Biodiversity Finance – the Emergence of a New Field of Research*

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Thomas Walker – Helena Naffa – Rajesh Kumar Tharumar – Simone Donders: Biodiversity Finance: The Economic, Operational, and Societal Impacts of Biodiversity Loss
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From time to time, a process takes place in nature as a result of which a species' population reaches the end of its exponential growth phase. The scarcity of resources forces individuals into stronger competition and more frequent confrontation, while external shocks may have more severe consequences than usual for the established equilibrium.

Humanity is currently following precisely this path. Fortunately, the process is mitigated by a number of factors, such as the organisation of our societies, the reflexive capacity of human thought and technological progress. The relative equilibrium that exists in the world today is fragile: it is threatened by two of the most significant – and mutually interacting – processes affecting the environment, namely climate change on Earth and the decline in the diversity and extent of wildlife. Although increasing attention has been dedicated to this dual crisis in recent decades, particularly to the issue of climate change, there still remains a substantial gap between the scale of the threat and both the decision-making processes and the funding of methods leading towards solutions.

Science alone is not sufficient to address these challenges, but its findings provide a key basis for making responsible decisions in the future. This is why the emergence of biodiversity finance as a field of research and a practical area of financial expertise, or some variation thereof, is of particular significance.

Quantifying biodiversity processes and examining them from an economic and financial perspective brings the natural crisis closer to the actors in economic and political life. In this way, alongside climate change, the protection of wildlife may

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also be given greater weight in investor decisions, risk management frameworks, national economic strategies and supranational agreements.

The synthesis of the independently accumulated achievements of ecology and finance holds outstanding promise, the outlines of which are already visible from a few years' perspective. The book *Biodiversity Finance* offers a compelling insight into this emerging field. Through 14 selected studies, the volume presents the most important research directions and results from the first years of research on this topic. Before discussing the individual studies, I would draw the readers' attention to *Odia's* summary (pp. 115–152), which outlines the causes and current status of the ecological crisis and the international agreements aimed at addressing it.

Below, I present some of the most exciting topics raised in the book's studies. Following the structure of the book, I discuss (1) the quantifiability of ecological processes and natural capital; (2) the two-way risks between the economy and the environment; and (3) some innovative financial instruments and methods that can promote the mobilisation of financing.

Measurability

Let us imagine a bustling deciduous forest! Trees grow towards the sky, competing for the sun's rays, while herbivorous animals nibble on the leaves of young saplings. Predators lie in wait with hungry stomachs, and fungi break down the remains of dead animals. The field of ecology offers an extensive literature discussing the modelling of forest ecosystem processes.

This is complemented by ecological economics and biodiversity finance, which assign a monetary value to the goods provided by nature, known as ecosystem services. Once we can assign a well-founded value to the elements and processes of nature, they can immediately be integrated into economic models, regulatory decisions and even the plans of individual corporate projects. If nature is not merely an external factor that poses an obstacle but a valuable asset incurred as an opportunity cost, the likelihood of its transformation and destruction is significantly reduced.

In this line of research, *Hernández-Blanco's* study (pp. 61–84) examines the extent to which individual species contribute to maintaining the balanced state of ecosystems. The "health" of the environment is a fundamental condition for providing ecosystem services that are beneficial to the economy and society. The author outlines a general methodology for assessing and quantifying the contribution of individual species to the process.

Beverdam and *Scholtens* (pp. 85–112) examine how environmental indicators and metrics that determine the state of biodiversity influence the value of companies. The authors separately analyse the role of ecological considerations in corporate valuation in terms of growth, profitability, efficiency and risk factors.

Risks and risk management

Natural disasters are an inevitable part of life on Earth, and unfortunately, they occasionally also affect all societies and communities. Fortunately, human ingenuity can often successfully reduce the occurrence and impact of unexpected events with the help of impressive engineering solutions. However, it should be noted that in many cases, nature does the same thing for us! Mangrove forests and coral reefs protect coastal areas from storms and waves, tree roots and natural vegetation prevent landslides and avalanches, and beavers build dams to protect against flooding of smaller streams and rivers, which are subject to the greatest fluctuations. Beyond natural disasters, ecosystems mitigate the effects of environmental variability on a daily basis, thereby smoothing out the volatility of yields from nature-related economic activities.

However, as biodiversity declines and ecosystems are destroyed, the risks increase. One area of research in biodiversity finance seeks, on the one hand, to assess and quantify these risks that nature poses to the economy. On the other hand, it also examines the opposite effects: what risks do the activities of an economic entity pose to nature, and how can the extent of these risks be avoided or reduced? Understanding this is crucial for company managers, as well as for investors and decision-makers.

The study by *Khandelwal* and *Khandelwal* (pp. 9–31) contributes to the former line of research, examining the effects of biodiversity loss on the stability of the financial sector. By synthesising the literature on the subject, the authors demonstrate that biodiversity loss is closely linked to credit, market, operational, reputational and regulatory risks, and they explore the financial mechanisms through which these effects are transmitted.

In their study, *Taddei* and *Ielasi* (pp. 153–173) provide a comprehensive overview of the regulatory frameworks related to biodiversity and environmental risks, focusing on the guidelines of the *Corporate Sustainability Reporting Directive* (*CSRD*) and the *European Sustainability Reporting Standards* (*ESRS*), concluding their work with a summary of the literature on metrics related to biodiversity risks.

Dallagiacoma and *Torelli* examine (pp. 175–201) how the European Union encourages companies to integrate biodiversity protection into different levels of their operations. In their study, they pay particular attention to the main provisions

of the recently adopted Nature Restoration Law and the Corporate Sustainability Due Diligence Directive, highlighting their expected impact on corporate practices.

Financial products and methods

Comments on biodiversity are still rare in the reports of publicly traded companies, and their level of detail varies greatly. Traditional financial products have limited ability to direct capital towards projects that support biodiversity. Since investor activism, corporate reputation and well-understood business interests together are still insufficient, innovative financial products are needed to attract capital aimed at financing nature-based and sustainable solutions with the right incentives. The approaches and tools outlined in the following three studies paint an encouraging picture of the possibilities.

Naffa introduces (pp. 33–57) the concept of nature-inspired finance and points out that there are many parallels between the functioning of natural and financial systems, for example, in the areas of resilience, adaptation and regeneration. The author illustrates how these natural principles can be applied in the development of investment portfolios and the design of financial products and then reviews the financial instruments and methods currently used to finance biodiversity.

Agliardi and *Agliardi* point out (pp. 205–232) that the analysis of biodiversity-related financial instruments has focused heavily on the examination of stock returns, while the examination of other relevant financial products has so far been neglected. In their study, they present biodiversity-related sustainability-linked bonds (BrSLBs), whose coupon payments are made only if predefined performance indicators are achieved. The authors are the first to develop a comprehensive pricing model for BrSLBs, which pose a complex financial mathematical problem due to the embedded optionality of the bonds.

Arjaliès, Bernard and *Patel* contribute further to the literature on biodiversity-linked financial products in their study (pp. 233–266) by outlining the characteristics and methodology of biodiversity offsets and lending and then making recommendations for overcoming the shortcomings of these products.

Recommendation

Due to their interdisciplinary nature, I highly recommend the studies outlined above to researchers in both scientific fields. The works in this volume and the literature they reference cover most of the important publications on biodiversity financing to date.

The final chapter of the book, based on *Saba's* work, may serve as a starting point for planning future research, as it outlines current research trends in biodiversity finance and future opportunities based on gaps and shortcomings in the literature.

The book may also be useful reading for practicing financial professionals and investors working at funds or companies dealing with sustainability and ESG issues. On the one hand, the volume of biodiversity-related investments and investor demand are expected to grow in the future, and on the other hand, the strictness and scope of regulations on biodiversity and ecosystems may also be set to expand further.