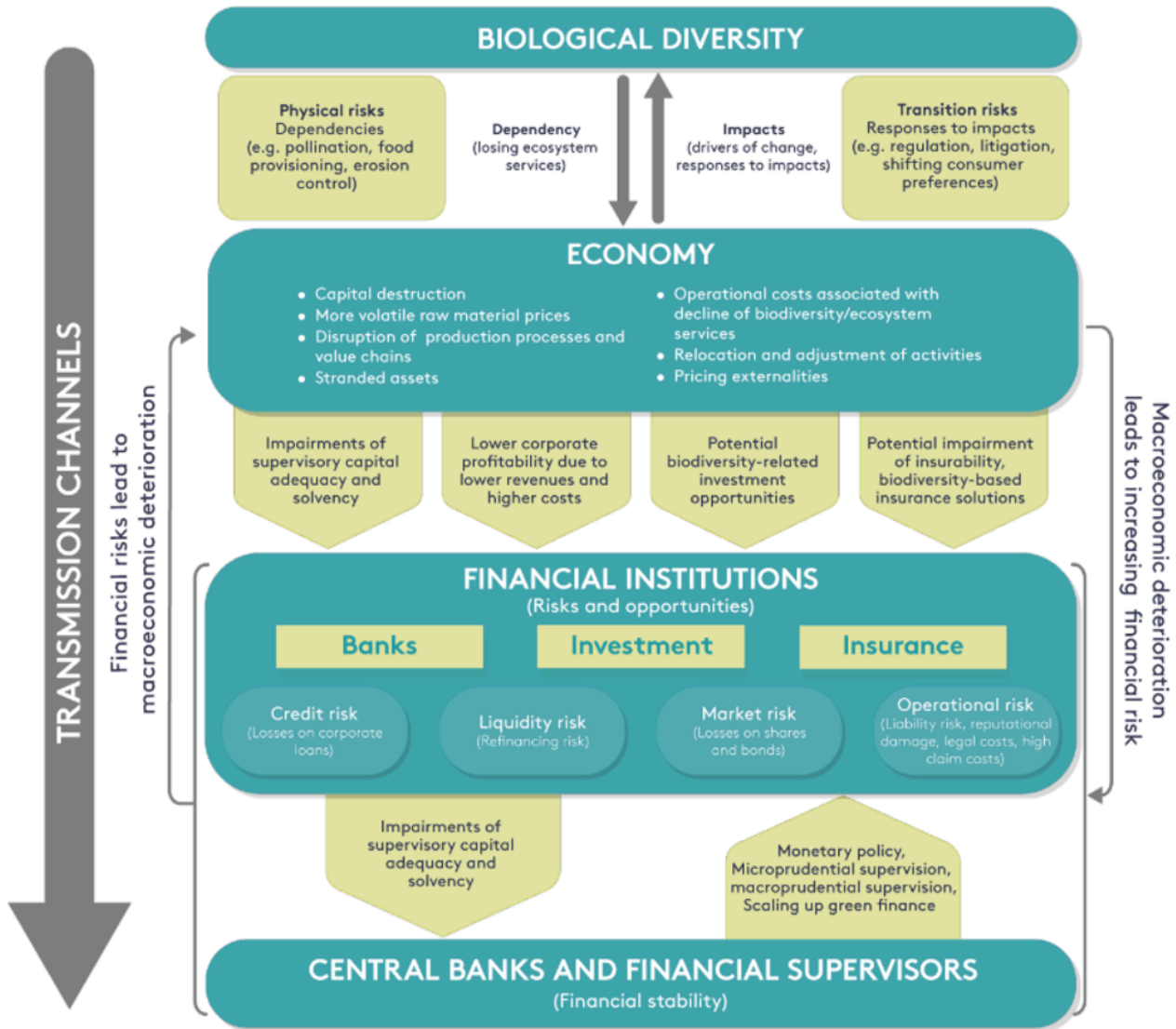


FIGURE 2: TRANSMISSION MECHANISM OF BIODIVERSITY RISK TO FINANCIAL RISK  
SOURCE: NGFS, 2021

and transition risks, characterized by widespread impact, severe extreme events, and irreversibility. Currently, research on climate risk disclosure, identification, assessment, and management is deepening globally and domestically. Climate bonds, insurance, investment tools, and related financial products are becoming more diverse. However, there's a lack of biodiversity risk management tools. Insurance plays a crucial role in providing risk protection and fostering credit interchange among market participants due to its financial connections and mutual aid in the market. Exploring and constructing biodiversity risk management mechanisms by insurance institutions lay the foundation for developing innovative financial products. This not only meets market demands but also offers risk prevention and mitigation options for industries and businesses affected by biodiversity.

### The Dual Significance and Impact of Biodiversity Risk on Insurance Institutions

Biodiversity risk can be categorized into two main types: physical risk and transition risk. These risks impact the stability of economic structure and operation, creating potential uncertainties for the business operations of financial institutions and presenting both opportunities and challenges. As summarized by the NGFS and illustrated in the figure below, the pathways through which biodiversity risk translates into financial risk are similar to those of climate risk, manifesting as credit risk, liquidity risk, market risk, and operational risk. Notably, biodiversity risk holds dual significance: the reliance of businesses on biodiversity and the impact of their production and operational activities on biodiversity.



## (1) DEPENDENCE ON BIODIVERSITY

Although financial institutions' dependence on ecosystem services and ecological resources is relatively indirect, the effects are significant and can result in extreme, immeasurable losses. As key risk-bearing entities in the financial market, insurance institutions are strongly linked to biodiversity risk through their underwriting liabilities and their investment and financing assets. This connection is particularly pronounced when the industries insured or invested in are highly sensitive to biodiversity, thereby heightening the insurance institutions' dependence on biodiversity. Viewed through the lens of physical risk, biodiversity loss can disrupt natural capital and ecological service systems, negatively impacting operational activities in traditional manufacturing industries such as agriculture, forestry, and fisheries, along with related service sectors. This can lead to financial losses or even business closures, triggering risk events for insurers. Transition risk, on the other hand, encompasses scenarios like adjustments in government policies (such as stricter biodiversity protection requirements), shifts in consumer preferences, and technological advancements, all of which may drive up operating costs for insured or invested parties. Consequently, insurance institutions could face an increase in risk claims or asset devaluation.

## (2) IMPACT ON BIODIVERSITY

The influence of insurance institutions on biodiversity mirrors their own reliance on biodiversity, operating indirectly and primarily impacting insured entities or investment targets. This influence is exerted through mechanisms such as risk transfer and financial intermediation, which can either positively or negatively affect ecosystems by influencing financial liquidity. The degree to which biodiversity affects insurance business targets is directly tied to industry and geographic factors. Particularly crucial are activities and projects of enterprises in industries monitoring environmental and climate risks or situated in ecologically vulnerable areas, such as petroleum and natural gas, mining, and large-scale hydropower sectors. In the course of their production and operations, businesses utilize and deplete natural resources. Through various production methods and operational processes, the generation of outputs often leads to the creation of substances or situations like waste, pollutants, and other materials that influence biodiversity. The table provided by ENCORE outlines several key factors driving enterprises' impact on biodiversity, spanning categories such as the atmosphere, minerals, oceans, soil and sediments, species, and water resources.

Factors	Key Elements
Ecological System Disturbance	Noise levels measured in decibels and their duration, duration of light pollution.
Utilization of Freshwater Ecosystems	The area of wetlands, ponds, lakes, streams, rivers, or peatlands required to provide ecosystem services such as water purification and fish spawning, as well as the infrastructure area needed for using rivers and lakes, such as bridges, dams, and flood embankments.
Greenhouse Gas Emissions	Carbon dioxide (CO <sub>2</sub> ), methane (CH <sub>4</sub> ), nitrous oxide (N <sub>2</sub> O), sulfur hexafluoride (SF <sub>6</sub> ), hydrofluorocarbons (HFCs), and perfluorocarbons (PFCs), among others.
Utilization of Marine Ecosystems	Aquaculture area classified by type, seabed mining area, etc.
Non-Greenhouse Gas Air Pollutants	Fine particulate matter (PM <sub>2.5</sub> ) and coarse particulate matter (PM <sub>10</sub> ), volatile organic compounds (VOCs), nitrogen oxides (NO and NO <sub>2</sub> , commonly referred to as NO <sub>x</sub> ), sulfur dioxide (SO <sub>2</sub> ), carbon monoxide (CO), etc.
Other Resource Utilization	The quantity of extracted minerals, the number of wild-caught fish species, and the number of wild-caught mammal species categorized by species.
Soil Contaminants	The amount of pollutants emitted and retained in the soil during a given period.
Solid Waste	This includes the amount of waste categorized by classification (i.e., non-hazardous, hazardous, and radioactive), specific material composition (such as lead, plastic), or disposal method (such as landfill, incineration, recycling, professional treatment).
Utilization of Terrestrial Ecosystems	Agricultural area, artificial forest area, open-pit mining area, etc., classified by type.
Water Pollutants	This includes emissions of nutrients (such as nitrates and phosphates) or other substances (such as heavy metals and chemicals) into receiving water bodies.
Water Usage	Groundwater consumption, surface water consumption, etc.

TABLE 1: FACTORS AND ASPECTS OF ENTERPRISES' IMPACT ON BIODIVERSITY  
SOURCE: ENCORE, IIGF.

## Opportunities Arising from Biodiversity Risk Management in Insurance Institutions

Biodiversity risk exposure is systemic, pervasive, and objective. As central figures in the financial market, insurance institutions can minimize the impacts of these risks while utilizing their operational strengths to capitalize on potential growth prospects. They can efficiently employ resource allocation and risk management strategies, both in terms of liabilities and assets. Through the provision of sustainable financial offerings and bolstering investments in biodiversity protection initiatives, alongside strengthening corporate measures for mitigating biodiversity risks, insurance institutions can significantly contribute to addressing biodiversity risks.

### LIABILITY SIDE: INNOVATING THE DEVELOPMENT OF BIODIVERSITY-THEMED GREEN INSURANCE PRODUCTS

Green insurance is exceptionally sustainable. Therefore, the introduction of insurance products centered around biodiversity by insurance firms carries a dual advantage. Not only does it meet market demands, thereby enhancing their competitive edge, but it also advances their pioneering efforts in green insurance. Currently, insurance institutions primarily address biodiversity risks on the liability side, focusing on biodiversity risk protection. In high biodiversity risk regions, insurers are actively crafting products with species diversity as the focal point. Initiatives like pilot projects on wildlife-related public liability insurance are underway, aiming to bolster biodiversity conservation efforts. Furthermore, insurance companies are exploring novel collaboration models with banks to create mechanisms for jointly managing financing risks in wildlife conservation projects, thereby advancing natural resource conservation efforts. Moreover, they can concentrate on enterprises highly reliant on or impacting biodiversity. By crafting innovative property or liability insurance policies, they can specifically address enterprise biodiversity risks, aiming to mitigate potential impairment losses across various tiers.

### ASSET SIDE: STRENGTHENING BIODIVERSITY INVESTMENT MANAGEMENT MECHANISMS

Insurance institutions' asset management operations align closely with those of fund companies and other asset management entities. They primarily direct funds towards diverse enterprises or projects by meticulously selecting targets and making investment decisions, with the goal of not only yielding excess returns but also fostering specific environmental and social advantages. Illustrated in the table below, the integration of environmental, social, and corporate governance (ESG) factors throughout the process and business practices, adhering to the six fundamental principles of the United Nations Principles for Responsible Investment (UNPRI), serves as a pivotal avenue for institutional investors to propel sustainable economic and social progress. Within this framework, "biodiversity" stands out as a pivotal focus area and a cornerstone of the ESG framework, underscoring the importance of biodiversity risk management in ensuring sustainable risk mitigation. Initiatives such as developing biodiversity-themed indices or investment products, formulating robust biodiversity risk management strategies, and crafting corresponding investment management models will broaden the horizons of sustainable investing, thereby fortifying mechanisms and protocols for responsible investment.

### Challenges Ahead in Biodiversity Risk Management for Insurance Institutions

Firstly, the institutional norms and frameworks for managing biodiversity risks are currently underdeveloped. The development of biodiversity risk management is in its early stages, with overarching policy documents at the macro level being the primary guidance, yet they have not directly impacted micro-level enterprises and financial institutions. Presently, biodiversity-related laws and regulations can draw insights from more established environmental protection laws or climate risk management requirements.

Principle	Content
Principle 1	Incorporate ESG issues into investment analysis and decision-making processes.
Principle 2	Be active owners and incorporate ESG issues into the ownership policies and practices.
Principle 3	Require investee companies to disclose ESG-related issues.
Principle 4	Promote acceptance and implementation of the Principles within the investment industry.
Principle 5	Enhance capacity building through shared learning and collaboration to enhance the effectiveness in implementing the Principles.
Principle 6	Expect the signatories to report on the activities and progress towards implementing the Principles.

TABLE 2: UNPRI'S SIX PRINCIPLES  
SOURCE: UNPRI, IIGF

These mainly focus on aspects such as ecological resource conservation, pollutant emissions, greenhouse gas emissions, and corporate environmental disclosures, providing some benchmarks for assessing potential transition risks for enterprises. However, the absence of direct institutional regulations still poses challenges to the risk assessment and product development endeavors of insurance institutions, acting as a barrier to the advancement of innovative insurance products and investment tools in this sector.

Secondly, financial institutions lack methodological frameworks for managing biodiversity risks. Despite international efforts by organizations like the Task Force on Nature-related Financial Disclosures (TNFD), the Science-Based Targets Network (SBTN), and the Partnership for Biodiversity Accounting Financials (PBAF), which have issued guidelines on biodiversity information disclosure, enterprise biodiversity protection goals, and tools for assessing biodiversity dependence and impact, there is still a need for further refinement in practical implementation and technical details. At present, the methodologies primarily target the financial sector, neglecting the insurance industry. Furthermore, there is a lack of comprehensive analysis covering both the liability and asset sides. Existing research outcomes are region-specific, thereby restricting their direct utility.

Thirdly, biodiversity information disclosure is limited, and efforts to bridge data gaps are insufficient. As previously noted, effective biodiversity risk management in insurance institutions relies on comprehensive risk data, factors, and scenario analysis. However, the limited extent of biodiversity information disclosure poses a significant obstacle to risk assessment and strategy formulation. With the increasing demands for sustainable disclosure, transparency in information across various industries is gradually improving. However, biodiversity remains an optional consideration, posing a challenge for insurance institutions in effectively managing biodiversity data for developing liability-side products.

## REFERENCES:

- [1] Kedward K, Ryan-Collins J, Chenet H. Biodiversity loss and climate change interactions: financial stability implications for central banks and financial supervisors[J]. *Climate Policy*, 2023, 23(6): 763-781.
- [2] 魏华林. 保险的本质, 发展与监管[J]. *FINANCIAL REGULATION RESEARCH*, 2018: 1.
- [3] World Economic Forum. *New Nature Economy Report Series*. 2020
- [4] World Economic Forum. *The Global Risks Report 2024*. 19th Edition
- [5] 中国人民银行金融研究所课题组. 金融支持生物多样性保护调研报告[J]. *中国人民银行政策研究*, 2022: 3.



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