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Keynote: Nature Finance – Academic Perspective

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Grand Societal Challenge: Biodiversity Loss

- Importance and urgency of mitigating biodiversity loss

Protecting biodiversity is critically **important and urgent**—it is important for the planet, our health and well-being, as well as the world's economy

- **“Code Red” alert for humanity**: global populations of mammals, fish, birds, reptiles, and amphibians declined by 69% since 1970 (WWF, 2022)
- **Climate and biodiversity crises are deeply intertwined**: Meeting the Paris Climate Agreement goals depends on the successful conservation, restoration, and management of biodiversity (UN 2022)
- **Existential threat to global economy**: over 50% of world's GDP is dependent on nature and the services it provides (UN 2022)

Natural Capital: A Public Good

- Biodiversity provides many services to humans
 - For example:
 - Stabilizes climate, food supplies, water, plants used for medicine, natural flood defenses, carbon storage, pollination of crops, recreational enjoyment, provides spiritual sustenance, etc.
 - These services are typically provided as **public good**
 - Their **consumption is non-rival**: available to everyone and those unwilling to pay cannot be excluded from consuming the public good
 - Long-standing literature in public economics: their **efficient provision is challenging** due to free-rider and preference revelation problems (e.g., Dasgupta 2021, Heal 2000)

➔ Implication: Biodiversity is likely **undervalued and underprovided**

Potential Solutions to Mitigate Challenge

- Potential solutions to enhance biodiversity protection

- 1) **Intergovernmental measures**

- E.g., Convention on Biological Diversity (CBD) and other global treaties

- 2) **Government measures** that aim to regulate

- **Quantity** of natural capital
 - E.g., establishing protected areas, technology standards, cap-and-trade programs
- **Price** of natural capital
 - E.g., through tax incentives and subsidies that encourage more sustainable production or consumption patterns

- 3) **Biodiversity finance**

- Relatively recent phenomenon gaining momentum in practice
- Yet, not well understood; investors feel underinformed about the risks and opportunities related to biodiversity finance (WEF 2023)

Important role, yet implementation challenging (Barrett 2022, Dasgupta 2021)

Financing the Protection of Biodiversity

- **Evolution of biodiversity finance**

- Historically, biodiversity protection financed through:
 - **Public funding**
 - E.g., debt-for-nature swaps, official development assistance (ODA), sovereign biodiversity bonds (e.g., sovereign ocean bonds, rhino bonds), payments for ecosystems services (PES), biodiversity offsets, etc.
 - **Philanthropic giving**
 - E.g., Environmental Defense Fund (EDF), The Nature Conservancy (TNC), World Wildlife Fund (WWF), etc.
- **Financing gap:** Additional capital (estimated \$722-967 bn/year) needed to address biodiversity crisis (TNC, 2021)

Focus of this presentation

- Relatively recent phenomena: **private investing in natural capital**
 - **Pure private capital investing**
 - **Blended finance** (i.e. blending concessionary funding with private capital)

Financing the Protection of Biodiversity

- **Gap in academic research**

- In practice, private investing in natural capital rapidly growing but not well-understood
- In academia, to date, **glaring research gap** in biodiversity finance (Karolyi & Tobin-de la Puente 2023, Starks 2023, Garel, Romec, Sautner, & Wagner 2023, Giglio, Kuchler, Stroebe, & Zeng 2023)
 - Likely due to:
 - **Lack of awareness** on how private capital can contribute to biodiversity conservation and restoration
 - **Lack of data** on biodiversity finance

Biodiversity Finance

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This Study

- **Research question and purpose**

- Aims to fill research gap

- 1) Introduce a **conceptual framework** that lays out how private capital can contribute to biodiversity conservation, and
- 2) Provide **first evidence** on biodiversity finance: document this emerging asset class, characterizing the different
 - Types of assets in biodiversity finance
 - Monetization mechanisms
 - Deal structures
 - Expected risks and financial returns
 - Expected biodiversity impact

Agenda

1. Introduction

2. Private Investing in Natural Capital — A Conceptual Framework

- a) Asset types and monetization mechanisms
- b) Types of financing

3. Private Investing in Natural Capital — 1st Empirical Evidence

- a) Data
- b) In-portfolio Deals
- c) Discarded Deals

4. Discussion and Conclusion

Financing the Protection of Biodiversity

- Intriguing question: How can the **conservation and restoration** of biodiversity **yield financial returns** for investors?



Economic Value of Natural Capital – A New Asset Class

- Typical monetization mechanisms of natural capital
 - Include the **transformation** of natural capital (e.g., logging and mining)
- Monetization mechanisms in case of **biodiversity?**
 - Revenues need to be generated from **protecting as opposed to transforming** natural capital
 - Puzzling at first, yet generating financial returns from biodiversity conservation is feasible:
 - Monetization mechanisms of ecosystem services—**bundling** biodiversity with private goods whose value it enhances (Heal 2003, 2004)

Asset Types and Monetization Mechanisms

Natural capital asset types	Monetization mechanisms of ecosystem services
A. Land	
Agriculture: soil and pollinators	Agricultural productivity; price of farmland; certification as “biodiversity-friendly” agricultural products (higher prices); carbon credits; fire suppression; water quality
Forests	Ecotourism (hotel nights, tour guide services); carbon credits (carbon capture and storage); biodiversity credits; health; recreational value; bioprospecting for medicine; certification as “biodiversity-friendly” wood (higher prices); hydropower (pay for success)
Urban parks and other green infrastructures in urban areas	Value of real estate (proximity to park, green roofs provide heat isolation); prevention of flooding; carbon credits (carbon capture and storage); recreational value (e.g., birdwatching tours, sports activities, etc.)
Natural parks & wildlife protection	Ecotourism (hotel nights, tour guide services); value of real estate around the park; biodiversity credits
Genetic resources	Protection against diseases (humans, plants, food, animals); bioprospecting for medicine; biodiversity credits

Asset Types and Monetization Mechanisms

Natural capital asset types

Monetization mechanisms of ecosystem services

B. Sea

Watersheds

Green infrastructure services; water purification

Coastal ecosystems

Ecotourism (hotel nights, tour guide services); value of real estate (prevention of coastal flooding); carbon credit (carbon capture and storage); biodiversity credits; food production

Fisheries

Food production; certification as “biodiversity-friendly” seafood products (higher prices)

Oceans (incl. coral reef)

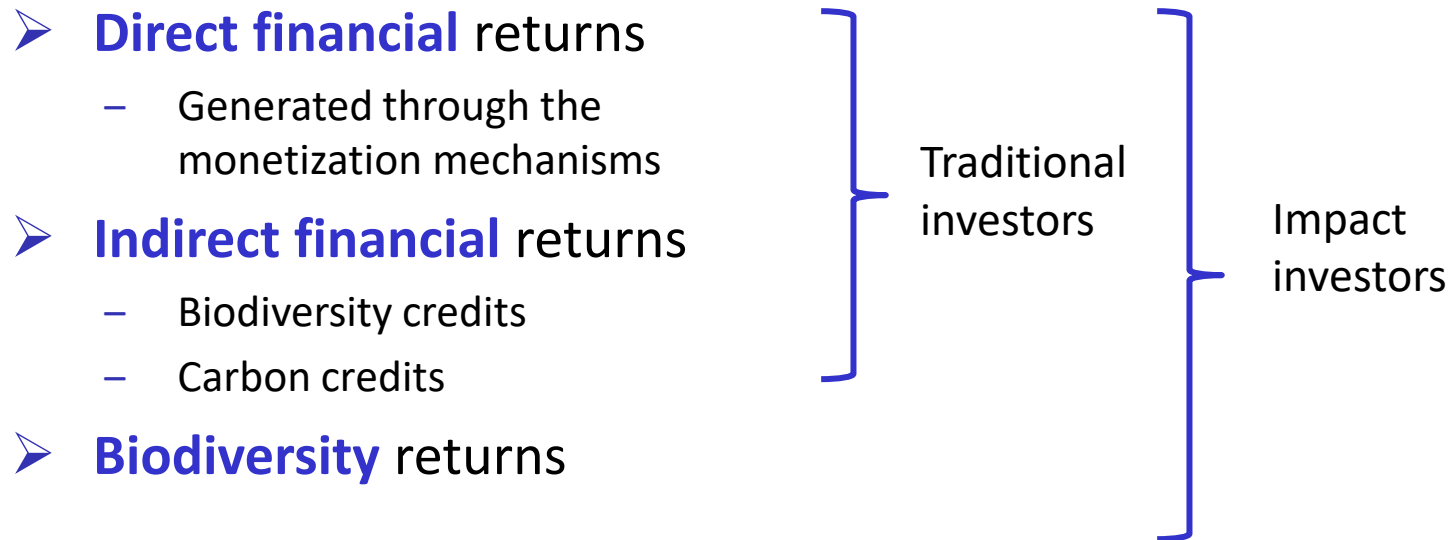
Ecotourism (hotel nights, tour guide services); carbon credits; biodiversity credits; value of real estate (prevention of hurricanes and coastal flooding)

Types of Financing

- Two broad categories:
 - **Pure private capital**
 - Akin to investing private capital in traditional asset classes
 - **Blended finance**
 - Private capital blended with public or philanthropic capital, whose aim is to subsidize and de-risk private capital investments

Returns and De-Risking Mechanisms

- **Returns** of Biodiversity Investments



- For blended financing structures: Grants and concessional funding help
 - **Subsidize** investments from private capital investors
 - ➔ Increase their overall financial and biodiversity returns
 - **De-risk** such investments

De-Risking Mechanisms

- Biodiversity Funds

- Typically structured as **partnerships**

- Partnerships with
 - One **general partner (GP)** making the investment and
 - Multiple **limited partners (LP)** investing capital
 - Each LP commits a specific amount to fund by closing date
 - Once closing date is reached, investment process begins
 - Payments made by LPs during life cycle of fund through drawdown notices that apply to all LPs at a pro rata of their capital contributions
 - If an LP defaults on one of the payments, GP can request additional drawdowns from other LPs
 - In such cases, the required capital contribution of each LP is increased on a pro-rata basis to cover the amount that remains to be funded

De-Risking Mechanisms

➔ **Objective** of de-risking mechanisms

- Various de-risking mechanisms
- Their objective is always the same: **act as a catalyst** in attracting private capital by **improving risk-return tradeoff** of biodiversity projects

De-Risking Mechanisms

- **De-risking Mechanisms** of Blended Finance

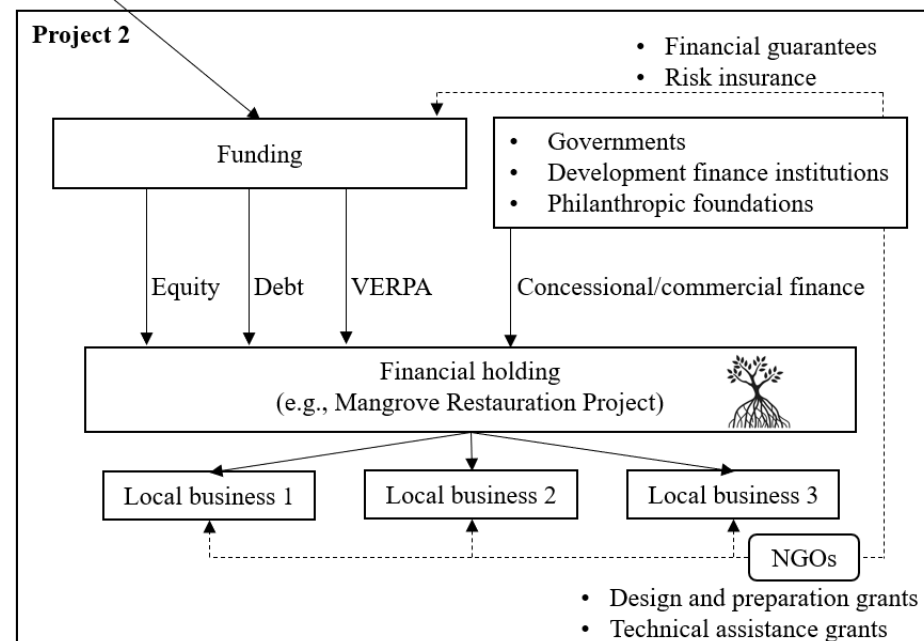
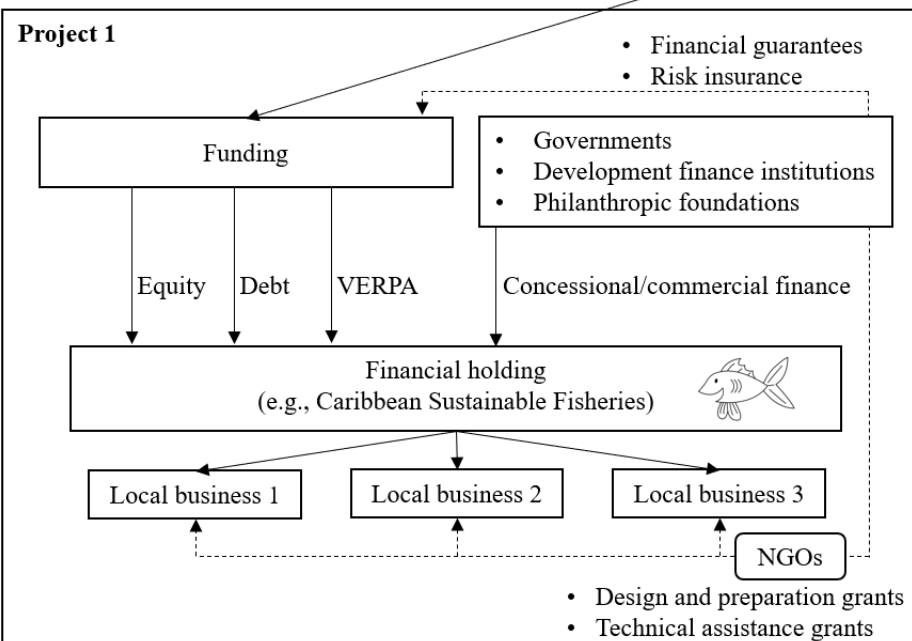
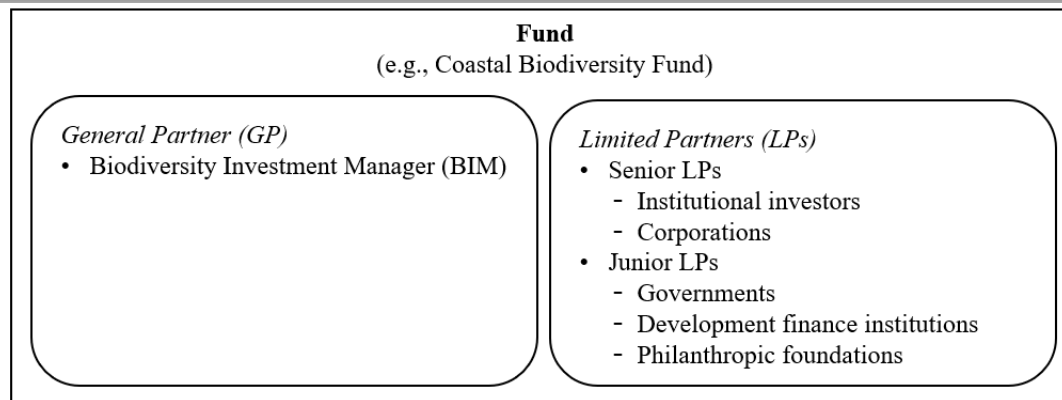
- **Fund-level** de-risking mechanisms

- 1) Seniority
- 2) Preferred rate of return
- 3) Financial guarantees

- **Project-level** de-risking mechanisms

- 1) Concessional finance
- 2) Ex ante risk mitigation
 - Design and preparation grants
 - Technical assistance grants
- 3) Ex post risk mitigation
 - Financial guarantees
 - Risk insurance

Summary



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Data: “Biodiversity Investment Manager” (BIM)

- **“Biodiversity Investment Manager” (BIM)**

- Description of BIM:

- Recognized leader in biodiversity finance (and sustainable finance more broadly)
 - Private equity firm fully dedicated to sustainable investing
 - \$30 billion in assets under management (AUM) throughout the world
 - Clientele comprises individual and institutional investors
 - Offers equity and fixed income investment strategies
 - Finances projects and companies at any stage of their life cycle

Data: “Biodiversity Investment Manager” (BIM)

➤ Proprietary data

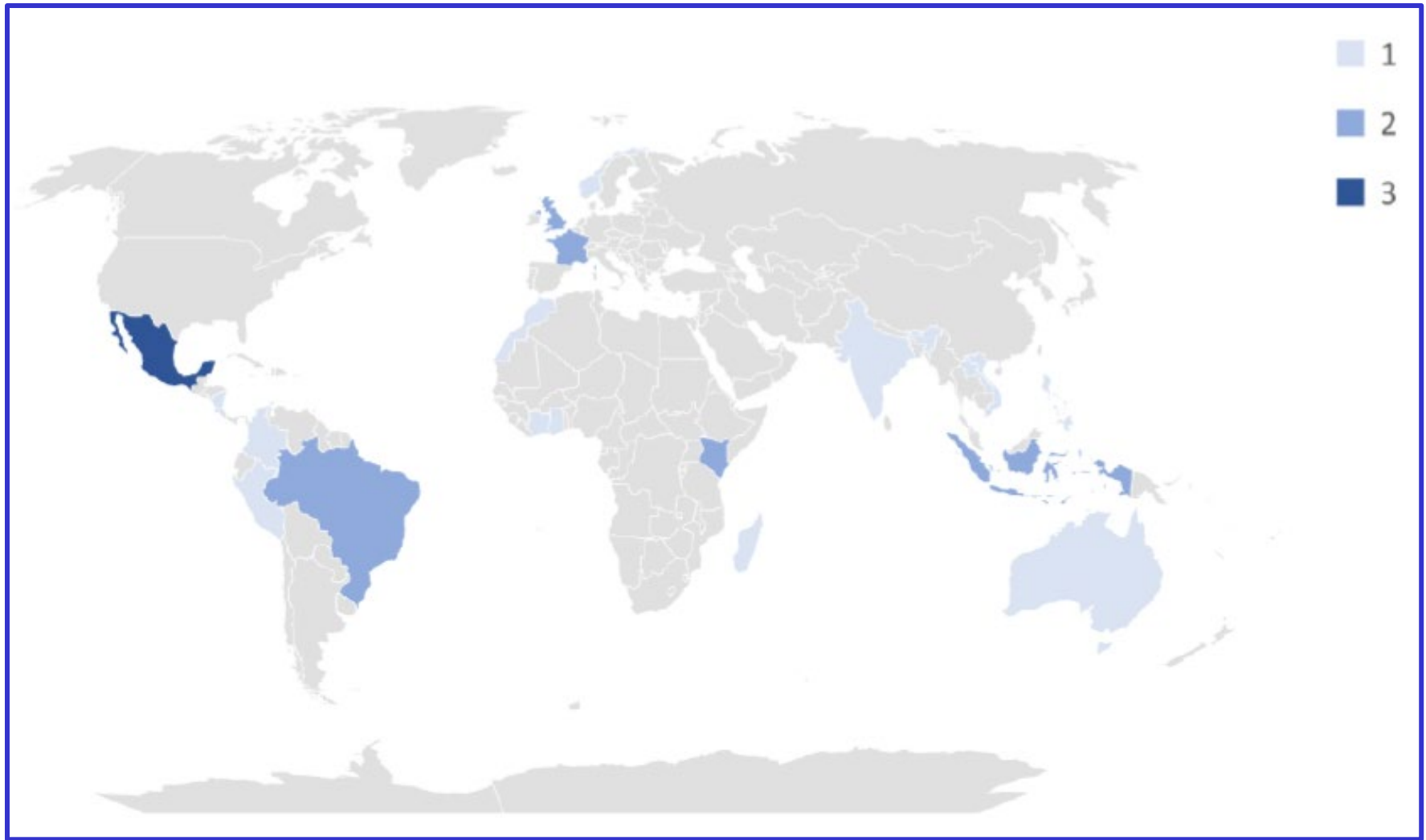
– Coverage:

- **All 33 in-portfolio** biodiversity finance **deals** that were closed by BIM between 2020 and 2022
- Note: deals are still **ongoing** (their average maturity is 8 years) and hence information about realized performance unavailable
- **Detailed data:** For each deal, we have access to BIM’s internal documentation
 - Includes information about
 - underlying biodiversity project
 - deal structure
 - expected biodiversity impact
 - expected financial return
 - BIM’s risk assessment
 - etc.
- In addition, access to **32 discarded deals**
 - Deals that were under consideration for portfolio inclusion, but were ultimately discarded by BIM’s management

Deals by Natural Capital Asset Types

		All (N = 33)		Blended finance (N = 14)		Pure private capital (N = 19)	
		# Deals	Percent	# Deals	Percent	# Deals	Percent
Land		16	48.5%	8	57.1%	8	42.1%
	Agriculture: soil and pollinators	8	24.2%	3	21.4%	5	26.3%
	Forests	6	18.2%	3	21.4%	3	15.8%
	Natural parks & wildlife protection	1	3.0%	1	7.1%	0	0.0%
	Genetic resources	1	3.0%	1	7.1%	0	0.0%
Sea		17	51.5%	6	42.9%	11	57.9%
	Watersheds	1	3.0%	0	0.0%	1	5.3%
	Coastal ecosystems	3	9.1%	0	0.0%	3	15.8%
	Fisheries	10	30.3%	4	28.6%	6	31.6%
	Oceans (incl. coral reef)	3	9.1%	2	14.3%	1	5.3%
Total		33	100.0%	14	100.0%	19	100.0%

Biodiversity Finance Deals by Country



Deal Characteristics

All			Blended finance			Pure private capital			Difference in means
N	Mean	Std. dev.	N	Mean	Std. dev.	N	Mean	Std. dev.	<i>p</i> -value

A. Deal size and financing

Maturity (years)	33	7.94	3.03	14	7.93	2.70	19	7.95	3.32	0.986
Deal size (\$ million)	33	22.84	17.47	14	29.15	18.39	19	18.19	15.63	0.074*
Ticket size (\$ million)	33	6.62	3.86	14	7.24	3.99	19	6.17	3.79	0.443
Equity (\$ million)	33	3.21	4.00	14	3.44	4.45	19	3.04	3.74	0.781
Debt (\$ million)	33	2.79	4.20	14	3.65	4.34	19	2.16	4.08	0.320
VERPA (\$ million)	33	0.62	1.62	14	0.14	0.53	19	0.97	2.03	0.147
% Equity	33	0.52	0.44	14	0.50	0.44	19	0.53	0.46	0.881
% Debt	33	0.35	0.42	14	0.47	0.46	19	0.26	0.39	0.172
% VERPA	33	0.13	0.33	14	0.03	0.11	19	0.21	0.42	0.124

Deal Characteristics

	All			Blended finance			Pure private capital			Difference in means
	N	Mean	Std. dev.	N	Mean	Std. dev.	N	Mean	Std. dev.	<i>p</i> -value
B. Financial performance and risk										
Project return (target IRR)	33	13.52%	3.68%	14	11.88%	2.86%	19	14.72%	3.81%	0.026**
Project risk (deviation from target IRR)	20	7.18%	5.22%	8	6.94%	6.13%	12	7.34%	4.81%	0.872
Project return / project risk	20	2.51	1.32	8	2.44	1.54	12	2.56	1.22	0.846
C. Environmental and social impact										
Total impact area (ha, expected)	17	73,408	167,115	9	114,798	226,016	8	26,844	27,805	0.098*
GHG emis reduction (1,000tCO ₂ e, expect)	18	5,665	8,649	8	9,469	11,900	10	2,622	2,824	0.096*
# Beneficiaries (expected)	13	11,623	11,779	6	19,133	13,812	7	5,185	3,710	0.025**
# New jobs created (expected)	15	1,846	4,273	6	3,358	6,693	9	838	1,050	0.279
Certification (1/0 dummy)	33	0.79	0.42	14	0.79	0.43	19	0.79	0.42	0.980

Deal Characteristics

- Results suggest
 - **Tradeoff between financial returns and biodiversity returns**, with implications for the type of financing
 - **Profitable projects** can be viably financed by pure private capital, but tend to have lower biodiversity impact
 - **Projects with higher biodiversity** return tend to be less profitable, but can nevertheless appeal to private investors through blending
 - ➔ Blending is important tool for improving risk-return tradeoff
 - ➔ Existence of a **three-dimensional “risk—financial return—biodiversity return frontier”**

Discarded Deals (“Outside Group”)

	In-portfolio deals			Discarded deals			Difference in means
	N	Mean	Std. dev.	N	Mean	Std. dev.	<i>p</i> -value
A. Financial performance							
Project return (target IRR)	33	13.52%	3.68%	32	11.29%	4.60%	0.035**
B. Environmental and social impact							
Total impact area (ha, expected)	17	73,408	167,115	28	19,684	43,148	0.006***
GHG emissions reduction (1,000 tCO ₂ e, exp.)	18	5,665	8,649	12	1,253	2,094	0.096*
# Beneficiaries (expected)	13	11,623	11,779	11	3,727	3,899	0.045**
# New jobs created (expected)	15	1,846	4,273	12	1,192	2,813	0.652

Policy Implications

- Results from discarded deals suggest
 - **Only deals above** certain risk-return threshold appeal to private investors, and
 - **Biodiversity impact** needs to be sufficiently favorable for blended finance to be a viable option

➔ Private capital (as standalone or blended) is **unlikely to provide a silver bullet** against biodiversity crisis and needs to be **complemented with effective public policies**

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Urgency of Biodiversity Crisis

- Biodiversity crisis

- A **critical threat** to the world economy

- Collapse of ecosystem services provided by nature—such as wild pollination, the provision of food from marine fisheries and timber from native forests—could result in a decline in global GDP of \$2.7 trillion annually by 2030 (World Bank 2021)

- Ambitious goals have been set

- E.g., “30 by 30” worldwide initiative (that is, the protection of 30% of land and 30% of oceans by 2030) at 2022 COP 15 meeting of the UN Convention on Biological Diversity
- Public measures crucial in addressing biodiversity crisis, yet **unlikely sufficient**

- **Financing gap**

- Massive amounts of funding are required to effectively address biodiversity crisis (TNC 2020)

➔ As such, **biodiversity finance** could play an **important role** in mobilizing private funding for the protection and restoration of biodiversity

Key Findings and Implications for Practice

- Key Findings:

- **Blending** is important tool for improving risk-return tradeoff of these projects to appeal to private investors
- Existence of a **three-dimensional “risk—financial return—biodiversity return frontier”**
 - **Only deals above** certain risk-return threshold **appeal to private investors**
 - **Biodiversity return** needs to be **sufficiently favorable for blended** finance to be used

- ➔ Implications: Private capital (as standalone or blended)

- Useful addition to the toolbox: Can **help close financing gap** and contribute to conservation and restoration of biodiversity
- Yet, **unlikely a substitute** for the implementation of **effective public policies** in addressing biodiversity crisis

Biodiversity Finance: Outlook

- Key factors to scale up private investments in biodiversity
 - Blended finance can help enhance the risk-return tradeoffs of such investments and serve as catalyst to crowd in more private capital
 - While blended finance is not novel, it is still in its infancy and not yet well-understood
 - Several hurdles are currently hampering the growth of this market:
 - **Information asymmetries** (and the corresponding information acquisition costs) are substantial for project holders (“sellers”), NGOs, international investors (“buyers”), etc.
 - **Lack of common metrics and frameworks** used to assess biodiversity projects
 - **Lack of rigorous studies and understanding** of current practices
 - To overcome these hurdles and scale up private investments, we need to:
 - **Develop standardized metrics and frameworks** (to assess biodiversity projects) that provide meaningful and decision-relevant information to investors
 - **Better understand the challenges and opportunities** that arise to:
 - identify and scale up investable projects, especially in the Global South
 - the characteristics of effective private-public partnerships (PPPs)
 - the balancing and allocation of risks across investors
 - how to improve financing structures, among others.

Thank You!

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