MISTRA FinBio

ANNUAL REPORT 2024

March 2025

MISTRA FinBio

Funded by MISTRA

Mistra FinBio is a transdisciplinary research programme centred on doing cutting-edge research while simultaneously developing science-based outputs that can promote real-world impact. It leverages key networks in the academic and finance sector alike, with the aim of serving as a testbed for piloting novel metrics and tools to achieve scalable impact.

Mistra FinBio is funded by Mistra.

www.finbio.org

Layout and graphics: Azote

Mistra FinBio 2024 at a Glance

Advancing Science at the Intersection of Finance and Biodiversity

In 2024, Mistra FinBio continued to bridge the gap between finance and biodiversity, delivering cutting-edge research and practical tools to shape a nature-positive economy. Here are the key scientific contributions from the year:

Major Research Outputs

- Doing Business within Planetary Boundaries – A landmark report that introduces the Essential Environmental Impact Variables (EEIVs) and Earth System Impact Score (ESI), providing a planet-centric approach to corporate sustainability and investment strategies.
- Investment Agreements and Biodiversity Risks – A study identifying 12 middle-income countries where international treaties could hinder biodiversity protection, exposing the need for policy reforms.
- Redirecting Flows – Navigating the Future of the Amazon – A deep dive into financial mechanisms that either support or threaten the Amazon's resilience, highlighting the risks of ecological tipping points and the role of blended finance solutions.
- Biodiversity Monitoring with eDNA – A pioneering pilot project with Svensk Kolinlagring testing environmental DNA (eDNA) as a tool to track biodiversity shifts in agricultural landscapes and link conservation efforts to carbon sequestration.

Selected Work Package Highlights

- WP1: eDNA & Biodiversity Metrics – Developed new methods for corporate biodiversity impact assessments and collaborated on a white paper with Pictet Asset Management.
- WP2: Systemic Financial Risks – Created models to assess how biodiversity loss impacts financial stability, with a focus on marine tipping points.
- WP4: Policy Engagement – Provided scientific feedback on the Nature Action 100 initiative and refined biodiversity risk assessment tools.
- WP7: Investment Risks & Agreements – Explored how international investment agreements influence stranded investments and biodiversity risks.

Looking Ahead

Mistra FinBio will continue refining biodiversity impact metrics, advancing financial risk assessments, and shaping global policy discussions. With our impact partners, we remain committed to driving scientific insights into real-world financial applications, ensuring a sustainable and resilient future for both nature and the economy.

Contents

Chair's preface

As we conclude another year of Mistra Finbio, it is a privilege to reflect on the programme's journey and its growing relevance in a rapidly changing world. Since its inception, Mistra Finbio has proven its ability to adapt and thrive amidst uncertainty, geopolitical shifts, and an evolving research landscape. In a world where changes in nature are increasingly destabilizing financial systems, and geopolitical realignments are reshaping policies and business opportunities, Mistra Finbio's work is not just relevant but vital. The programme has become a hub of connection, productivity, and collaboration with a diverse array of stakeholders, making meaningful contributions at the intersection of biodiversity and finance.

Mistra Finbio's Role in a Changing World

Significant global initiatives are advancing the integration of biodiversity into financial systems. Mistra Finbio's research and outputs are actively contributing to and supporting these international efforts, reinforcing its position as a critical player in this field. As we look ahead, geo-political tensions and the weakened state of multilateralism raise concerns about the conditions for further progress in the realm of global co-operation, but this challenge also underlines the key role of research initiatives such as Mistra Finbio. On the basis of a growing body of knowledge, and continued collaborations between engaged partners, the integration of biodiversity with finance will hopefully remain a key global priority, also in the years to come.

Board members (from the left): Victor Galaz, Katherine Richardson, Ian Thomson, Lena Sommestad (Chair of the Board), Marten Winter and Magnus Emfel.

Innovations and Achievements in 2024

Mistra Finbio continued to lead the way in integrating biodiversity into financial decision-making through groundbreaking innovations and practical applications. A standout initiative involved a pilot project with Svensk Kolinlagring, where eDNA was used to monitor biodiversity on regenerative farms. This effort aimed to create a biodiversity index linked to carbon sequestration, demonstrating the potential for a biodiversity credit market akin to carbon credits.

In addition, Mistra Finbio developed a prototype model to analyze biodiversity changes across landscapes, enabling scenario planning for industries such as mining. The programme identified financial actors exposed to marine tipping points and advanced work on a high-resolution data explorer that maps resilience loss per country. These tools provide actionable insights for financial actors to anticipate and mitigate risks linked to biodiversity changes.

Ethical and governance dimensions were another focal point, with Mistra Finbio addressing challenges like greenwashing and exploring governance structures to ensure interventions are both effective and ethically sound. The programme's efforts in creating open data platforms and investor guidance tools highlight its commitment to equipping stakeholders with the resources to make informed, biodiversity-positive decisions. Together, these achievements underscore Mistra Finbio's dual focus on innovation and tangible impact.

Mistra Finbio's Board

The board of Mistra Finbio has a pivotal role in guiding the programme through an ever-shifting landscape. As the world continues to change significantly, the board's stewardship is essential in ensuring that Mistra Finbio remains responsive and forward-looking. This year, the board has focused primarily on the budget and on the progress and strategic direction of the programme, as Mistra Finbio enters its third year and as we look ahead to the mid-term evaluation.

Board members have engaged in in-depth discussions on research updates, reports on Mistra Finbio's work with impact partners, and on Mistra Finbio's role in a broader economic and political context. Board members have also had the opportunity to meet for formal and informal discussions with research teams and impact partners. All in all, it has been deeply rewarding to contribute to a programme that not only addresses critical global challenges but also exemplifies resilience, innovation, and collaboration.

In closing, I think that Mistra Finbio's achievements this year clearly reaffirm its position as a leader in the biodiversity-finance nexus. As we look to the future, the programme is well-equipped to navigate the turbulence and uncertainties ahead, driving meaningful change and fostering a sustainable relationship between finance and the natural world.

Lena Sommestad,
chair of the board for Mistra FinBio

Director's view

As Mistra Finbio enters its third year, I am proud of the progress we've made at the dynamic intersection of finance and biodiversity. This initiative unites academic researchers and financial leaders to embed biodiversity into financial decision-making.

The project is thriving. Our team is increasingly connected, productive, and collaborating with diverse stakeholders, including biodiversity scientists, philosophers, accountants, and lawyers. We work with venture capitalists, banks, development banks, scientific partnerships, and standard setters. Mistra Finbio has published scientific articles, released reports, and participated in global events bridging nature and finance. These achievements highlight our growing role in shaping sustainable financial systems.

This work is more critical than ever as global discussions on finance and nature accelerate. Treaties like the Kunming-Montreal Global Biodiversity Framework and frameworks such as the Task Force on Nature-Related Disclosures, the EU's European Sustainability Reporting Standards, and the Corporate Sustainability Reporting Directive have advanced the integration of biodiversity into financial systems. Additionally, the Network for Greening the Financial System is addressing biodiversity risks, and IPBES is conducting its first assessment linking business, finance, and biodiversity.

These efforts take place in an increasingly turbulent world. The recent California wildfires remind us that changes in nature are destabilizing financial systems, while geopolitical realignments are reshaping policies, regulations, and business opportunities.
In this context, Mistra Finbio's work to improve financial decision-making around nature is vital. I look forward to advancing our mission to create a world where economic activity supports – and is supported by – people and nature.

Garry Peterson,
Programme director

This is Mistra FinBio

Mistra Finbio is a transdisciplinary research programme centred on doing cutting-edge research while simultaneously developing science-based outputs that can promote real-world impact. In Mistra Finbio, we leverage key networks in the academic and finance sector alike, with the aim of serving as a testbed for piloting novel metrics and tools to achieve scalable impact. We do this by engaging strategically selected impact partners who can translate research into immediate realworld change.

The programme brings together researchers from diverse disciplines – computational biology and bioinformatics, ecology and systematics, financial and trade economics, and philosophy – as well as partners from the finance sector, to collaboratively develop meaningful ways of incorporating biodiversity into financial decision making. We also examine key ethical and governance concerns associated with the monetisation of biodiversity, synthesising lessons from past and ongoing efforts to develop markets for biodiversity and ecosystem services, and exploring future risks and opportunities. We take a holistic systems perspective on the financial service sector and address the information needs of various different types of financial actors.

Mistra Finbio aims to play a pivotal role in initiating and accelerating the inclusion of science-based sustainability criteria, particularly biodiversity, in decisions made throughout the financial sector.

By co-creating new research and testing novel metrics and tools to capture corporate biodiversity impacts with our impact partners, we are developing applicable use cases. The firm intention of Mistra Finbio is to demonstrate the benefits of integrating biodiversity into financial decision-making.

Mistra Finbio

Mistra Finbio aims to enhance the financial sector's ability to contribute to a nature-positive economy. The programme develops methods and metrics to identify business models that protect or strengthen existing biodiversity.

Second year

The second year of Mistra Finbio has seen an increased collaboration between work packages, as our research group has grown and strengthened its capacities. We have conducted a first pilot project for monitoring and measuring biodiversity impacts through environmental DNA and begun work on integrating results into new business models.

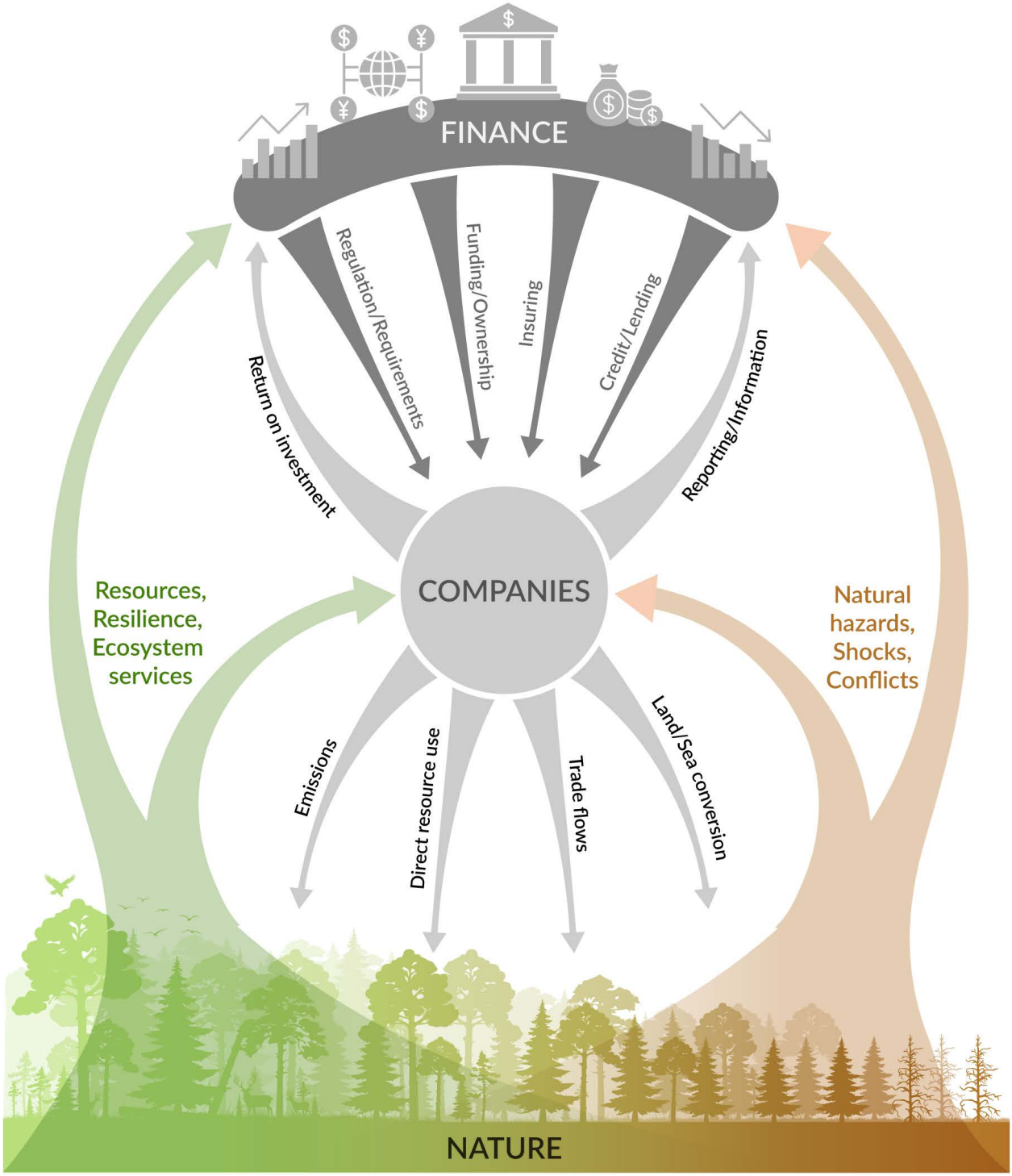
Research papers and reports published over in 2024 reached both academic, business and finance actor stakeholders. In the year to come our work continues in publishing research insights and piloting new tools for financial sector decision making.

Mission and vision

Our vision is a future where financial investments promote and shape an economy that supports a resilient biosphere and prosperous societies.

Our mission is to facilitate real change in the financial system in a way that benefits biodiversity by developing theory and decision support tools, and by conducting empirical research that can inform financial actors' strategies and promote investments that enhance rather than harm nature.

Connecting nature and finance



The financial system depends on and impacts nature through its relationship to companies and how they are able to act. Nature underpins the economy and the financial system as it provides resilience, resources and ecosystem services. The loss of nature and biodiversity is a threat to the economy and financial actors as risks of natural hazards, shocks and conflicts increase, while resilience is eroded. Finance has the responsibility and opportunity to understand this dependency and impact, and to steer its activities to support regeneration and protection of nature and biodiversity. Mistra FinBio positions itself to bring light to these connections and to develop actionable tools to guide a green development for finance sector actors.

Programme Host and Partners

The programme is hosted by the **Stockholm Resilience Centre** at Stockholm University. The consortium includes: IVL Swedish Environmental Research Institute, University of Gothenburg, Swedish Museum of Natural History, Oxford Sustainable Finance Group

FinBio has strategic impact partners that help us develop and translate our research outputs into real-world financial impact. Our impact partners are key actors that help us drive change across a significant portion of the financial services industry.

We engage with our impact partners through dialogues, learnshops, events and co-produced publications.

Back row, left to right: Henrik Johansson, Fredrik Ronqvist, Robert Goodsell, Mats Töpel, Meagan Meachem, Mark Sanctuary, Garry Peterson, Boudewijn de Bruin, Emmy Wassénius, Hjalmar Funke, Christophe Christiaen. Middle row: Hassan Sheikh, Johanna Gustafson, Emma Grankvist, Eliza Nobles, André Pinto da Silva, Maganizo Kruger Nyasulu, Joakim Sandberg, Bianca Voicu, Shruti Kashyap, Marika Haeggman. Front row: Dario Marone, Giulia Rubin, Richard Endörfer, Beatrice Crona, Giorgio Parlato, Juan Rocha, Jean-Pierre Didier Constant

Our impact partners

Since the programme was launched, Mistra Finbio has strategic impact partners that help us develop and translate our research outputs into real-world financial impact. This is done as we share knowledge through dialogue and discussions, co-produce reports, organize learnshops and events, and pilot the tools generated in Mistra Finbio.

Our impact partners are key actors that help us drive change across a significant portion of the financial services industry.

Natural Capital Project

Pictet Asset Management

PRI

VC2050

Sustainable Finance Lab

Finance for Biodiversity

SISD

Swedish Investors for Sustainable Development

Quotes from impact partners:

"As an impact partner of Mistra Finbio, we have enjoyed a unique collaboration with a diverse group of world-class researchers. These exchanges have allowed us – and our clients – to gain valuable scientific insights and strengthen our investment process in relation to biodiversity. We hope our investment expertise is contributing to the development of practical and impactful research inputs for the financial industry. We look forward to further interactions."

Natsuko Waki,
Pictet Asset Management

"We welcome our ongoing work with Mistra Finbio. Climate and nature issues represent a material risk issue for responsible investors and the opportunity to assist in expanding the global knowledge base on these topics, and to deliver these insights to our signatories, is an important one for the sector."

Magnus Odén,
Nordic head, Responsible Investor Ecosystem at the PRI

"Collaborating with Mistra FinBio on the Redirecting Flows report was invaluable. Their expertise in aligning financial strategies with biodiversity goals helped shape key insights—like the need for blended finance mechanisms and nature-positive investment pathways to protect the Amazon. This kind of cross-sector collaboration strengthens relationships with institutions like the IDB, ensuring that financial innovation, such as sustainability-linked credit and ecosystem service markets, is grounded in robust science and practical solutions for the region."

Mary Ruckelshaus,
Executive Director of the Stanford-based Natural Capital Project

Highlights

Knowledge sharing

In April 2024 Mistra Finbio programme director Garry Peterson shared his insights on invasive species and nature-related risks facing investors and businesses in a thought piece published on Pictet Asset Management's website:

"The Varroa mite [a mite that feeds on honey bees] and the process of its evolution provide an example of a nature-related risk to companies that is quite distinct from climate risks.

Invasions by alien species, like Varroa, are difficult to reverse; they can spread, evolve and are difficult to eliminate once established. The Varroa mite, and the diseases it spreads, spread in the 1950s in response to the expansion of global trade and the global spread of European honeybees for agriculture.

Managing nature risks therefore requires understanding how company, industry, and human action are promoting the spread and evolution of these risks."

This kind of knowledge sharing makes biodiversity research insight available to stakeholders interacting with Mistra Finbio impact partners.

Pictet Asset Management also hosted roundtable discussions with Mistra Finbio researchers attending, to showcase and develop a model for assessing biodiversity impact.

AP7 report and round table discussion on biodiversity and deforestation

Swedish Investors for Sustainable Development is a network that brings together around 20 of Sweden's largest asset owners, asset managers and institutional investors. The network aims to contribute to more sustainable investments in line with the Sustainable Development Goals and the Paris Agreement through exchange of experience, learning and communication. Sjunde AP-fonden, AP7 is one of the members.

Towards the end of 2024 AP7 launched their theme report on deforestation and biodiversity, with input from among others Mistra Finbio senior scientific advisor Beatrice Crona and the research conducted in Mistra Finbio.

In a round table discussion on the report, a key message from Beatrice Crona was:

"What I want the financial sector to take to heart is that this will be more complex than climate. We won't be able to boil this down to one single metric, so we have to be prepared to think holistically, think in systems, and be open to that we might have to use several different metrics and tools to know that we are moving in the right direction."

This kind of input is important as investors formulate and develop assessment models and metrics.

Beatrice Crona and Johan Florén (AP7) at the round table discussion on the report on deforestation and Biodiversity.

NatCap symposium

Mistra Finbio team members Garry Peterson, Megan Meacham and Bianca Voicu, as well as Mistra Finbio board member Victor Galaz attended the Natural Capital symposium 2024 at Stanford University on June 4-7th, presenting their report Redirecting Flows - Navigating the Future of the Amazon. The symposium was a great opportunity to present Mistra Finbio research to a diverse set of actors, from researchers working on natural capital and ecosystems services to finance sector professionals working in development banks, national governments, and accounting firms.

Garry Peterson says, “The Natural Capital Project is a great impact partner for Mistra Finbio. It is amazing, the impact that they have had. The symposium demonstrated how nature is entering the mainstream of financial thinking, but also highlighted how much more work still needs to be done.”

Megan Meacham attending the Natural Capital symposium 2024 at Stanford University.

Featured activities

Celebrating Mistra 30 years

To celebrate that Mistra has been making research possible for 30 years, Mistra Finbio participated in the Mistra jubilee tour. We shared our research through Joakim Sandberg in the Biodiversity focused day in Lund the 9th of April. All participants shared the insight that the knowledge about biodiversity needs to increase and we need to understand how we can measure, value and understand the risks if we continue to lose biodiversity.

“On the one hand we need to make clear how important biodiversity is, and what we do not measure does not exist to capital owners. On the other hand, is it impossible to put a price on nature’s value,” says Joakim Sandberg.

Joakim Sandberg at the Mistra jubilee tour.

Accounting conference in Grenoble

Mistra Finbio team members contributed to the EIASM Network interdisciplinary conference on “Intangibles, sustainability, and value creation” in Grenoble. Beatrice Crona held a keynote at the conference together with Professor Anup Srivastava, and Mistra Finbio researcher Shruti Kashyap gave a presentation on moving from single to double materiality as a path towards capturing biodiversity impacts and nature-related risks through corporate disclosures.

“If someone had told me, even a few years ago, that I would be giving a keynote address at an accounting conference, I would have thought it a strange and almost humorous suggestion. But things change,” say Beatrice Crona, emphasizing that this is significant development in two fields that have had little interaction now meeting and exchanging ideas and insights.

Accountants and sustainability scientists need to join forces to tackle the challenge of developing sustainability reporting standards and guidelines. Only then are we likely to arrive at a place where corporate sustainability disclosures can be succinct and not over-burdening, but also meaningful for a range of end-users, and for the planet. “This conference was a great opportunity to both present to, but also learn from, a community that has thought deeply about this for some time, yet was genuinely interested and open to discussion with sustainability science,” Crona says.

COP16

COP16 took place in Cali, Colombia, in November 2024. Juan Rocha, WP leader in Mistra Finbio was at the conference, contributing to discussions and following negotiations.

A main goal was for the parties to agree on indicators for monitoring and measuring biodiversity loss and progress that are comparable across countries.

“We need open data and timely monitoring to understand what policies work and where in bending the curve of biodiversity loss,” says Juan Rocha. “These are important insights from our research, and it felt valuable to bring them to the venue in Cali.”

Mistra Finbio director Garry Peterson reflects on the importance of the COP-process:

”There is strong scientific consensus that the loss of nature is continuing and will have increasing impacts on people. Most people benefit from nature and are losing out from this destruction. Negotiators and other participants at COP16 need to mobilize for nature. This requires establishing robust monitoring, reporting, and synthesis frameworks to track progress and hold actors accountable for their commitment.

Left to right: André Pinto da Silva, Hassan Aftab Sheikh, Giorgio Parlato, Bianca-Ioana Voicu, Sofia Maniatakou

Building Bridges

At the Building Bridges conference, held in Geneva 9-12 December 2024, colleagues from the Mistra Finbio research team actively contributed to discussions on shaping a more sustainable future.

Mistra Finbio’s senior scientific advisor Beatrice Crona presented the scientific point of view in a workshop called “Engaging for biodiversity – how to encourage issuers to transition away from negative impact”, hosted by Pictet Group. Beatrice Crona emphasised the importance of targeted collaboration between scientists and investors to drive impactful biodiversity engagement. The workshop included moderated table discussions, fostering dynamic conversations on key nature finance topics, and facilitating exchange of practical solutions for reducing pressures on biodiversity and working towards a regenerative economy.

Mistra Finbio researchers attended an array of plenary sessions and discussions, delving into broad topics from valuation methodologies for biodiversity credits, disaster risk and nature-positive insurance, the need for improving the regulatory framework to guide financial innovation, and the forthcoming Taskforce on Inequality and Social-related Financial Disclosures (TISFD). Conversations highlighted the interconnectedness of biodiversity, climate, and social justice, with collaboration and knowledge-sharing emerging as critical drivers for progress. Networking events at the conference provided additional opportunities to engage with experts and peers in the field.

Hållbart Näringsliv

Hållbart Näringsliv is a conference organised by Dagens Industri and Aktuell Hållbarhet that gathers influential stakeholders in the Swedish business sector. One of the hottest topics for businesses right now is CSRD – the new reporting directive that will change how companies account for their environmental impacts in a big way. But will it steer us towards business that remains within planetary boundaries?

Mistra Finbio's senior scientific advisor Beatrice Crona presented key findings from the report Doing Business within Planetary boundaries. She stressed the importance of acknowledging the planet as a stakeholder for business.

"We have to measure what counts. If we are serious about remaining within the planetary boundaries, sustainability reporting has to depart from what is essential for the planet. Without an understanding of our impact on these variables we are flying blind in relation to the planet," says Beatrice Crona.

Beatrice Crona presenting at Hållbart Näringsliv. Photo: Elias Ljungberg.

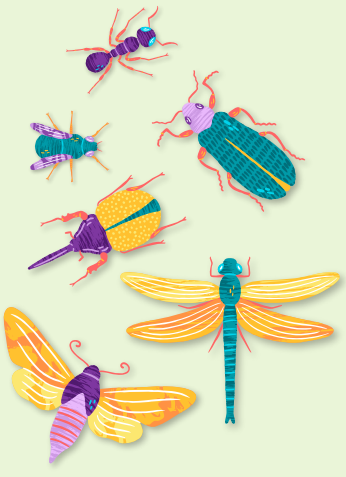
Danske Bank's Responsible investments conference

Mistra Finbio WP leader Mark Sanctuary presented research insights from the programme at a conference for asset managers organized by Danske Bank, focusing on responsible investments. Sanctuary's talk focused on the how fund portfolio allocations impact nature and the climate, presenting new findings from a study on green European equity fund portfolio allocations.

"The study highlights the importance of asking the right questions assessing the accuracy of the "green" claims made by investment funds"," Sanctuary explains. "This further emphasizes the importance of knowledge exchange and the need for improved metrics and assessment tools, which is the aim of Mistra Finbio," he continues.

Symposium at the Swedish Museum of Natural History: Understanding and monitoring insect diversity: the environmental DNA revolution

The Insect Biome Atlas (IBA) was a large-scale insect project aimed at charting the insect faunas of Sweden and Madagascar and their associated microbiomes using high-throughput DNA sequencing of Malaise trap and soil samples. It was funded by the Knut and Alice Wallenberg Foundation during 2019-2024. At this symposium key results from the project were shared. Fredrik Ronquist, as one of the PI's, gave several talks where one was "Evaluating methods for measuring biodiversity impact using IBA data". There he presented WP1 of FinBio, and how we use the IBA data as reference data and insights for our pilot projects and our methods evaluation.



World biodiversity forum in Davos

The World Biodiversity Forum in Davos has seen its first ever session on Finance and Biodiversity. This is a welcome addition to the programme, judging from the number of people in the room. The topic attracted attention. Mistra Finbio was happy to be part of the World Biodiversity Forum and give two presentations "Opportunities and barriers to achieving environmentally sustainable investments" with Beatrice Crona and "Land-use following a middle-road socio-economic pathway (SSP2) is not enough to recover mammal populations in Southern-Asia" with André Pinto da Silva

"Financial practitioners and biodiversity scientists are beginning to have a conversation at scale, and that is positive. However, it was clear from discussions that the demand from the corporate and financial sector for easy-to-use metrics, tools and procedures, still sits uncomfortably with the scientific community, given the complexity and divergent ways of conceptualizing and measuring biodiversity. We still have a lot to learn, from both sides. I believe it can be done, and I think the dialogues, collaborative learning and hopefully co-design of usable concepts and tools emerging from the Mistra Finbio programme are a testament to that," says Beatrice Crona.

Learnshops

In 2023 we launched the concept Mistra Finbio Learnshops where we convene the research and impact partners to dive into core concepts, central to understanding how to assess anthropogenic impact on nature and biodiversity, and to evaluate economic dependencies on nature. The role of the learnshop series is to create broad understanding across the Mistra Finbio programme.

During 2024 we have continued with Learnshops and have hosted another 5 learnshops on global biodiversity model for policy support (GLOBIO), life-cycle assessment (LCA), Group on Earth Observations Biodiversity Observation Network (GEO BON), footprinting approaches, and Exploring Natural Capital Opportunities, Risks and Exposure (ENCORE). The learnshop sessions provide a space for learning and discussions between researchers and practitioners and also helps situate Mistra Finbio and our research in the broader nature and finance space. They also serve to educate Mistra Finbio researchers and partners alike in the science, theory and practice behind some of the rapidly growing biodiversity impact assessment tools on the market.

Reflecting on the interactions between impact partners and Mistra Finbio, Programme Manager Megan Meacham comments "Bringing together tool developers, experts, and practitioners in a collaborative setting has been invaluable. The Learnshops create a rare space where we can openly discuss methodologies, challenges, and applications—helping to bridge the gap between research and practice in biodiversity impact assessment."

Science is Essential to Strengthen and help simplify EU Sustainability Reporting Standards

The European Union is at a crossroads as it embarks on a revision of its corporate sustainability reporting standards, as part of the "Omnibus simplification package" due to be published in Feb 2025. These rules determine how businesses disclose environmental impacts and concomitant risks, and in doing so they shape the information available to investors and regulators.

In an open letter, Mistra Finbio researchers, along with many other scientists, accountants, and sustainability experts from leading EU research institutions with backgrounds in environmental science, economics, and corporate reporting proposed Five Science-Based Principles for Better Sustainability Reporting:

1. Streamline Disclosures Using Science.
2. Standardize Mandatory Disclosures.
3. Prioritize Environmental Degradation Drivers.
4. Ensure Stability and Predictability.
5. Foster Collaboration with Scientists.

Transparent, science-based disclosures help businesses, investors, and regulators align with global climate and nature goals and can provide the data necessary to assess and mitigate the rising nature-related risks we see evidence of in already today - whether it is Californian wildfires, increasing frequency and intensity of European hail storms that damage crops and property, droughts and heatwaves that reap human lives and disrupt transport and production. By embracing science-based reforms and resisting efforts to dilute these standards, the EU can strengthen its leadership in sustainability, and ensure EU economic activity is future-proofed and benefits both people and the planet.

Business models for biodiversity workshop

Mistra Finbio hosted a workshop at Stockholm Resilience Centre on the topic "How can we create business models for biodiversity?"

The workshop was initiated by Work Package 1 with participants from Naturhistoriska riksmuseet, Stockholm Resilience Centre, Svensk Kolinlagring, Axfoundation, Bona Gård, IVL Svenska Miljöinstitutet, Kungliga Tekniska högskolan and Nordea.

"Building on the ongoing pilot project between Mistra Finbio WP1 and Svensk Kolinlagring, we are now exploring ways to integrate biodiversity data into a compelling business case," says Emma Granqvist.

"We were fortunate to have an exceptional group of participants at the workshop, offering diverse perspectives in sustainable agriculture, biodiversity, and finance. While several promising approaches have emerged in our discussions, we recognize that many aspects of this evolving market remain in flux. It will be exciting to both observe and actively contribute to the development of biodiversity markets going forward," she concludes.

Financial Ethics for a Sustainable Future

Researchers from WP6 organized a panel on “Financial Ethics for a Sustainable Future” at the *14th Braga Meetings on Ethics and Political Philosophy*, at University of Minho, Portugal, 26-28 June 2024. This is one of the major international conferences in the field of ethics and political philosophy. The panel featured presentations by several Mistra Finbio researchers: Richard Endörfer, Joakim Sandberg, Eliza Nobles and Mattias Gunnemyr. The topics mainly concerned the responsibilities of individuals and policy makers with regards to sustainable finance.

Mark Sanctuary presenting his research findings.

Economy and nature at Svenskt Näringsliv

Mistra Finbio WP leader Mark Sanctuary was invited to present research findings at an event on economy and nature, organized by Svenskt Näringsliv. For an audience of about 100 business people he gave a talk on how physical nature and climate risks relate to business.

“Clear insights are emerging from scientific studies on the connections between climate and nature related risks - exacerbated by human activity – and how these risks directly impact business operations and financing,” Sanctuary explains. “Understanding these connections is important for the sake of both nature and the economy.”

Workshop on Business and Biodiversity

In December, 13 Swedish biodiversity researchers gathered at Ekenäs herrgård, to discuss “Emerging Methods for Business & Biodiversity” for two days. Fredrik Ronquist, Robert Goodsell from WP1 and André Pinto da Silva from WP2 took part in the workshop with participants from diverse backgrounds – academic research, museums, databases, research infrastructure, nature tech, the private sector, and public agencies. The main goal was to produce a shared perspective and framework that provides an overview of the entire information flow, from raw biodiversity data into data products and actionable solutions for businesses.

The insights from this workshop is the basis for a review article, entitled “The Business Case for Investing in Biodiversity Data”.

Our work packages - research activities in Mistra Finbio

Themes		Work packages
1	Connecting biodiversity to finance Data collection, practical & diverse metrics	1 Biodiversity data and metrics 2 Capturing complexity
2	Financing systemic change Identifying & developing novel methods for funding natur-positive solutions for corporate & financial actors	3 Biodiversity markets 4 Diagnostic tools for complex decision making 5 Alternative pathways
3	Biodiversity finance governance & risks Trade, history & ethical considerations	6 Biodiversity finance governance 7 Biodiversity-related financial risk
4	Transforming practices Pilots & experiments with Impact Pratners	8 Testbed for novel approaches

Mistra Finbio thematic and work package structures

Theme 1: Connecting biodiversity to finance

There is growing interest in the state of biodiversity across the corporate world, and a range of methods have emerged both for data collection and impact assessment. However, developing reliable metrics for biodiversity, in lieu of easy-to-grasp proxies, is a challenge. Often it is difficult to verify claims in terms of accuracy and biases.

In order to understand how changes in biodiversity impact financial systems, we need to understand how social-ecological interactions shape biodiversity and, in turn, how changes in biodiversity impact human wellbeing and economic activity, generating knock-on effects within the financial system.

Within the 'connecting biodiversity to finance' theme, the focus is on testing and analysing different ways of measuring and describing biodiversity and its connection to finance. This theme consists of two work packages: work package 1 (WP1) led by Fredrik Ronquist and work package 2 (WP2) led by Juan Carlos Rocha.

WP1: Leveraging Environmental DNA (eDNA) for Biodiversity Monitoring

WP1 focuses on advancing eDNA methodologies to track biodiversity. The objective is to develop robust and scalable techniques that move beyond assessing rare or charismatic species, instead adopting a holistic approach to measure biodiversity at large. These methods could then be used to inform business impact assessments, land management practices, and biodiversity-related investments.

In 2024 WP1 conducted an analysis on the potential of eDNA for corporate biodiversity impact assessments, emphasizing the need to integrate a broader set of Essential Biodiversity Variables (EBV's) and promote open methods and data.

WP 1 lead: Fredrik Ronquist, Swedish Museum of Natural History

WP1 is also scaling up EBV assessment using model-based predictions from earth observation and large-scale biodiversity inventory data. This project will evaluate predictive applications and contrasts that with large scale collection of raw biodiversity data.

WP1 also ran its main pilot study in collaboration with Svensk Kolinlagring to assess impact on biodiversity from agricultural practices and help build a business case for biodiversity-friendly practices. Highlights from the year include the kick-off of eDNA sampling in May that saw researchers working directly with farmers and soil experts in the field, and a joint workshop on business models in December that brought together industry stakeholders, researchers, and practitioners to strengthen interdisciplinary collaboration. There has been notable interest in the project and its results from the corporate sector, particularly in Swedish agriculture. WP1 is now engaged in planning a symposium at the Royal Swedish Academy of Agriculture and Forestry (KSLA) to strengthen outreach efforts.

Over the year, engagement with the Swedish Crop Protection Council has highlighted the potential of eDNA in sustainable pest management strategies, while collaboration with museums has stressed the importance of digitizing collections to expand reference libraries for improved analyses.

During 2024, the work of WP1 has focused on completing data collection and processing this data. This work will now provide the foundation for the analysis and evaluation of eDNA, Earth Observation data and traditional biodiversity monitoring in the next stage of the project. As the data collection stage is now complete, and the final elements of sequencing will be completed in Spring 2024, quantification methods for eDNA are being developed and further tested on real datasets. Additionally, at least two suitable pilot projects for testing eDNA methods have been identified. Researchers from WP1 contributed to a white paper published by FinBio's impact partner Pictet Asset Management, underlining the importance of measuring impact on biodiversity and presenting eDNA as a potential way forward.

WP2: Modeling Biodiversity Impacts and Systemic Risks

WP2 develops and tests models linking biodiversity changes to systemic risks, including disruptions to ecosystem services and financial stability. The goal is to create tools capable of assessing how local biodiversity impacts, such as those from land-use changes, cascade into broader ecological and economic consequences.

In 2024 a prototype model was developed to study biodiversity changes across landscapes, enabling "what-if" scenarios for industries such as mining. This global assessment aims to identify areas where landscape modifications are most detrimental to biodiversity.

A preprint article under review, examines the role of financial actors in marine biodiversity tipping points. These research findings contribute to the understanding of financial exposure to ecological risks.

WP2 leader Juan Rocha participated in COP16 in Colombia contributing to discussions on biodiversity financing. Rocha had the opportunity to emphasize the gap in addressing biodiversity tipping points within economic and financial planning – a niche that Mistra Finbio is well-positioned to address.

WP2 lead: Juan Carlos Rocha, Stockholm Resilience Centre

Pilot study with Svensk Kolinlagring - eDNA data from regenerative farms

Measuring Biodiversity in Agricultural Land with Environmental DNA (eDNA)

Mistra Finbio is developing methods to measure biodiversity using environmental DNA (eDNA). The goal is to establish a biodiversity measurement system that extends beyond species lists to include aspects such as genetic variation, species richness, ecosystem services, and overall ecosystem resilience.

In 2024 a key part of this work was a pilot study in collaboration with Svensk Kolinlagring, focusing on monitoring the impact of agricultural practices on biodiversity.

The pilot project involves intensive biodiversity monitoring on eight fields in southern Sweden—four from farms participating in Svensk Kolinlagring's programme and four from neighboring farms serving as a control group. The ultimate goal is to develop a biodiversity index that links biodiversity-positive outcomes to carbon sequestration efforts, enabling businesses and investors to support biodiversity-enhancing agricultural practices.

Svensk Kolinlagring is an organization that works to enhance carbon sequestration in Swedish agriculture while improving soil health and food system sustainability. The programme connects farmers interested in increasing soil carbon storage with organizations willing to invest in these efforts.

Methodology

The use of eDNA allows researchers to extract and analyze DNA from various environmental sources, such as soil, water, air, and insect samples, making it possible to track and map changes in biodiversity. Advances in eDNA technology over the past decade have significantly improved the accuracy and cost-effectiveness of these analyses.

Sampling took place between May and August 2024. Farmers collected weekly insect samples using Malaise traps and took monthly soil samples. These DNA samples are now being sequenced and analyzed. The

Maria Lundesjö (Torsåker farm, Axfoundation), Natalie Danielsson (IVL) and Emma Grankvist (Swedish Museum of Natural History) putting up a Malaise trap for collecting insect samples.

objective is to refine the sampling methodology, ensuring that biodiversity data can be effectively used as a basis for financial and policy decisions.

“This approach will help researchers evaluate how farming practices influence soil biology and biodiversity,” says project leader Emma Granqvist, from the Swedish Museum of Natural History.

From autumn 2024 through spring 2025, researchers will sequence and analyze the collected data, comparing biodiversity changes in fields with enhanced carbon sequestration practices to those in control fields. Rather than accounting for every possible variation, the goal is to develop a replicable method for measuring biodiversity over time, allowing for long-term monitoring of changes.

Conclusion

This pilot study will provide valuable insights into how eDNA can be used to monitor biodiversity in agricultural landscapes. The results, expected in 2025, will contribute to the development of business models that support investments in biodiversity-enhancing land management.

With scalable and reproducible eDNA methodologies, agriculture could become a key sector in funding biodiversity monitoring and conservation – provided the right financial mechanisms and incentives are in place. By combining scientific research with financial expertise, Mistra Finbio aims to be a catalyst for a more sustainable, nature-positive future, within the agricultural sector.

Theme 2: Financing systemic change towards sustainability

There is an urgent need for transformative change that reverses biodiversity loss and degradation of nature. The financial sector is pivotal in generating and directing capital to support this change, but currently faces a three-fold challenge regarding transformation: a lack of reliable market architecture, insufficient payment mechanisms, and shortage of funding. For finance to successfully support nature-positive change there is also a need for suitable performance indicators and incentive structures.

The 'financing systemic change towards sustainability' theme focuses on exploring, developing and supporting a shift in the financial architecture toward structures, metrics and pathways that support biodiversity both now and in the future. The theme is made up of three work packages: work package 3 (WP3) led by Ben Caldecott, work package 4 (WP4) led by Beatrice Crona, and work package 5 (WP5) led by Garry Peterson.

WP3: Biodiversity Markets

WP3 focuses on understanding the requirements for financial institutions to mobilize capital for nature recovery. This work has provided deeper insights into the barriers to mobilizing nature recovery projects and the role of asset location data in nature-related risk analysis.

WP3 Lead: Ben Caldecott, Oxford Sustainable Finance Group

In 2024 research findings in WP3 have resulted in two draft papers—one on finance architecture for nature recovery and another on asset location data for nature-related risk analysis.

As collaboration across Mistra Finbio work packages has strengthened, WP3 has worked closely with WP1 and WP4 on spatial finance topics, including earth observation data for biodiversity monitoring and risk assessment. Among other meetings, the Oxford Sustainable Finance Group hosted a workshop for Mistra Finbio team members from other work packages. This collaboration led to a review article, a whitepaper on asset location data sources for nature finance, a joint funding proposal with SRC, and a proposal to develop a Mistra Finbio nature risk case study for central banks in WP8.

Research into the diversity of funding models for nature recovery has identified key differences in risk-return dynamics and potential benefits to biodiversity. Moving forward, the WP3 team is actively investigating causal links to inform the design of biodiversity markets and nature-positive funding mechanisms.

WP4: Policy and Corporate Engagement

WP4 aims to make Mistra Finbio research more accessible through pilot projects, events, and thought leadership presentations. In 2024 this work culminated in the launch of the report Doing Business within the Planetary Boundaries in November at the Norrsken Impact Week in Barcelona. The report synthesizes core Mistra Finbio research themes into a single resource and since the launch in November it has been presented at several different events.

WP4 lead: Beatrice Crona, Stockholm Resilience Centre

WP4 also continued the development of the ESI tool, launched in 2023, piloting it with Mistra Finbio impact partner VC2050.*

* Crona, B., Parlato, G., Lade, S., Feltzer I., & Maus, V. (2023) Going beyond carbon: An "Earth System Impact" score to better capture corporate and investment impacts on the Earth system, SSRN 2023

In 2024, WP4 leader Beatrice Crona contributed to AP7's Deforestation and Biodiversity report. She was also nominated to provide scientific feedback on Nature Action 100 activities, with the goal of co-producing outputs in 2025.

At the conference Building Bridges Mistra Finbio team members were invited to present an upcoming investor guidance and to host a Mistra Finbio research roundtable.

Moving forward, WP4 has an active collaboration with WP7 to gather data and refine their research focus on the research on compound climate/nature related risks to the economy.

WP5: Finance and Biodiversity Futures

WP5 uses scenarios and other futures methods to examine what novel risks and opportunities emerge in the interface between finance and biodiversity now and in the future, and develop scenarios of alternative pathways forward for finance and biodiversity.

In 2024 the team focused on horizon scanning and testing multiple methods for imaging futures that align finance with sustainability goals. This included exploring how financial systems can better integrate nature and biodiversity considerations. A key area of focus was advancing the IPBES Nature Futures Framework and connecting it to Nature Positive investment, creating actionable pathways for aligning financial practices with global biodiversity objectives.

In 2024 Bianca Voicu joined WP5 as a PhD student after finalising her master's thesis, based on which a research paper analyzing innovative initiatives combining nature and financial innovations has been submitted: *Towards Transformation in Finance: Seeds for New Pathways*.* Her work as a PhD student focuses on linking the IPBES Nature Futures Framework to Nature Positive investment. Ongoing in WP 5 is work to compare existing Nature Positive definitions to the Nature Futures Framework, with findings to be submitted in 2025.

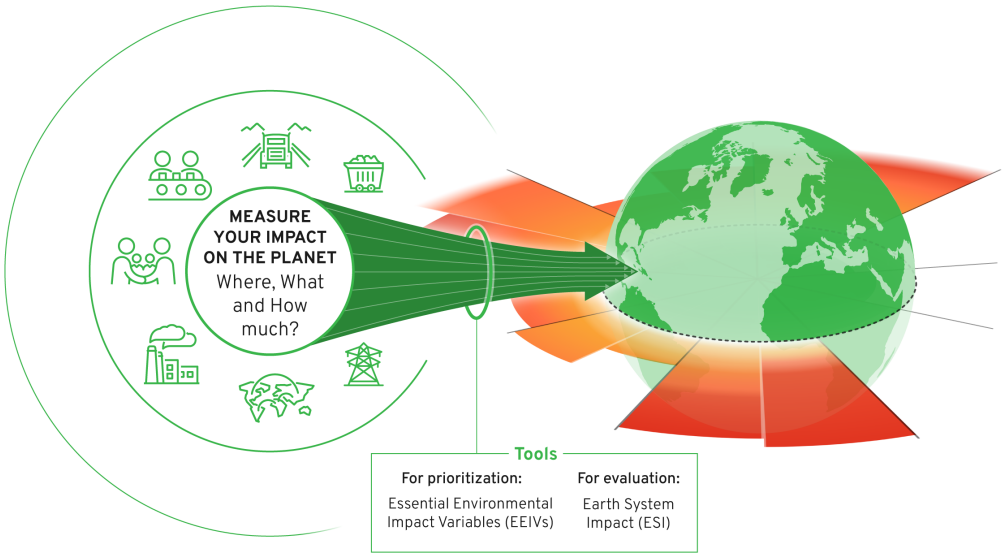
WP leader Garry Peterson presented Mistra Finbio research on finance transformation and biodiversity at the Natural Capital Symposium in Stanford in June 2024. Several Mistra Finbio team members attended the symposium, contributing to discussions with diverse international participants working in development banks, in finance, and on ecosystem services.

WP5 visited the Oxford Sustainable Finance Group in February to discuss new frameworks for integrating nature and finance, facilitated workshops at the annual Mistra Finbio meeting and conducted cross-programme interviews to refine mental models. This feeds into the system mapping and scenario work that improves overall understanding of the financial sectors interlinkages with biodiversity.

WP5 lead: Garry Peterson, Stockholm Resilience Centre

* Voicu, B-I., Meacham, M., Peterson, G. Towards transformation in finance: seeds for nature-positive futures.

Doing Business within Planetary Boundaries



Businesses and investors can play a key role in addressing the climate and nature crisis. But this calls for a shift in practices to measure corporate activities based on what really matters for the health of the planet. This is reflected in the report "Doing business within planetary boundaries" that was launched during the Norrsken Impact week in Barcelona.

The report argues that by anchoring corporate activities in the scientifically developed planetary boundaries framework, businesses can be drivers of transforming societies towards sustainability. But this calls for having full and accurate information about corporate environmental performance.

"What gets measured gets done," says Beatrice Crona.

In an emerging corporate reporting landscape, shaped by EU's CSRD framework, the new report offers guidance to businesses, investors, and policymakers to significantly improve the reliability of their assessment of nature-related impacts, risks and opportunities.

In the EU, reporting according to the CSRD-regulation becomes mandatory for large companies from 2025. The report, however, shows that sustainability reporting practices still focus too much on the company perspective, and not on what is material for the environment.

"What is needed is a shift in perspective, from company to the planet. Reporting should include absolute and location-specific data of the aggregated environmental impact of all the company's activities," says Emmy Wassénius, researcher and co-author of the report.

To support this shift, the report introduces "Essential Environmental Impact Variables" (EEIVs).* They capture the most essential environmental impact of companies in a standardised manner. These impact disclosures must account for where, what, and how much impact happens. Armed with this information, companies and their investors can gain a vastly more accurate insight into their impact and the resulting risks.

The report also presents the Earth System Impact score (ESI).† A science-based tool that offers a way for companies and investors to move beyond impact metrics focused primarily on carbon, and delivers a means to understand and communicate the global effect of their local impacts.

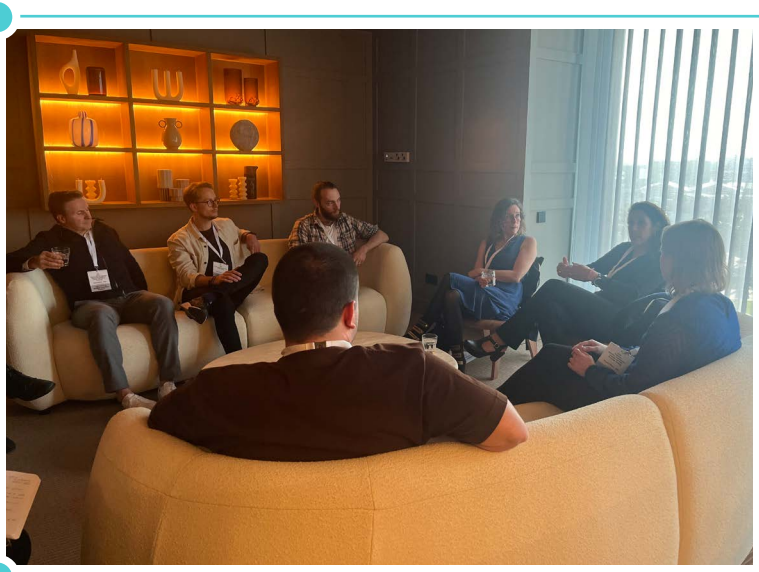
* Wassénius, E., Crona, B., & Quahe, S. (2024). Essential environmental impact variables: A means for transparent corporate sustainability reporting aligned with planetary boundaries. One Earth, 7(2), 211–225.

† Crona, B., Parlato, G., Lade, S., Feltzer I., & Maus, V. (2023) Going beyond carbon: An "Earth System Impact" score to better capture corporate and investment impacts on the Earth system, SSRN 2023

The ESI-score can aid investors in their company engagements by identifying key areas for improving environmental performance and facilitating the development of strategic plans to enhance sustainability.

“Accounting for the amplified effects of the interactions between climate, land and water resources improves our understanding of the systemic impact of corporate activities on the Earth System,” says Giorgio Parlato, researcher and co-author of the report.

The report was launched at Norrsken Impact Week in Barcelona to a community of impact investors, startups and business representatives with sustainability at its core. The presentation of the report and its content was well received with multiple stakeholders reaching out afterwards to learn more and engage with our research.



Left to right: Giorgio Parlato, Emmy Wassénius, Lisen Schultz, Beatrice Crona, Per Olsson, Johanna Gustafson, Marcus Lundsted

Theme 3: Governing biodiversity finance and identifying biodiversity-related risk

Finance plays a crucial role in supporting biodiversity, but even well-intentioned interventions can generate unintended negative side effects that need to be identified and mitigated. Simultaneously, biodiversity loss poses significant, yet poorly understood, risks to economies and the finance sector. To develop effective governance systems for biodiversity finance, these challenges must be addressed. The 'governing biodiversity finance and identifying biodiversity-related risk' theme focuses on closing these knowledge gaps. It consists of two work packages: WP6, led by Joakim Sandberg, and WP7, led by Mark Sanctuary.

WP6: Governance Structures and Ethical Risks

WP6 evaluates the ethical risks associated with biodiversity finance and explores governance structures to mitigate them. The focus in 2024 has been on the ethical implications of biodiversity measurement metrics used by companies and investors.

WP6 lead: Joakim Sandberg, University of Gothenburg

Researchers in WP6 have examined the ethical and normative assumptions underlying biodiversity metrics across conservation focal areas. They have also identified misleading claims in biodiversity finance and the need for tailored regulatory frameworks to address greenwashing risks. The research has resulted in two papers that will be published as part of a special issue in Current Opinion in Environmental Sustainability in early 2025.

These findings were presented at major conferences, including a workshop on "Financial Ethics for a Sustainable Future" at the Braga Meetings on Ethics and Social Philosophy in June. The findings in the two papers draw heavily on collaboration with other work packages in Mistra Finbio.

WP 6 team members also participated in the Nordic Environmental Ethics Winter Symposium in Umeå, the Justice in Finance for Climate Change Adaptation workshop in Berlin, and the Swedish Congress of Philosophy in Gothenburg.

WP7: Nature related physical and transition risks

WP7 investigates biodiversity-related risks to investors, with a focus on transition and physical risks. In 2024, research in WP7 has progressed on two key tasks: analyzing the effects of international investment agreements (IIAs) on stranded investments and exploring compound climate- and nature-related risks to the economy.

WP7 lead: Mark Sanctuary, IVL

WP7 researchers have in 2024 studied international investment flows, biodiversity indicators, and stranded investments. In this work they have strengthened their collaboration with WP1 and WP2 to gain insights on biodiversity indicators and biodiversity impacts for extractive activities. They have also connected with experts from IUCN through the Mistra Finbio network. This expanded and deepened collaboration has fostered important interdisciplinary insights and helped advance the work on biodiversity-related financial risks.

Building on the work in WP7 Mark Sanctuary received a 2.2 MEUR grant for looking at how Nature Based Solutions can be used to mitigate climate risks.

Investment agreements as a threat to biodiversity

Phasing out investments in activities that drive the loss of biodiversity is necessary to prevent further deterioration. However, foreign investments are often protected by investment treaties. In a 2024 study, Mistra Finbio researchers Mark Sanctuary, Henrik Horn and Axel Lavenius identify the countries where biodiversity appears to be most threatened by these treaties.

Globally there are more than 2,600 international investment treaties that protect foreign-owned activities - some of which are harmful to nature and biodiversity. These treaties protect investments between partner countries from public measures, and often grant private investors the right to initiate dispute resolution processes against host countries regarding treaty compliance.

“There is widespread concern that the compensation claims often associated with these treaties may discourage host countries from implementing desirable policy measures, making them an obstacle to phasing out harmful activities” explains Henrik Horn.

The study “Investment Treaties and the Threat to Biodiversity” identifies the countries for which bilateral investment treaties appear to pose the greatest threat to biodiversity protection, as well as the most problematic treaties.

“Biodiversity conservation is going to require a phase-out of harmful economic activities. But some of the assets that need to be phased out are foreign owned, which means they may be covered by certain international investment agreements. In our research we want to understand to what extent these international agreements interact with efforts to protect nature - and to what extent they hinder or can support the protection of nature,” says Mark Sanctuary.

The study assumes that problematic treaties combine three characteristics: they can be interpreted as (1) granting extensive investment protections for

(2) significant stocks of foreign investments in (3) countries with sensitive biodiversity.

Middle-Income Countries get the short end of the stick

The study finds that the threat from investment treaties does not primarily affect the world's richest or poorest countries. The wealthiest nations often have many treaties that protect large investments, but they have less sensitive biodiversity according to an index based on the data used to compute the Red List index. The least developed countries sometimes have sensitive biodiversity, but they usually receive small amounts of foreign investment and have few treaties.

Instead, investment treaties pose the greatest threat to biodiversity in 12 middle-income countries: Argentina, Chile, Colombia, the Philippines, China, Malaysia, Mexico, Papua New Guinea, Panama, Peru, South Africa, and Vietnam. These countries are among the 30 nations with the most threatened biodiversity out of 254 countries, according to the index. At the same time, their inflexible treaties protect foreign investments amounting to at least USD 2 billion.

The study also identifies the 44 most problematic treaties, which are characterized by being inflexible and protecting at least USD 1 billion in investments in countries that rank among the 30 most biodiversity-sensitive nations out of 254. One of these treaties is the one Sweden has with South Africa.

Theme 4: Initiation and coordination of transformation processes

Mistra Finbio ultimately aims to support real innovation in and transformation of financial markets, in relation to biodiversity. We seek to transform current practices by developing new and innovative instruments for capturing and addressing biodiversity. To ensure that the research outcomes are useful in practice we are working with seven carefully selected impact partners operating in different parts of the financial system.

The fourth theme, 'initiation and coordination of transformation processes', consists of work package 8 (WP8) led by Megan Meacham.

WP8

WP8's main aim is to take 'late-stage' ideas and outputs, particularly from WP4, and to facilitate testing research outputs with impact partners. The insights and outcomes from piloting and prototyping will also feed back to the other work packages to inform the continued development of scientific theories and methods.

WP8 also plays a central role in coordinating cross-programme communication and facilitating collaboration across work packages. The Mistra Finbio in-person meeting in September was a highlight of the year, where our growing team got to spend two days sharing ideas and workshopping to support the development of new and deeper insights. In 2024 WP8 developed a guidance tool for investors with WP4 and began piloting the tool with several impact partners. The tool is planned to be released in 2025.

WP8 has also initiated work on clarifying and refining the definition of "Nature Positive" in collaboration with other work packages.

The Mistra Finbio learnshops are coordinated by WP8, and in 2024 we organized four of them on the themes: footprinting, Life Cycle Assessment, GEOBON, and GLOBIO.

WP8 lead: Megan Meacham, Stockholm Resilience Centre

Redirecting investments for a just and resilient Amazon

The Amazon Basin stands at a critical juncture: Pressing environmental challenges on one hand, and immense potential for transformative change on the other. The financial sector has a vital role to play in that transformation.

Biodiversity serves as the foundation for economic prosperity and human well-being. But around the world, loss of biodiversity due to human activities, such as deforestation and wildlife trading, threatens food security, water quality, health, and security.

The financial sector plays a significant role in driving biodiversity loss by funding extractive activities that result in direct and systemic socio-economic risks, which can trigger instability across businesses, markets and livelihoods.

This is the backdrop of the report "Redirecting Flows – Navigating the Future of the Amazon", which was published in spring 2024.

"This new report tries to identify ways in which we could better align international financial activities with the health of the Amazon to avoid destabilizing it in ways that pose risks to the entire financial system; and rather invest in building a sustainable Amazon that supports people within and outside of the region," says Centre researcher Garry Peterson, Mistra Finbio programme director and one of the co-authors of the report.

One particular area of concern is the Amazon rainforest, which is home to around half of the world's remaining rainforests and a significant portion of global biodiversity. There is evidence of a potential "Amazon dieback", where the rainforest could transition to a drier, more degraded state due to reduced moisture recycling and increased droughts. The consequences could be dire. If wide-scale dieback was to occur, the Amazon rainforest could release significant amounts of CO2 into the atmosphere, exacerbating global warming and regional climate impacts.

The financial sector would not be shielded from this. A potential 'tipping' of the Amazon rainforest can be considered a "green swan event", posing significant financial risks with wide-ranging social, economic, and ecological implications.

The report outlines the transformative role investments can play. Equity, loans and bonds provide pathways for investors to influence corporate policies and actions. Mobilizing such financial influence can complement governmental efforts by engaging with the corporate sector to advance financial transparency and support a resilient planetary health agenda.

"By adapting investments towards sustainable practices, we can ensure financial stability long into the future while supporting ecological health," explains Centre researcher Megan Meacham, co-author of the report.

The report "Redirecting Flows – Navigating the Future of the Amazon" is the result of a collaboration between the Natural Capital Project (Stanford University), Mistra Finbio at Stockholm Resilience Centre (at Stockholm University) and the Inter-American Development Bank Lab (IDB Lab).

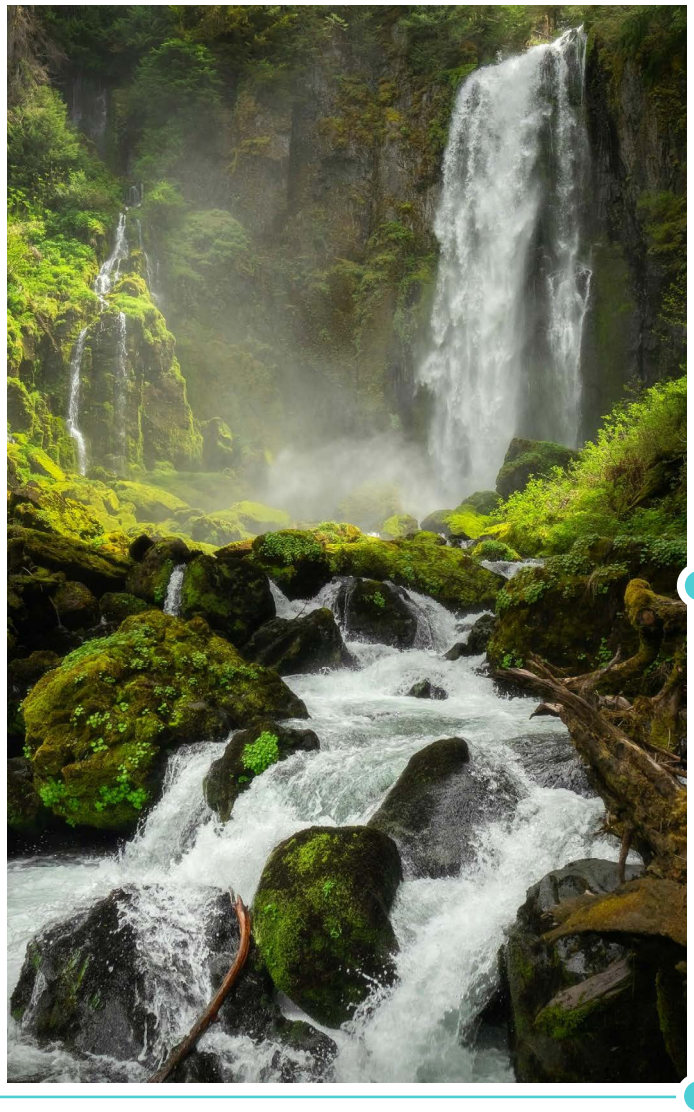
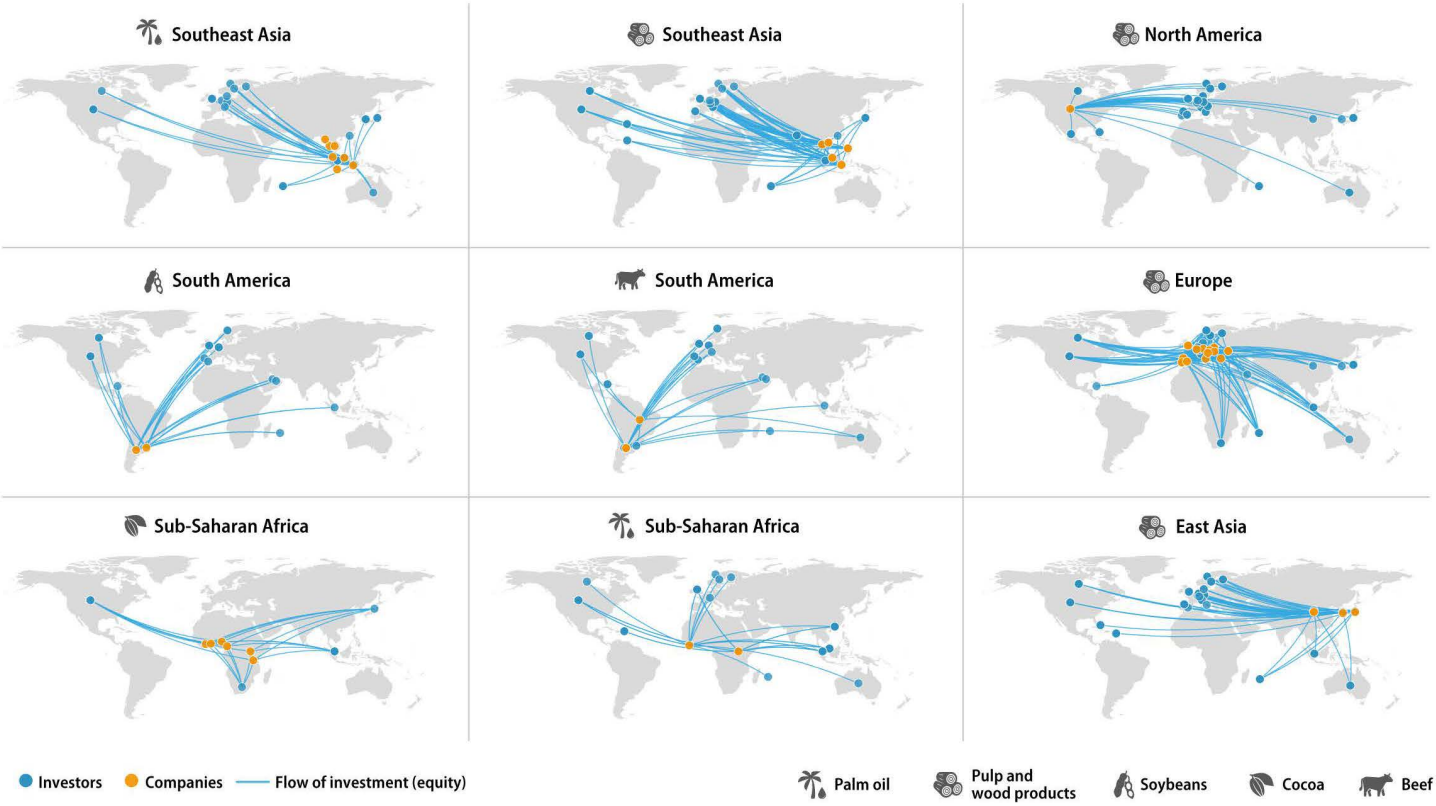


Photo: Divulgação (CC BY-NC-SA 2.0)



Global connections of investments through equity. Financial investments shape the biosphere, and as a result also emerging and re-emerging disease risks through investments in economic sectors associated with anthropogenic land-use changes in known zoonotic disease "hotspots". The figure includes N=54 companies and shows the global characteristics of such investments in the nine selected regional case studies, as well as the respective investment size through equity in USD. Purple nodes are where companies and investors overlap geographically. Note that the figure is a simplified databased animation based on (Galaz, V., J. C., Rocha,. P. Sanchez et al. 2023. "Financial dimensions of zoonotic disease risks: an integrative analysis of financial influence and emerging and re-emerging infectious disease". Lancet Planetary Health).

Navigating uncertainty – science, policy and the future of nature-related finance

The geopolitical landscape is changing rapidly. In the US, prioritization of sustainability issues has been reduced since the election of the new president and in the EU a new Omnibus package will be presented in early spring 2025. This legislative initiative is aimed at streamlining and consolidating various regulatory frameworks to improve consistency and efficiency across member states. While some see this as an opportunity to enhance sustainability regulations, others warn that it could lead to a dismantling of existing rules and reporting requirements in the name of simplification and reducing bureaucratic burdens.

Currently, we do not know how the regulatory landscape relating to sustainability issues will develop, but events around the world show that the notion of nature-related risks has never been more topical. Recent wildfires in California and the 2024 summer heatwaves and floods in Europe are only a few examples of impacts on our societies and economies that are directly related to the changing dynamic of climate and ecosystems.

For Mistra Finbio this means that we will continue to work on doing research that in different ways can help companies and investors better understand their nature-related impacts and risks.

Given the fundamental importance of data for any decision-making our research will continue to elucidate how environmental science can contribute to improved corporate and financial disclosure of biodiversity-relevant impacts. Such data are fundamental for also understanding and assessing risks that stem from a degraded biosphere. Together this research will give companies and investors a broad knowledge base, ranging from disclosures to various forms of impact and risks assessment, that can support them regardless of the particular outcomes of current institutional flux.

Corporations have often called for consistency - welcoming a change in regulation and policy so long as it is for the long term. As the policy landscape experiences some turbulence, we will work hard to provide scientifically based and applicable tools that can guide investors and corporations towards nature positive, long-term business outcomes.

Beatrice Crona
Senior scientific advisor

Financial summary

Mistra Finbio started in September 2022. Its total funding from Mistra over a four-year period amounts to 50 MSEK. In addition, the programme receives co-funding from its impact partner Pictet Asset Management amounting to 5 MSEK over the four years.

A total of 5 MSEK was set aside in a strategic reserve from the start of the programme. The strategic reserve is meant to allow the programme board to act on unforeseen, emergent research tracks and activities that show promise and potential. In 2024 1,38 million SEK from the strategic reserve was placed towards running a pilot project under WP1 together with Svensk Kolinlagring (read more about this project on page 21).

The main budget posts for 2024 were salaries and overhead costs. Salary costs have doubled in comparison with year one as more researchers have been recruited both as PhD students and post-docs. The total budget for the first two years show an underspending compared to the plan, but is on target for completion.

Expenditure 2024	SEK
Salaries	8 216 856,85
Overhead cost	2 875 899,80
External services (including subcontracters)	2 321 117,50
Workshops	146 478,22
Travel	657 287,93
Material	144 428,70
Other Costs	28 107,32
Total	**14 390 176,32**

Appendices

Mistra FinBio Scientific Network

- ***Programme office***

Garry Peterson, Programme Director, Work Package 5 Lead, *Stockholm Resilience Centre*

Beatrice Crona, Senior Scientific Advisor, Work Package 4, *Stockholm Resilience Centre*

Megan Meacham, Programme Manager, Work Package 8 Lead, *Stockholm Resilience Centre*

Johanna Gustafson, Communications Manager, *Stockholm Resilience Centre*

Marika Haeggman, Communications Officer, *Stockholm Resilience Centre*

- ***Work Package leaders***

Fredrik Ronquist, Work Package 1, *Swedish Museum of Natural History*

Juan Rocha, Work Package 2, *Stockholm Resilience Centre*

Ben Caldecott, Work Package 3, *Oxford Sustainable Finance Group*

Joakim Sandberg, Work Package 6, University of Gothenburg

Mark Sanctuary, Work Package 7, *IVL Swedish Environmental Research Institute*

- ***Researchers***

Hassan Aftab Sheikh, Researcher, *Oxford Sustainable Finance Group*

Boudewijn de Bruin, Professor, *University of Groningen*

Christophe Christiaen, Research Coordinator, *Oxford Sustainable Finance Group*

Natalie Danielsson, Research Assistant, *IVL Swedish Environmental Research Institute*

Jean-Pierre Didier Constant, Research Assistant, *Royal Swedish Academy of Sciences*

Richard Endörfer, Deputy Researcher, *University of Gothenburg*

Hjalmar Funke, Research Assistant, *Royal Swedish Academy of Sciences*

Robert Goodsell, Researcher, *Swedish Museum of Natural History*

Emma Granqvist, Researcher, *Swedish Museum of Natural History*

Mattias Gunnemyr, Postdoctoral Researcher, *University of Gothenburg*

Henrik Horn, Researcher, *Research Institute of Industrial Economics*

Henrik Johansson, Researcher, *IVL Swedish Environmental Research Institute*

Shruti Kashyap, Researcher, *Stockholm Resilience Centre*

Maganizo Kruger Nyasulu, Researcher, *Oxford Sustainable Finance Group*

Axel Lavenius, Data Science Researcher, *IVL Swedish Environmental Research Institute*

Dario Marone, Research Assistant, *Royal Swedish Academy of Sciences*

Divya Narrain, Researcher, *Oxford Sustainable Finance Group*

Eliza Nobles, PhD Candidate, *University of Gothenburg*

Giorgio Parlato, PhD Candidate, *Royal Swedish Academy of Sciences*

André Pinto da Silva, Postdoctoral Researcher, *Stockholm Resilience Centre*

Giulia Rubin, Research Assistant, *Royal Swedish Academy of Sciences*

Mats Töpel, Senior Researcher, *IVL Swedish Environmental Research Institute*

Bianca-Ioana Voicu, PhD Candidate, *Stockholm Resilience Centre*

Emmy Wassénius, Postdoctoral Researcher, *Stockholm Resilience Centre*

Sasha Quahe, Research Assistant, *Royal Swedish Academy of Sciences*

Calvin Quek, Executive Director for Nature Finance, *Oxford Sustainable Finance Group*

Programme Outputs

- ***Scientific publications***

Chaplin-Kramer, R., Polasky, S., Alkemade, R., Burgess, N. D., Cheung, W. W. L., Fetzer, I., Harfoot, M., Hertel, T. W., Hill, S. L. L., Johnson, J. A., Janse, J. H., Jeetze, P. J. v., Kim, H., Kuiper, J. J., Lonsdorf, E., Leclère, D., Mulligan, M., Peterson, G. D., Popp, A., Roe, S., Schipper, A. M., Snäll, T., van Soesbergen, A., Soterroni, A. C., Stehfest, E., van Vuuren, D. P., Visconti, P., Wang-Erlandsson, L., Wells, G., Pereira, H. M. 2024. Integrated modeling of nature's role in human well-being: A research agenda. Global Environmental Change, 88, 102891. https://doi.org/10.1016/j.gloenvcha.2024.102891.

Kuiper, J. J., L. R. Carpenter-Urquhart, M. Bérbes-Blázquez, E. Oteros-Rozas, L. Fredström, K. Psiuk, C. Savu, R. Kautsky, A. D. Guerry, S. R. Carpenter, C. E. Green, M. Meacham, R. P. Remme, F. I. Ravera, F. Wankmüller, K. K. Arkema, L. M. Pereira, and G. D. Peterson. 2024. Biosphere Futures: a database of social-ecological scenarios. Ecology and Society 29(1):19. https://doi.org/10.5751/ES-14795-290119.

Wassénius, E., Crona, B. and Quahe, S., 2024. Essential environmental impact variables: A means for transparent corporate sustainability reporting aligned with planetary boundaries. One Earth, 7(2), pp.211-225.

- ***Accepted for publication***

Nobles, E. 2025. The ethical foundations of biodiversity metrics. Current Opinion in Environmental Sustainability. 72, 101503. https://doi.org/10.1016/j.cosust.2024.101503.

Granqvist, Goodsell, Töpel & Ronquist. The transformative potential of eDNA-based biodiversity impact assessment. Accepted for publication at COSUST. 2025.

- ***Manuscripts in review***

Abela, C.M., Blum, V., Crona, B., Kashyap, S. Business and finance on a path towards sustainable reporting and accountability for biodiversity? Submitted to Current Opinions on Environmental Sustainability

Christiaen, C., Jackman, A., Lockwood, P. 2024. Location location location - Asset location data sources for nature-related financial risk analysis. Currently under review for Current Opinion in Environmental Sustainability.

Crona, B., Peterson, G., Meacham, M., Lade, S.J., Galaz, V., Rocha, J.C., Parlato, G. A systems approach to sustainable finance: Reviewing actors, their influence mechanisms, and potential for virtuous cycles of sustainability. In second round of reviews in One Earth

de Bruin, B., de Grefte, J. Sustainable finance, biodiversity, and greenwashing: How contested values, metrics, and causation facilitate information distortion, omission, and pollution. Under review in Current Opinion in Environmental Sustainability

Endörfer, R., Corvino, F. How Not to Fill the Gap: Blended Finance and Climate Justice. Submitted for review.

Endörfer, R. Human Rights Against Climate Risks and the Problem of Paralysis. Submitted for review.

Gunnemyr, M. Divesting for the climate: In defence of a hopeless idea.

Gunnemyr, M., Wieland, J.W. Corporate Switching Defences. Under review.

Pinto da Silva A, Knecht N, Thomas R, Lotcheris R, Crona B, Rocha J. Challenges and opportunities when assessing exposure of financial investments to ecosystem regime shifts. In review at COSUST. Submitted 2024.

Voicu, B-I., Meacham, M., Peterson, G. Towards transformation in finance: seeds for nature-positive futures. Under review.

- ***Preprints and working papers, available online***

Rocha, J.C., Jouffray, J-B., Bengtsson, F., Voicu, B-I., Sánchez, P.A., Galaz, V. Identifying companies and financial actors exposed to marine tipping points. Submitted November 2024.

Horn, H., Sanctuary, M. 2024. Investment Treaties and the Replacement of Stranded Investment. IFN Working Paper No. 1479, Available at SSRN: https://ssrn.com/abstract=4720677 or http://dx.doi.org/10.2139/ssrn.4720677

Horn, H., Lavenius, A., Sanctuary, M. 2024. Investment Treaties and the Threat to Biodiversity. IFN Working Paper No. 1496, Available at SSRN: https://ssrn.com/abstract=4878262 or http://dx.doi.org/10.2139/ssrn.4878262

Sanctuary, M., Lavenius, A., Parlato, G., Plue, J., Crona, B. 2024. A study of green European equity fund portfolio allocations. Available at SSRN: https://ssrn.com/abstract=4864620 or http://dx.doi.org/10.2139/ssrn.4864620

Wassénius, Emmy and Crona, Beatrice, A Tool to Capture Multiple Pathways of Nature-Related Risk (September 17, 2024). Available at SSRN: https://ssrn.com/abstract=4958755 or http://dx.doi.org/10.2139/ssrn.4958755

- ***Book chapters***

Gunnemyr, M. Forthcoming. Shareholder Complicity In Maon, F., Lindgreen, A., et al. (eds.) Routledge Companion to Responsible Business. London: Routledge.

- ***Reports***

Christiaen, C., Jackman, A., Lockwood, P. 2024. Location location location - Asset location data sources for nature-related financial risk analysis. Oxford Sustainable Finance Group.

Crona, B., E. Wassénius, G. Parlato, S. Kashyap (2024). Doing Business Within Planetary Boundaries. Research brief. Stockholm Resilience Centre (Stockholm University) and the Beijer Institute of Ecological Economics

(Royal Swedish Academy of Sciences).

Galaz, V. and Meacham, M. (eds., 2024). Redirecting Flows - Navigating the Future of the Amazon. Report. Stockholm Resilience Centre, Stockholm University. https://doi.org/10.48550/arXiv.2403.18521

- ***Conference presentations featuring FinBio research***

Ronquist, F. “Evaluating methods for measuring biodiversity impact using IBA

data” Symposium: Understanding and monitoring insect diversity: the environmental DNA revolution. Stockholm, Sweden. October 2024.

Rocha, J. ”Identifying financial actors exposed to tipping points” at PECS, Montral, Canada. August 2024

Rocha, J. ”Identifying financial actors exposed to tipping points” Conference of complex systems in Exeter, UK. September 2024

Pinto da Silva, A. “Land-use following a middle-road socio-economic pathway (SSP2) is not enough to recover mammal populations in Southern-Asia” World Biodiversity Forum, Davos, Switzerland. June 2024

Pinto da Silva, A. “Economic consequences of land-use scenarios compatible with a safe operating space for humanity” ESRI meeting, Potsdam, Germany. November 2024.

Pinto da Silva, A. “Linking earth-system processes and finance” TIPMIP, Potsdam, Germany. December 2024.

Pinto da Silva, A. “Estimation of corporate’s effects on species resilience based on ecological processes.” Conference on Complex Systems 2024, Exeter, UK. August 2024.

Meacham, M. Christiaen, C. “Nature Finance Research Priorities workshop.” Workshop in Oxford to engage with financial sector stakeholders to collect inputs into research priorities for FinBio, Oxford, UK. 2024.

Meacham, M. “Greening Finance, Financing Green.” Program on Ecosystem Change and Society (PECS - III). Montreal, Canada. August 2024.

Crona, B. “Working at the interface between Earth system science and private investments - A journey of discovering sweet spots and dark corners” 2024.

Crona, B. “Opportunities and barriers to achieving environmentally sustainable investments” World Biodiversity Forum, Davos, Switzerland. June 2024

Crona, B. “Accounting for a Sustainable Future: Integrating Planetary Boundaries into Corporate Reporting” 19th EIASM Interdisciplinary conference, Grenoble, France. September 2024

Crona, B. “ESG-effekter på lönsamhet, konkurrenskraft och aktieägarvärde” Hållbart Näringsliv 2024, Stockholm, Sweden. November 2024.

Kashyap, S. “From single to double materiality: A path towards capturing biodiversity impacts

and nature-related risks through corporate disclosures” 19th EIASM Interdisciplinary conference, Grenoble, France. September 2024

Peterson, G., Voicu, B., Galaz, V., Meacham, M. “Finance to Revive Biodiversity: FinBio session” 2024 Natural Capital Symposium, Stanford, US. June 2024.

Peterson, G. “Can Mainstreaming Bend the Curve of Biodiversity Loss?” 2024 Natural Capital Symposium, Stanford, US. June 2024

Endörfer, R. “Blended Finance and Climate Justice”, Justice in Finance for Climate Change Adaptation and Loss and Damage, Humboldt University Berlin, Berlin, Germany. February 2024.

Endörfer, R. “Maldistribution and the Climate Bargain Approach”, 14th Braga Meetings on Ethics and Political Philosophy, Braga, Portugal. June 2024.

Endörfer, R. “Maldistribution and the Climate Bargain Approach”, Environmental Humanities Colloquium, University of Fribourg, Fribourg, Switzerland. 2024.

Sandberg, J. “Ethics and Sustainability – The Crucial Questions”, Nordic Environmental Ethics Winter Symposium, Umeå University, Umeå, Sweden. January 2024.

Sandberg, J. ”En prislapp på naturen – styrmedel och incitament”, Mistra 30-Year Jubilee Conference, Lund University, Lund Sweden. April 2024

Sandberg, J. “Carbon Footprints and Moral Mathematics”, Swedish Congress of Philosophy, University of Gothenburg. Gothenburg, Sweden. June 2024.

Sandberg, J. “What do different sustainability indicators really mean?”, Danske Bank Asset Management Conference, Copenhagen, Denmark. November 2024.

Gunnemyr, M. “Shareholder Complicity”, Nordic Environmental Ethics Winter Symposium, Umeå University, Umeå, Sweden. January 2024.

Gunnemyr, M. & Willem Wieland, J. “Corporate Switching Defences” Swedish Congress of Philosophy, University of Gothenburg. Gothenburg, Sweden. June 2024.

Gunnemyr, M. & Willem Wieland, J. “Corporate Switching Defences” 14th Braga Meetings on Ethics and Political Philosophy, Braga, Portugal. June 2024.

Nobles, E. “Unearthed Value: Biodiversity Finance Beyond Human Instrumentation” 14th Braga Meetings on Ethics and Political Philosophy, Braga, Portugal. June 2024.

Nobles, E. “The Ethical Foundations of Biodiversity Metrics,” Gothenburg Global Biodiversity Center seminar series, Gothenburg, Sweden, 2024.

Sanctuary, M. Presentation at Danske Bank Asset Management Conference, Copenhagen, Denmark. November 2024.

- ***Workshops and Roundtables***

Rocha, J. & Galaz, V. “Seminar: Mitigating Pandemic Risk through Financial Influence.” Digital seminar. March 2024.

Rocha, J. Participated in workshops organized by Business Sweden around the role of business in achieving biodiversity goals at COP16.

Peterson, G. Parlato, G. & Christiaen, C. Roundtable on biodiversity finance hosted at Pictet offices in London with selection of their clients and partners. London, UK. April 2024.

Crona, B. Lade, S. & Parlato, G. Workshop to pilot test the ESI tool with VC2025 and one of their portfolio companies. December 2024.

Crona, B. Participated in a Round Table on biodiversity investing organized by Pictet for their Swedish clients and presented the Mistra FinBio program. October 2024

Christiaen, C. “Transforming equity analysis with location-specific corporate risk data” Webinar organised by Environmental Finance.

- ***Presentations***

Sanctuary, M. Presentation at Svenskt Näringsliv on economy and nature, Stockholm, Sweden. 2024

Sandberg,J. “Science-Based Metrics for Sustainable Finance”, Sustainable Finance Lab Partner Day. May 2024.

Sandberg, J. ”En kritisk analys av impact-mått inom hållbar finans”, SWESIF member lunch, Stockholm, Sweden. September 2024.

Sandberg, J. ”Samtal om finansmarknadens roll i klimatomställningen”, SACO:s konferens Makro, August 2024.

- ***Other Media Publications***

Granqvist, E. “Interview published by Mistra, regarding eDNA pilot”. Available at: https://mistra.org/nyheter/mistra-finbio-utvecklar-metoder-med-hjalp-av-miljo-dna/

Tunón, H., Ecke, F., Ebenhard, T., Hilding-Rydevik, T., Smith, H, Antonelli A., Klingberg, J., Björkman, M., Marissink, M., Arvidsson S., Sterner, T., Elliot, V., Gordon, L., Schultz, L., Crona, B., Peterson, G., Töpel, M., Stenvinkel P., Bornemark, J., Kockum, I., Dirke, K., Fredengren, C., Gerhardt, K., Kvarnström, M., ”Skapa inte mer polarisering mellan människa och natur, Moderaterna” Available at: https://www.altinget.se/artikel/forskare-skapa-inte-mer-polarisering-mellan-manniska-och-natur-moderaterna

- ***Online resources***

Rocha, J & Peterson G. “The regime shifts database - version 2.0” Old website available at: https://www.regimeshifts.org

Crona, B. “The ESI tool has a public website” Available at: https://gedb.shinyapps.io/ESI_showcase/

Peterson, G. Meacham, M “Biosphere Futures Database” Available at: https://ecologyandsociety.org/vol29/iss1/art19/

- ***Other Activities***

Quek, C. Shiekh, H. & Kruger Nyasulu, M. The Oxford group did an extensive review of AIIB’s upcoming Nature Health Planet report, which provides a potential engagement and research testing platform for WP3 regarding nature markets.

Quek, C. Shiekh, H. & Kruger Nyasulu, M. The Oxford group explored working with Credit Nature, a company that works in the area of Nature Credits to unlock capital for nature-positive projects.

Crona, B. Joins Nature Action 100+ Science council in 2024.

Crona, B. Contributed to AP7 Theme report on deforestation and biodiversity and a filmed conversation with AP7 and other invited guests. September 2024.

Partners

Stockholm Resilience Centre | Stockholm University

University of Gothenburg

ivl Swedish Environmental Research Institute

Naturhistoriska riksmuseet

Oxford Sustainable Finance Group

University of Oxford

More information on our website

www.finbio.org

Visit us on LinkedIn

LinkedIn

MISTRA FinBio

Funded by Mistra