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INNOVATIVE FINANCE FOR CONSERVATION: ROLES FOR ECOLOGISTS AND PRACTITIONERS

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SUMMARY

Global efforts to conserve biodiversity and maintain ecosystem services have shifted from a traditional emphasis on the establishment of protected areas to one that includes the design of conservation projects that deliver positive social, ecological, and economic outcomes for people and the environment. This shift is a necessary recognition that protected areas alone will be insufficient to conserve a large proportion of species globally, especially given competing pressures for land development and marine resources. However, despite clear demonstrations of the potential benefits of managing terrestrial and marine resources to produce a sustainable mix of environmental and human co-benefits, many of the most promising models remain under-funded or largely aspirational. Consequently, only 12–17% of the estimated $300–$400 billion* of investment needed annually to maintain healthy ecosystems globally currently flows to conservation finance, with most originating from limited public and philanthropic sources. Those numbers contrast with the amount of capital available to invest globally. Institutional investors and other asset managers have more than $175 trillion in assets under management that are being invested in economic activity globally. Many of these investors are increasingly demanding that environmental sustainability be used, at least partly, to guide investment decisions. As a result of this growing demand, sustainable investment funds in the United States grew by over 33% from 2014 to 2016 and now comprise about one-fifth ($9 trillion) of professionally managed assets. Substantial opportunities may, therefore, exist to direct private capital towards conservation investments, despite the marketplace for such investments being slow to develop to date. The promise of conservation investing notwithstanding, there remain important barriers and concerns about unintended or negative outcomes for people and the planet due to bad actors, redirection of public resources, perverse incentives, misaligned objectives, or poorly designed projects.

In this issue, we summarize specific challenges and opportunities related to the mobilization of private capital in conservation. There is a critically important role for the development of consistent and accountable frameworks to guide project design, implementation, monitoring, and evaluation while also ensuring equitable and beneficial outcomes for all stakeholders. Scientists and practitioners in the social and ecological sciences, as well as law and finance fields, can shape these rapidly growing initiatives by helping to:

1. Design investable projects with meaningful conservation impacts.
2. Develop rigorous but flexible frameworks to standardize metrics and monitoring protocols, compare project and investment outcomes, and track progress towards global targets.
3. Establish safeguards, protocols, and ethics for engaging local stakeholders.
4. Create blueprints to facilitate the design of projects that allow investors to generate economic returns while ensuring positive, sustainable outcomes for the environment.
5. Reconsider existing financial vehicles and structures of investment projects to improve flexibility, performance, and salience for stakeholders.

*Unless noted otherwise, all monetary values in this article are expressed in 2020 United States dollars.

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INTRODUCTION

The conservation community is rapidly moving beyond its traditional emphasis on establishing protected areas to promoting integrated approaches that achieve a wide range of social, economic, and ecological co-benefits for people and the environment, especially within *working landscapes*†. Applying this socioecological lens has become a hallmark of participatory conservation and community-based programs that co-develop and collaboratively implement conservation plans that promote sustainable development, facilitate markets, and deliver benefits to people without eroding *natural capital*.[5,7]

Global efforts regularly seek win-win outcomes for people and the planet through new and diverse mechanisms to achieve conservation goals and overcome existing funding challenges, including debt-for-nature swaps, payments for ecosystem services, and tourism-related taxes and fees. However, these approaches — promising as they appear — collectively have been insufficient to meet global needs for biodiversity conservation. Conservation funding continues to flow overwhelmingly from public and philanthropic sources with limited potential for growth, leaving enormous shortfalls in conservation budgets.

Currently, only 12–17% of the estimated $300–$400 billion of investment required annually to initiate conservation projects that preserve species and ecosystems and support them until they can generate sustainable cash flow is available. Those estimates contrast sharply with the >$175 trillion of assets currently under management and available to be invested by retail, high net worth, and institutional investors. Credit Suisse, World Wildlife Fund, and McKinsey & Company have suggested that the funding gap for conservation could be closed if just 1% of new and reinvested capital were allocated to conservation finance.[27]

The appetite for investments that meet Environment, Social, and Governance (ESG) standards also continues to grow. For example, the Climate Action 100+ initiative now has 360 investors with more than $34 trillion in assets under management committed to reaching the goals of the Paris COP21 agreement. Consequently, new approaches that attract investors motivated by personal ethics, corporate responsibility, stable supply chains, and business opportunities in the green economy may have the potential to advance human well-being and the environment by financing conservation projects built on such goals.

Conservation finance, as used here, refers to an emerging discipline that seeks to meet this challenge by developing environmentally sustainable financial products and investment strategies designed to generate returns for investors while maintaining or enhancing the delivery of beneficial *ecosystem services* and safeguarding *natural capital* (*Figure 1*).

Figure 1. *Environmental impact investing aims for both positive impacts and returns. Although impact investing is often associated with concessionary capital or below-market returns, conservation finance projects aspire for competitive returns to investors.*

Funds spent on environmental sustainability have historically come from public and philanthropic sources in the form of programmatic or grant capital or of *concessionary finance*. However, a growing number of financial institutions, conservation organizations, asset managers, and investors have begun promoting or investing in green financial products. Moreover, many leading conservation organizations are joining with commercial financial institutions and academics to help define and mainstream such approaches to catalyze global conservation efforts.

Current trends suggest that conservation finance has enormous potential for growth and could represent a turning point in global approaches to biodiversity conservation. For example, sustainable investment funds in the U.S. alone grew by over 33% from

† Italicized words defined in Glossary.

2014 to 2016 and now comprise almost a fifth ($9 trillion) of all professionally managed private investments in the country.[46] Sustainable finance vehicles are also more regularly incorporating standards that have the potential to increase their appeal to traditional institutional and private investors, such as by underwriting projects against potential harm to the environment or participating communities. Moreover, leaders in private sector finance and conservation alike, such as the Coalition for Private Investment in Conservation (Box 1), are pushing for coordinated, transformational change in economic practices capable of influencing natural resource use by facilitating the investment of private, return-seeking capital in a manner that results in positive conservation actions. Enabling practices include de-risking novel or unfamiliar projects, covering development, reducing the costs of aggregating or bundling projects, and building capacity to better measure and monitor outcomes.

BOX 1. THE COALITION FOR PRIVATE INVESTMENT IN CONSERVATION

CPIC
COALITION FOR PRIVATE INVESTMENT IN CONSERVATION

A key moment for conservation finance was the launch of the Coalition for Private Investment in Conservation (CPIC) at the 2016 International Union for Conservation of Nature (IUCN) World Conservation Congress in Hawaii. With over 50 member institutions from the finance and conservation communities, CPIC aims to accelerate the entry of private, return-seeking capital into conservation investments by building capacity in investors, delivery parties, and other partners. Specifically, the coalition works to (1) develop scalable models (called "blueprints") for specific investable conservation projects that will deliver competitive risk-adjusted returns, (2) increase access to expertise in creating new finance vehicles, and (3) facilitate replication, aggregation, and standardization by sharing lessons from successful conservation finance transactions. CPIC's initial activities focus on the development of investment blueprints for six priority sectors – sustainable forestry, agriculture, coastal fisheries, coastal resilience, watershed management, and landscapes.

Ultimately, CPIC seeks to facilitate the development of a pipeline of investable deals that deliver both economic and environmental returns. Doing so requires establishing information exchange networks that help relevant actors build skills related to (a) financial structuring, including blended finance, credit guarantees and first loss capital, (b) business plans to identify, manage and maximize cash flow and the presentation of investable ideas to finance institutions, (c) new metrics for non-financial returns on investment (e.g., biodiversity, ecosystem services), and (d) communications materials and research products that maintain and enhance the profile of conservation investment to the conservation community, the investment sector, and the public.

Several examples of efforts to engage the private and public sectors in environmentally beneficial activities have appeared in the last 25 years, including carbon trading and finance, mitigation banking, and nutrient trading (*Figure 2*). The energy sector has, in particular, implemented projects at large scales in response to increasing competition from alternative power generation technologies, attracting the attention of

Sustainable Commodity	Recreation & Ecotourism	Tax Revenues	Ecosystem Services	Avoided Costs
Sustainably-produced commodities with market value, such as agricultural products, timber, non-timber forest products	Recreational use and tourism generates revenue through visitor fees and concessions	Tax and regulatory frameworks provide tax benefits for certain land uses or practices.	Value of services or resources in markets with established pricing, such as water and carbon credits.	Project benefits help avoid costs that would otherwise be incurred, such as with water filtration systems and flood control measures.

Figure 2. *Examples of revenue streams from conservation investment projects. Adapted from: https://ssir.org/articles/entry/green_bonds_and_land_conservation_a_new_investment_landscape*

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investors as a result. In the area of habitat conservation, a variety of novel investment options across the risk-return spectrum have also become available to environmentally-focused investors, including in green infrastructure development, sustainable production of agricultural commodities or extraction of natural resources, and the maintenance or restoration of valuable ecosystem services.

A recent study by Forest Trends' Ecosystem Marketplace (2016) summarized private capital commitments to conservation between 2004-2015 in three specific sectors: (1) sustainable food & fiber production; (2) habitat conservation, which includes mitigation banking and carbon trading; and (3) water quality and quantity, which includes watershed protection and water rights trading (*Figure 3*). Recent growth, particularly within sustainable food and fiber production, has accelerated considerably, although overall totals remain modest. Within each sector, approaches to conservation vary widely. For example, for land receiving investments in sustainable food and fiber, 88% was subject to a sustainability certification (e.g., Forest Sustainability Council, Sustainable Forestry Initiative, Rainforest Alliance), 66% affected by habitat management, 24% actively restored, 31% established no-take zones, and 2% managed by easements. Indeed, a growing number of non-governmental organizations, including The Nature Conservancy, Environmental Defense Fund, Conservation International, and American Bird Conservancy, now have dedicated staff or entire units focused on developing conservation finance solutions to achieve environmental goals. With increasing attention to financial risk due to climate change, investment in agricultural practices that enhance biodiversity and protect natural carbon sinks may also increase.

However, despite substantial fanfare, concern and dissenting opinions also exist, particularly regarding the potential risks faced by local communities, the *commodification of nature*, impediments linked to legal uncertainties, or subsidies with the potential to undermine success. Whereas proponents of conservation finance have heralded the entry of private capital as a potentially transformative, cost-effective way to achieve conservation and sustainable livelihoods at scale, skeptics warn of an underlying neoliberal agenda with the potential for adverse outcomes for local peoples via the promotion of *accumulation by conservation* and the dispossession of their land or natural capital. Critics have suggested that the promise of conservation investment has been overstated, plagued by a perennial failure to launch, and fated to remain outside global flows of capital (Dempsey and Suarez 2016; Clark et al. 2018).[16,13] One concern is that efforts to attract new private investment in conservation may require market-based interventions supported by public funds and *command-and-control legislation* that can translate into large, hidden public costs (Fletcher and Breitling 2012).[20] This view was supported by NatureVest and EKO Asset Management Partners (2014), who noted that >90% of the $23.4 billion invested in conservation from 2009–2013 originated in development banks, such as the World Bank, rather than private entities. As a result, ill-conceived investments have the potential to engender '*socialized risks*,' wherein public subsidies sustain private profits. Such concerns point to a critical role for the development of vetted, consistent frameworks to guide project development, design, implementation, monitoring, and evaluation, while also ensuring equitable and beneficial outcomes for all actors.

The pace of development in conservation finance currently provides many opportunities to advance such projects and evaluate and address criticism. For example, the Bonn Challenge (www.bonnchallenge.org/) aims to attract substantial private sector funding in association with The Global Partnership on Forest Landscape Restoration (*Figure 4*). Working together, these groups aim to reap the economic and climate benefits of restoring 150 million

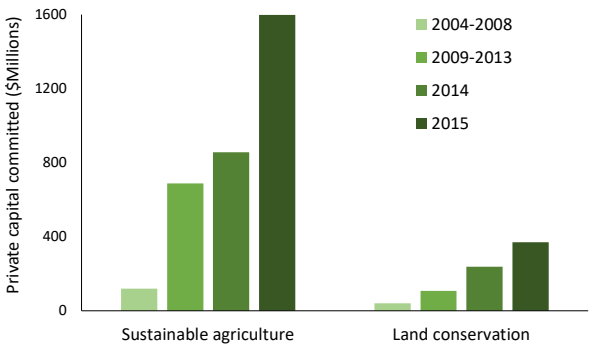


Figure 3. *Since 2004 private investments have risen substantially in sustainable agriculture and land conservation markets (Adapted from: Forest Trends, State of Private Investment in Conservation 2016: A Landscape Assessment of an Emerging Market).*

hectares of degraded or deforested land by 2020 and 350 million hectares by 2030. The International Union for the Conservation of Nature (IUCN) estimates that the net benefit to national and local economies of restoring 150 million hectares of forest approaches $85 billion per year. Value propositions for private investors involved in such projects can include payments for carbon storage and sequestration, production of sustainable and/or certified food or fiber, protection of water quality or quantity, or provisioning of other ecosystem services that increase with forest productivity and health, and/or species diversity and richness. As a case in point, Nicaragua's commitment to restore 2.8 million hectares of degraded land is estimated to return $848 million in economic benefits and 0.26 Gt of sequestered CO_2 while supporting rural livelihoods and conserving biodiversity and ecosystem services. However, systematic assessments of the vulnerabilities of such projects are still required, especially given that many of the most critical assumptions involving resource and revenue flows, legal structures, and conservation outcomes of conservation finance projects remain uncertain and unmeasured.

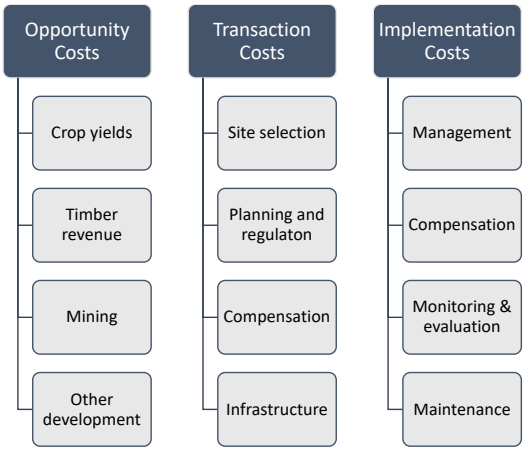
Figure 4. *Revenue streams from restored land as envisioned by the Bonn Challenge. Source: World Resources Institute.*

Figure 5. *Common costs associated with conservation investment projects.*

CHALLENGES AND BARRIERS TO MAINSTREAMING CONSERVATION FINANCE

In addition to the promises and perils outlined above, conservation finance faces challenges and barriers in the near-term that may constrain its ability to scale-up for mainstream investors. First, a fundamental issue arises in the fact that ecosystems are not yet valued for the full set of services they provide, despite much work on the monetary and non-monetary costs and benefits of conservation action under uncertainty (e.g., Ando & Mallory 2012).[2] Developing reliable, cost-effective metrics to quantify market and non-market benefits, costs, trade-offs, and co-benefits in ecosystem service and/or species conservation will be essential to avoid unsustainable harvest rates and ensure an explicit accounting of socioeconomic and ecological trade-offs (e.g., Clark 1972, Levi et al. 2012).[15, 29]

Second, financial obstacles to conservation investment still exist, including (1) a shortage of investable projects; (2) uncertain risk/return profiles; (3) small transaction sizes leading to high implementation/validation costs; (4) an absence of universal standards to evaluate projects and; (5) the absence of familiar exit strategies, risk mitigation approaches, or collateral options for investors (*Figure 5*).[33, 27] Reliable frameworks are also required to identify projects with positive social, environmental, and financial outcomes to addressthe potential for 'greenwashing'.



Third, more work is required to build trust while managing the social, political, and ethical risks potentially arising in conservation finance. For example, private investment in conservation has been characterized as an extension of *neoliberal environmentalism* and criticized for trying to solve many of the same problems that capital markets created.[8] In this view, conservation finance can be seen as a potential cover for capital accumulation by furthering *land-grabs*, *rent-seeking behavior*, or the creation of *poverty traps*, and can become more likely where land or resources provide collateral. Disparities

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among those individuals, communities, and entities potentially receiving benefits from conservation investments can also arise if revenues flow disproportionately to wealthy or powerful actors but remain out of reach for smallholder or landless farmers and workers. Such disparities are also well-known at national and continental scales, as illustrated in the Little Biodiversity Finance Book (https://www.globalcanopy.org/sites/default/files/documents/resources/LittleBiodiversityFinanceBook_3rd%20edition.pdf), which shows that the U.S., Europe, and China generate and receive most of the world's conservation funds, whereas Africa and Latin America receive just 6%.

Fourth, caution is warranted if projects might increase dependence upon agricultural or renewable resources that are of low value or subject to global oversupply. In these cases, projects may compromise economic diversification and the development of value-added products, especially in regions also subject to regulations, tariffs, export subsidies, or related penalties capable of distorting trade. Generating substantial revenue in agriculture can also be challenging for producers unable to capture a fair share of global prices when selling into internationalized value chains. For these reasons, commodity-dependent countries can suffer chronically poor economic performance, a pattern labeled as '*the commodity problematique*' or '*natural resource curse*'.[44]

Last, concerns and misperceptions about conservation finance also persist among ecologists and practitioners. For example, whereas such projects aim to marry environmental and socioeconomic benefits, there remains a very wide scope among projects with blended financial and environmental goals, particularly in sustainable forestry, agriculture, and fisheries. In the absence of certified standards and reporting metrics, such projects have the potential to introduce novel environmental risks, open the door to *greenwashing*, over-emphasize conservation outcomes, and potentially undermine success in the field.

GOALS OF THIS ISSUE:

Recognizing the potential promise of conservation finance and its rise on the agendas of governments and non-governmental organizations, we assembled practicing and academic experts in finance, law, social science, ecology, and environmental science to evaluate key opportunities and challenges in conservation finance, identify priority needs, and outline ways in which scientists and practitioners might help shape the field to ensure positive outcomes for people and the planet.

Our discussion rested on two initial premises. One, while acknowledging a wide range of concerns regarding private finance and monetary valuation of nature, we recognized that innovative funding mechanisms and financial structures can and have played key roles in sustaining and restoring biodiverse ecosystems in rapid decline globally. Two, because large-scale efforts to mobilize private finance are already underway and may accelerate, we recognized an urgent need to engage ecologists, environmental social scientists, and a broader conservation community to identify and examine potential impediments, risks, and benefits of conservation finance.

Ultimately, we suggest that individuals and organizations working in conservation finance engage in three fundamental discussions about how to (1) build constituencies and trust by establishing social and environmental safeguards for the projects, places, and people involved; (2) develop financial structures capable of facilitating conservation investment globally; and (3) propose standardized frameworks for project development, design, implementation, monitoring, and evaluation. In the remainder of this paper, we incorporate these fundamental conversations, expert opinion, and literature to identify key challenges to be overcome or to more fully articulate the environmental, social, and financial dimensions at issue (Box 2). We then review five priority actions required to mainstream the field:

1. Design investable projects with meaningful conservation impacts.
2. Develop rigorous but flexible frameworks to standardize metrics and monitoring

protocols, compare project and investment outcomes, and track progress towards global targets.

3. Establish safeguards, protocols, and ethics for engaging local stakeholders.
4. Create project blueprints and design tools to ensure positive environmental outcomes while generating sustainable economic returns.
5. Reconsider existing financial vehicles and structures of investment projects to improve flexibility, performance, and salience for stakeholders.

BOX 2. CHALLENGES AND NEEDS IN CONSERVATION FINANCE

Challenges and needs in conservation finance identified by 22 international experts with disciplinary expertise and experience in finance, law, social and environmental policy and conservation at the Peter Wall Institute for Advanced Studies International Roundtable on Conservation Finance, held March 2018, at the University of British Columbia, Vancouver, Canada. Participants identified and ranked by importance, the key challenges that are still necessary to overcome to mainstream conservation finance globally.

Environmental challenges

1. Design projects with positive environmental impact and sufficient revenue to attract investors and be financially self-sustaining
2. Identify practical, evidence-based targets for restoration/conservation outcomes
3. Develop a rigorous framework to measure and monitor environmental outcomes
4. Potential mismatches between conservation outcomes and the spatial or temporal scale of projects
5. Unfamiliarity about the role of private finance in the conservation community
6. Difficulty in valuing and assessing ecosystem services

Social challenges

1. Limits on participation due to land tenure, title, or rights
2. Avoiding poverty traps that reduce well-being, and insuring outcomes that enhance well-being
3. Lack of community monitoring to track social/environmental outcomes
4. Strategies to engage and build capacity for local participation
5. Limits on access to finance or markets
6. Limits on bargaining power by small, fragmented, or vulnerable producers
7. Safeguards to build trust, ensure rights, and prevent exploitation by rent-seeking, ransom, or hold-out behavior

Financial challenges

1. Lack of standard frameworks, metrics to attract capital investment and monitor outcomes at relevant scales
2. Lack of a rigorous screening to identify projects, including risk-return profiles
3. Few mechanisms to expose patient and social capital investors directly to conservation initiatives needing seed or operational financing
4. Uncertain or mismatched time horizons for returns (i.e., lack of patient capital)
5. Scalability, transaction size, lack of efficient mechanisms to bundle projects
6. Limited record to demonstrate proof of concept
7. Absence of standard risk mitigation or exit strategies to investors
8. Uncertain oversight, regulation, and enforcement

These needs are not discrete and include overlapping issues related to project design, the market and non-market valuation of ecological goods and services, short and long-term costs of conservation actions, impact assessment, safeguards, governance structures, and relationships necessary to achieve scale in conservation finance. Fulfilling such needs in ecological monitoring, impact evaluation, and economic valuation will remain challenging in the absence of political will to fund adequate research or implement solutions known to have promise. While continued growth in conservation finance may lead to new incentives and funds to address such needs, solving them in general ways will be challenging. Therefore, we focus on investments wherein significant progress appears to have already been made. The remainder of this *Issue* reviews each of these priorities using existing resources, examples of progress, and needs, and then identifies links and research priorities.

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NEED 1

Design investable projects with meaningful conservation impacts

Conservation finance projects require a purposeful design to achieve meaningful impacts and avoid opportunism and costly outcomes for stakeholders. Substantial work is required to define goals precisely, estimate the marginal benefit of conservation investments (e.g., increase in a wildlife population or service), their market and/or non-market value, as well as the monetary and non-monetary opportunity costs of conservation. While the provision of ecosystem services is often discussed as a co-benefit of many conservation projects, tradeoffs among ecological goods and services and socio-economic objectives can also arise in ways that add substantial complexity and uncertainty to predicting potential outcomes (e.g., Clark 1973 [15], Ando & Mallory 2012 [2], Levi et al. 2012 [29]). Therefore, we describe briefly how expert knowledge and the application of design tools and valuation methods should help practitioners, local actors, and scientists to identify and achieve positive, measurable conservation and socio-economic outcomes.

DEFINE THE PROBLEM AND GOALS

Articulating the problem a project sets out to solve and the specific project goals and targets are the first steps in identifying interventions that can be facilitated by conservation finance. In defining project goals and targets, it is critical to conceptualize the appropriate scales and methods used in project planning and to derive evidence-based assessments of monetary and non-monetary project benefits, costs, risks, and potential outcomes. Given sufficient knowledge, predictive models that incorporate key parameters of system change can be used to improve transparency by helping to estimate project risks and returns, including by using the marginal benefits and costs of conservation and portfolio theory to optimize management actions given temporal and spatial uncertainty due to anthropogenic climate or habitat change.

Failing to conceptualize conservation problems and projects explicitly increases the chance that key drivers of system states are incompletely addressed or entirely missed, undermining a project's enduring positive impacts. For example, ensuring that the spatial and temporal scales of projects match the intended conservation outcomes should reduce the likelihood that uncertainties about ecological processes, emerging threats, or species biology, which can all respond to pressures at different spatiotemporal scales, lead to underperformance in socio-economic or conservation objectives. For example, demand for wildlife products often originates in markets far from the regions in which illegal harvest occurs (Box 3). In such cases, interventions to enhance conservation at regional scales can be overwhelmed by market forces or policies operating at national or global scales. Tools to identify appropriate project scales and realistic conservation outcomes are now available, including evidence-based, quantitative models that can be used to characterize project inputs and outputs at local and landscape scales (e.g., Sustainable Landscapes Rating Tool – Climate, Community & Biodiversity Alliance: http://www.climate-standards.org/sustainable-landscapes-rating-tool/).

Projects that aim for outcomes at multiple scales or in different sectors (e.g., enhancing species/habitat targets and ecosystem services) also face challenges due to limits on empirical understanding of ecological and socioecological processes globally. To the degree that uncertainties about particular outcomes can be quantified over the range of interventions being considered, structured decision-making protocols, modern portfolio theory, and quantitative optimization models can all help minimize specific risks to social, ecological, or financial dimensions of conservation finance projects.

SELECT INTERVENTIONS TO ACHIEVE INTENDED OUTCOMES

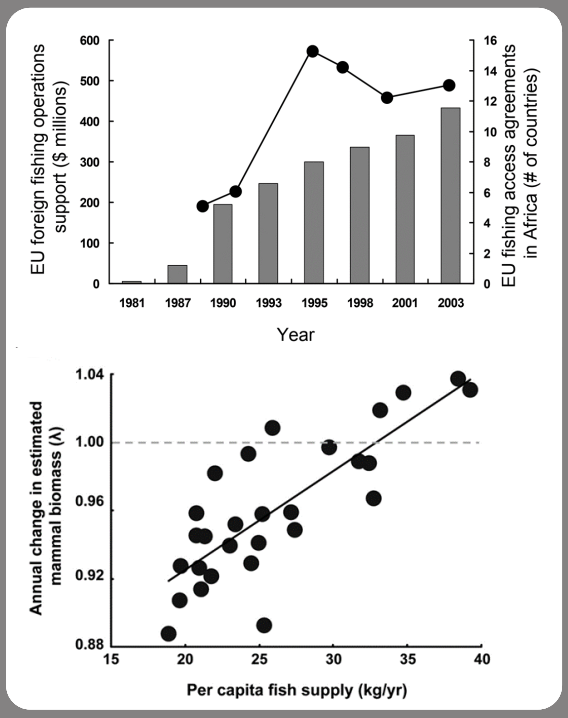
Identifying evidence-based interventions and their meaningful social and ecological outcomes represents a particularly critical step in project design, in part because empirical evidence on the efficacy of specific ecological interventions remains sparse globally and may be absent locally. Project

BOX 3. ECONOMIC SUBSIDIES, FOREIGN MARKET DEMAND, AND BIODIVERSITY DECLINE

Rising prices and demand for ivory predicted a renewed decline in African elephant populations in the 1980s[3] and continues to do so despite an international ban on ivory sales.[47] Although an obvious case of market-driven over-exploitation, elephant declines offer a poignant example of the inherent instabilities of conservation programs that rely on resource harvest and are easily influenced by market demands and subsidies.[5, 3]

A more insidious case of subsidies and market demand on biodiversity conservation was revealed by Brashares et al. (2004)[6], who supported the conceptual models of Barrett and Arcese[4] by demonstrating clear empirical links between European Union subsidies, per capita fish supply, and the catastrophic decline of terrestrial mammal populations in West Africa from 1970 to 1999. EU subsidies to fishing fleets in West Africa increased from 0 to >$400m/year (top left), while also increasing their annual take from less than 50,000 to >1 million tons annually. The ensuing collapse of the Gulf of Guinea fish stocks and continued export and over-harvest of marine fish from West Africa decimated local artisanal fishing communities. It also led to dramatic increases in the regional price of fish, illegal hunting, and the collapse of terrestrial mammal populations to supply massive increases in bushmeat sale and consumption by human populations forced to seek out new protein sources (bottom left).

Box 3 Figure 1. Photo Credit: P. Arcese



Box 3 Figure 2. Reprinted from Brashares et al. 2004

developers thus require repeatable methods to elicit and employ local and expert knowledge to predict the effectiveness of interventions over a range of socioecological and financial targets. In natural resource management, such approaches typically seek to characterize and/or optimize conservation outcomes given a specific intervention. Although the efficacy of many ecological interventions is inherently uncertain due to the timescales involved, a large economic literature on the ex-post evaluation of conservation and development projects does suggest many areas of consensus on the types of interventions more and less likely to achieve their intended outcomes.

Reducing the risk of harmful outcomes is a particular concern. Adaptive Management (see Williams and Brown 2012 for applications guide), Structured Decision Making (see Gregory et al 2012 or for description), Modern Portfolio Theory,[3] Priority Threat Management,[9] and Bayesian Networks[31] all offer protocols to anticipate uncertainty, reduce risk, and optimize long-term outcomes. Applying such tools in conservation finance thus has the potential to advance project evaluation substantially. For example, Stewart et al. (2005) proposed an 'evidence-based framework' similar to those established in health services, whereby judgments about the quality of evidence for a given intervention are based on systematic reviews of studies weighed by their rigor. Applying such approaches to develop standardized, vetted frameworks for the evidence-based selection of interventions and project design in conservation finance could benefit from existing examples and advance evidence-based practice in applied conservation biology (Box 4).[43]

ASSESS AND MITIGATE RISK

Every project includes ecological risks such as floods, fire, disease, pest outbreaks, climate change, as well as social and economic risks related to markets, political unrest, human displacement, or trade subsidies or

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BOX 4. CASE STUDY: WHAT WORKS IN CONSERVATION ASSESSMENT

Expert panels assess and synthesize evidence for alternate interventions in terms of effectiveness (0 = no effect; 100% = always effective), certainty or strength of evidence for positive outcome (0 = no evidence, 100% high quality evidence), and potential harm to the species or habitat of concern (0 = none, 100% major negative side-effects to species or habitats of concern). Interventions are then classified into 8 categories based upon elicited scores to produce ranked predictions of the merits of particular interventions as 'Beneficial' to 'Likely ineffective or harmful'.

Categories	Effectiveness	Certainty	Harms
Beneficial	>60	>60	<20
Likely beneficial, case 1	>60	40-60	<20
Likely beneficial, case 2	40-60	>40	<20
Trade-offs for benefits & harms	≥40	≥40	≥20
Unknown	Any	<40	Any
Unlikely to beneficial	<40	40-60	<20
Likely ineffective or harmful, case 1	<40	>60	Any
Likely ineffective or harmful, case 2	<40	≥40	≥20

Box 4 Figure 1. Source: www.conservationevidence.com

For example, interventions to reduce fisheries by-catch of seabirds were evaluated in the 2017 volume of What Works in Conservation.[42] Only use of stream lines on longlines was determined "Beneficial"; although marking trawler warp cables to reduce collisions, releasing offal overboard when setting longlines, and weighting baits or lines were "Likely to be beneficial". Use of line shooters was deemed "Likely to be ineffective or harmful", whereas others had insufficient or limited evidence.

tariffs. Even affirmative actions, such as co-management agreements in reconciliation with Indigenous peoples, may engender risk if they influence land rights or title. Estimating the magnitude of such risks, potential mitigation measures, and trade-offs with respect to the likelihood of positive ecological, social, and financial outcomes is therefore essential.

Frameworks designed to minimize risk in conservation planning exist, including qualitative and quantitative tools capable of assessing project risks from planning to operation. The Restoration Diagnostic (World Resources Institute) initially assesses projects by scoring the presence, absence, and influence of factors thought to predict success by: (1) motivating awareness of environmental, social, and economic benefits and costs of projects; (2) enabling conditions related to the ecology and status of the system, market, supply chains, governance, and policies (e.g., *land tenure*, restricted activities, engagement); and (3) given capacity and resources to implement and sustain leadership, knowledge, and financial evaluation. With risks and deficiencies identified, the costs of incurring or mitigating them can then be evaluated in the context of the social, biological, or financial sustainability of projects (*Figure 6*). Quantifying such risks precisely should also facilitate their explicit inclusion in investment blueprints (see Need 4) and, potentially, contribute to the development of conservation insurance funds, or comparable guarantees, built on blended finance strategies that engage multilateral groups, foundations, or development organizations.

OPTIMIZE CO-BENEFITS FOR PEOPLE AND THE ENVIRONMENT

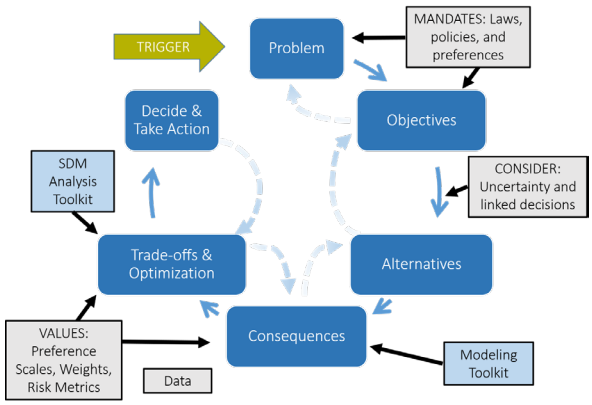

Figure 6. *A conceptual framework for structured decision-making in resource management. A goal of such approaches to characterize formal steps to identifying and contrasting conservation interventions using a range of tools applied within an implicit 'theory of change.' (https://nctc.fws.gov/courses/programs/decision-analysis/structured-decision-making-overview.html).*

Severe limits on global investment in human development and biodiversity conservation, typically pursued independently, emphasize a need to recognize a range of social and ecological synergies as potential benefits in all such projects. *Co-benefits* include but are not limited to protecting water quality and quantity, improving soil productivity and health, restoring forests to sequester carbon, and diversifying croplands to support rural livelihoods. Despite optimistic assessments of the potential to achieve *co-benefits* for people and the environment, developing projects that optimize their provision

remains challenging due to a range of practical uncertainties linked to ecosystem function and potential trade-offs among ecosystem services and socio-economic or conservation goals, as well as existential uncertainties about their valuation. Likewise, understanding how co-benefits might be influenced by unanticipated changes in markets, infrastructure (e.g., access), or regulatory frameworks may add considerable complexity to the estimation process.

In principle, spatial optimization models designed to maximize environmental, social, and financial benefits while minimizing project costs offer a potentially promising approach in project evaluation. Although many regions of the world lack precise spatial data on markets, land tenure, value, and condition, or biodiversity and ecosystem services, mapping data and tools are appearing rapidly. These include an impressive array of tools to measure, model, or value ecosystem services and, thus, estimate co-benefits associated with specific interventions or project locations, summarized in Box 5.

BOX 5. TOOLS FOR MEASURING, MODELLING, AND VALUING ECOSYSTEM SERVICES

Assessments serve a wide range of purposes, including in adaptive management, policy support, public engagement, and knowledge generation; tool selection should be informed by goals and constraints. An IUCN report[34] reviewed nine tools to assess ecosystem services. In addition to providing descriptions of tools, types of information needed, outputs obtained, ease of use, and ecosystem services assessed, Neugarten et al. provided decision trees to guide the selection of tools including:

WRITTEN STEP-BY-STEP TOOLS

- Ecosystem Services Toolkit (EST)
- Protected Areas Benefits Assessment Tool (PA-BAT)
- Toolkit for Ecosystem Service Site-based Assessment v. 2.0 (TESSA)

COMPUTER-BASED MODELLING TOOLS

- Artificial Intelligence for Ecosystem Services (ARIES)
- Co$ting Nature v.3 (C$N)
- Integrated Valuation of Ecosystem Services and Tradeoffs 3.4.2 (InVEST)
- Multiscale Integrated Models of Ecosystem Services (MIMES)
- Social Values for Ecosystem Services (SolVES)
- WaterWorld v.2

TAKE-HOME MESSAGE

For conservation investments to have meaningful outcomes, careful attention must be given to their design, including the selection of interventions, ability to anticipate and manage risk, and potential to generate reliable, positive co-benefits for people and the planet. Equal attention must also be given to the potential socio-economic and ecological costs and trade-offs involved. To achieve these aims, conservation projects must be explicit in the identification of key drivers of ecosystem state, trend, and change, within a sound theory of change, using transparent, evidence-based models to do so.

NEED 2

Develop rigorous but flexible frameworks to standardize metrics and monitoring protocols, compare project and investment outcomes, and track progress towards global targets

The conservation community still lacks cost-effective, evidence-based approaches to evaluate interventions, despite much effort to do so and wide recognition of the need for reliable monitoring and evaluation data and standards. This situation contrasts sharply

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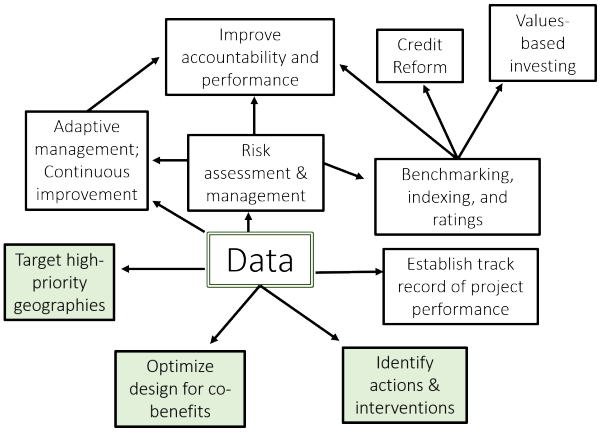
with the financial services and investment sectors, which regularly employ standardized indicators of financial risk and return. Stakeholders and investors in conservation projects are also keenly interested in tracking environmental and socio-economic outcomes, especially given the uncertainties in their dynamics noted above. Developing such indicators remains a challenge given the timeframes needed to reach desired conservation, social, and economic outcomes, the slow pace of many ecological processes, and the potential for rare events with large impacts (e.g., climate anomalies, invasive species, disease). We suggest that metrics and targets developed in the financial sector to assess risks and opportunities associated with climate change may offer helpful insights; for example, a governance and disclosure framework proposed by the Financial Stability Board Taskforce on Climate-related Financial Disclosures has been endorsed by many governments, all major banks and accounting firms, and hundreds of institutional investors globally (https://www.unepfi.org/climate-change/tcfd/).

Standardization of monitoring and evaluation frameworks and the development of reliable metrics and indicators (hereafter '*metrics*') of project outcomes have therefore been repeatedly identified as necessary to facilitating conservation investment at large enough scales to enhance socio-economic and biodiversity outcomes globally (*Figure 7*). Ideally, suites of such metrics will be used to evaluate interventions, identify best practices, and demonstrate the value of projects to investors and local communities, through monitoring to ensure accountability, transparency, and continuous improvement.



DEVELOP METRICS THAT ARE SCALABLE, COST-EFFECTIVE, AND TIGHTLY LINKED TO DESIRED OUTCOMES

An enormous range of qualitative and quantitative metrics exist to characterize socio-economic, environmental, and human dimensions of conservation projects. However, they vary hugely in simplicity, their ability to act as lagging or leading indicators, and cost when estimated from remotely sensed or field-based measurements. As a result, it is challenging to identify metrics that are sufficiently reliable, tightly linked to project outcomes, and standardized to facilitate comparisons of performance across projects that vary in size, scope, or time horizon. Recently, Hawkins & Beatty (2019) applied the IUCN Biodiversity Return on Investment (BRIM) tool, developed in collaboration with the finance industry, to estimate the change in the risk of bird species extinction given investments in a conservation project on coffee farms in El Salvador. BRIM is a component of the IUCN's Species Threat Abatement and Restoration metric (STAR; see next page). Likewise, Priority Threat Management is a powerful tool that can also be used to estimate the cost-effectiveness of conservation interventions to explicitly estimate the return on investment in alternative projects or approaches in species and ecosystem conservation.[9] We recommend additional research aimed at developing and validating composite or multi-purpose metrics that could serve as benchmarking tools (e.g., *S&P 500*) or tracked to record progress towards global conservation targets, such as those articulated in the post-2020 global biodiversity framework of the Convention on Biological Diversity and potentially standardized in consultation with international organizations, government agencies, and financial services industry.

Recent additional examples of impact metrics and/or associate platforms proposed to date include:

- **IMPACT REPORTING INVESTMENT STANDARDS (IRIS+)**
  https://iris.thegiin.org/
  The IRIS+ catalog provides a series of metrics that can be used in a variety of sectors, including clean energy, agriculture,

Figure 7. *The availability of reliable monitoring data underlies many recommended approaches and solutions in conservation finance. Standardized metrics to track socio-economic and environmental outcomes are still required to evaluate and compare project performance and ensure positive outcomes at meaningful scales.*

financial inclusion, health, gender, forestry, and water. The Global Impact Investing Network (GIIN) has recently launched a beta version of their updated metrics on the IRIS+ portal featuring 32 specific biodiversity & ecosystem metrics (GIIN 2019).

- **GLOBAL IMPACT INVESTING RATING SYSTEM (GIIRS)**
  Developed by B-Analytics, GIIRS uses a common set of indicators across themes of Community, Environment, Workers, Governance, and Consumers (B-Analytics, 2018). It is reasonably cost-effective, easy to implement, and the ratings are clear and concise. However, the importance given to environmental matters is fairly low.
- **IPAR** https://iparimpact.com/
  A tool to measure and report the impacts created by an investment, the goal of iPAR is to align communication between investors and investees by providing standardization of themes or location and metrics (iPAR 2018)
- **ESSENTIAL BIODIVERSITY VARIABLES (EBV)**
  EBVs are an initial suite of metrics designed to provide a standardized framework for collecting data to monitor and identify key drivers of environmental change. EBVs were developed by the Group on Earth Observations Biodiversity Network, a collaboration of scientists affiliated with the Global Observation of Forest and Land Cover Dynamics (www.fao.org/gtos/gofc-gold/) and GEO BON (http://geobon.org/).
- **SPECIES THREAT ABATEMENT AND RESTORATION METRIC (STAR)**
  STAR measures the opportunity for changing the likelihood of species extinction and can be derived at both site or country levels. Based on the IUCN Red List of Species, it can be estimated ex-ante from existing data and then measured as a baseline and ex-post, following an intervention, using field data to monitor outcomes. See https://www.iucn.org/regions/washington-dc-office/our-work/species-threat-abatement-and-recovery-star-metric
- **IUCN GREEN LIST**
  IUCN Green List is a preliminary framework for assessing species recovery and conservation success, emphasizing viability, functionality, and representation, and using counterfactuals to quantify recovery. Four metrics were proposed to demonstrate: (1) impacts of conservation effort; (2) dependence of species on conservation action; (3) expected gains given a conservation action; and (4) the conditions necessary for long-term recovery. These metrics were designed to incentivize, establish, and achieve conservation outcomes to establish an IUCN Green List of Species.

In all cases, however, scenario testing will be helpful when metrics are uncertain, such as under alternative climate projections. Mark Carney (former Governor, Bank of England) suggested scenarios be comprehensive, rigorous, and challenging; guidelines for doing so are available from the Task Force on Climate-related Financial Disclosures (www.fsb-tcfd.org) for carbon-related investments and have been endorsed by more than 1500 companies and investors globally.

ENSURE METRICS ALIGN WITH A WELL-ARTICULATED THEORY OF CHANGE OR LOGIC MODEL

Theories of change represent holistic, causal models of problems that inform overarching strategies and make assumptions explicit, whereas logic models provide a descriptive framework for implementation focusing more narrowly on specific goals along different pathways. Articulating a theory of change or logical model can provide critical direction on activities, metrics, and indicators because they force project developers to identify relevant targets, spatiotemporal scales for evaluation, and potentially confounding socioecological factors (e.g., Need 1). Both approaches should help to ensure that metrics align with project outcomes as well as practices, and that project assumptions and aspirations are well defined. However, because many ecological and socio-economic values are hard to estimate (e.g., existence values), careful thought is also warranted when deciding how to treat such benefits and costs.

LEVERAGE BIG DATA

Big data from a wide variety of sources have the potential to advance monitoring for performance in conservation investments dramatically. Open access to data on agriculture, climate, land use/land cover, biodiversity, human health, energy, and

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other topics is increasingly available from government agencies (US, http://data.gov; European Union, http://open-data.europa.eu/en/data/; UK, http://data.gov.uk/), businesses (Amazon, http://aws.amazon.com/datasets; Google, https://www.google.com/publicdata/directory), and organizations such as the World Health Organization, International Union for the Conservation of Nature, and NatureServe (http://www.natureserve.org/). Increasing rigor in the collection and maintenance of *citizen science or crowd-sourced data* is allowing some environmental monitoring programs to surpass the detail, coverage, and/or precision of traditional public or private sector providers. For example, eBird (https://ebird.org/home), the world's largest biodiversity-related citizen science project, receives >100 million observations each year from volunteers around the world. The Cornell Lab of Ornithology maintains these real-time and archived data in an open-access and online platform and provides sophisticated analytics about distribution, abundance, population trends, and habitat associations of birds around the world.

STANDARDIZE AND IMPROVE MONITORING PROGRAMS

Forest Trend's Ecosystem Marketplace reported that 25–35% of projects surveyed from 2009–2015 used 'in house' evaluation criteria, and <20% used third-party standards or certification services, indicating a need for consistency in metrics and monitoring strategies in conservation finance. The use of non-standard metrics can contribute to (1) a lack of transparency, (2) the uncertain alignment of targets and goals, (3) an inability to conduct comparative analyses of project scale or impact at local, regional, national, or global scales, and/or (4) an inability to compare year-over-year performance among projects with similar contexts and goals. Developing standardized, vetted, and transparent metrics and monitoring programs thus represents a key hurdle to growth in conservation finance. Advances in cloud computing and big data should hasten the development of standardized metrics and monitoring by increasing their reliability and cost-efficiency. However, failure to do so may create opportunities to exploit stakeholders by using unvalidated metrics that can be gamed (i.e., *Goodhart's law*). Collaboratively cultivating standards with third-party assessors who can establish vetted protocols and enforce standards provides one potential path forward.

USE METRICS TO BUILD CONFIDENCE AND CAPACITY IN INVESTORS AND THE CONSERVATION COMMUNITY

Much evidence indicates that conservation and investment communities require better protocols, metrics, and monitoring to ensure project transparency and evaluation (*Figure 7*). Ideally, such products will include open-source data and tools to minimize project costs while maximizing the ability to compare projects in different regions and across goals. Filling such gaps should also help address concerns expressed by ecologists, social scientists, and conservation practitioners regarding the potential for greenwashing and perverse outcomes. These concerns are also shared by many potential investors in conservation. The GIIN noted in a 2017 survey of impact investors that >90% monitored at least some social or environmental indicators of project performance. Investors also used monitoring data to determine project impacts (83%), report impacts to stakeholders (78%), improve impacts over time (75%), and enhance project value (63%). Likewise, projects used at least some impact data to communicate results to stakeholders (85%), identify or refine metrics (72%), or improve data protocols, analysis, or interpretation (67%). Standardizing such metrics and approaches in ways that foster transparency and confidence among all stakeholders could include recruiting and/or training environmental auditors to help establish such standards. Helpful examples already available include Third-Party Assessments, Cross Cycle Measurement Systems, or Balanced Scorecard Tools (Box 6).

TAKE-HOME MESSAGE

Growth and maturation of the conservation finance field requires the development of reliable, standardized monitoring frameworks and metrics to assess outcomes, facilitate the comparative analysis of projects within and across sectors, cultivate a culture of continuous improvement, and ensure transparency and accountability for all stakeholders.

BOX 6. EXAMPLES OF THIRD-PARTY ASSESSMENTS, CROSS CYCLE MEASUREMENT SYSTEMS, SCORECARDS, AND TOOLS

- Global Impact Investing Network's IRIS: Environmental Impact Objectives (checklist)
- Sustainable Agriculture Network standards (SANS)
- Council on Smallholder Agricultural Finance's environmental, social, and governance (ESG) principles
- The Sustainability Consortium (TSC)
- PwC's Total Impact Measurement & Management (TIMM) framework
- iPar
- United States Sustainability Accounting Standards Board (SASB)
- Sustainable Landscapes Rating Tool http://www.climate-standards.org/sustainable-landscapes-rating-tool/.
- The Investment Leaders Group (ILG) Framework
- Stakeholder platforms co-developed with the Committee on Sustainability Assessment
- GAAP – Generally Accepted Accounting Principles
- IFRS – International Financial Reporting Standards
- Society for Ecological Restoration's 5-star recovery scale
- Equator Banks / IFC Performance Standards
- World Bank Environmental and Social Safeguards
- Financial Stability Board, Taskforce on Climate-related Financial Disclosures (TCFD)
- EDF's Principles for Investment in Sustainable Wild-Caught Fisheries
- Encourage Capital's Sustainable Fisheries Goals
- Meloy Fund's ecosystem metrics for fisheries projects

NEED 3

Establish safeguards, protocols, and ethics for engaging local stakeholders

Conservation investments have the potential to affect large segments of society because about half of all humans depend directly or indirectly on employment in agriculture, forestry, and fisheries (*Figure 8*). This high degree of dependence is highest in parts of the world where global trade and investment is dramatically influencing local markets and contributing to food and land insecurity. Sayer et al. (2013) developed ten summary principles in support of landscape approaches to addressing conservation and development trade-offs; these offer useful lessons for conservation finance. Synthesizing these lessons and existing literature reinforces learning in community conservation projects (see Introduction) and highlights governance as among the most severe obstacles to project implementation. Conservation investments must be flexible, based on genuine stakeholder engagement, and accommodate multiple objectives, especially those of local people.

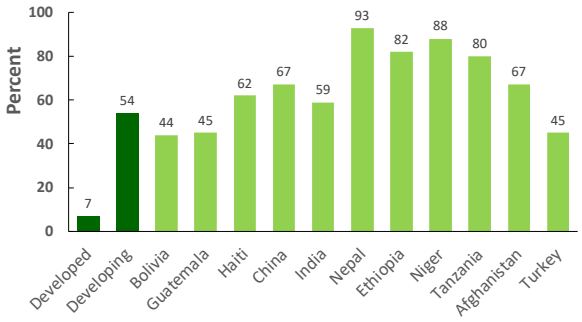

Figure 8. *Because a high percentage of the global population is supported by agricultural, forestry, or fisheries sectors (below from WRI, UN, and World Bank. 2005), conservation investments related to sustainable commodities may support local livelihoods.*

BUILD SOCIAL BENEFITS INTO CONSERVATION PROJECTS

Despite many attempts to construct conservation projects in ways that deliver

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social benefits to local people, success has been mixed (e.g., Ezzine De Blas et al. 2011 and Riggs et al. 2018). Mixed success typically arises due to uncertainties linked to land tenure or resource ownership, or to weakness in regional or national governance structures affecting natural resource use and conservation. For example, conservation investments increasingly involve projects structured as Payments for Ecosystem Services (Box 7), but legal, political, or other complexities have led to unanticipated negative outcomes for local communities. These failures reinforce the need for cost-effective, independent monitoring protocols that derive from processes outlined in Needs 1 and 2, and that include monitoring of local livelihoods and local benefit flows.

ENGAGE AND EMPOWER LOCAL COMMUNITIES IN PROJECT DESIGN, DEVELOPMENT, AND IMPLEMENTATION

Stakeholders that benefit from conservation investments will share interests in project performance. Engaging local communities as stakeholders will require increased capacity in conservation organizations to understand, articulate, and address the concerns and interests of all people potentially impacted by new investment. Recognizing these shared interests also emphasizes that projects designed to benefit all stakeholders and the environment must ensure that no single stakeholder has a unique claim to monitoring data or their interpretation in different knowledge systems. Catch Together (Box 8) engages resource-based communities with private investors interested in sustainable fisheries, conservation, and strong fisheries management systems. By providing low-interest loans to community fishing organizations, Catch Together facilitates the acquisition of fishing rights or tradeable 'quotas' and involves fishers in data acquisition and decision-making. Such help addresses the need for standardized frameworks and metrics to facilitate engagement and ensure transparency among stakeholders and investors (Need 2).

SAFEGUARD OR IMPROVE TRANSPARENCY

Another pervasive social issue is limited transparency or disclosure around the use of public, philanthropic, and multilateral funds

BOX 7. THE COMPLICATED CASE OF PAYMENTS FOR ECOSYSTEM SERVICES (PES)

When the benefits of an ecosystem service flow to those individuals making management decisions about the resource, private markets may help to incentivize decisions that provision the service. In contrast to command-and-control regulation or other common government interventions, PES schemes rely upon incentives and are more effective than regulation when there is wide variation in management and/or abatement costs.[28] That said, in situations where PES accrue to outside the project area, externalities can lead to market failure by causing individuals to manage for less of the service or increase the profitability of environmentally harmful activities by changing prices. Ransom (hold-out) behavior to leverage additional compensation or manipulation of baseline conditions are other potential negative outcomes of PES programs. Ultimately, the effectiveness of PES schemes depends on the availability of robust and appropriate indicators or proxies for environmental and social outcomes, as well as thorough examinations of the marginal benefits and costs, including the opportunity costs of alternative conservation actions and outcomes under uncertainty (e.g., Ando and Malloy 2012, Levi et al. 2012).

Though PES schemes certainly have opportunity to support rural livelihoods, harm still can come to the poor.[24] For example, although poor service users may benefit from improved environmental conditions (e.g., water quality), poor laborers might be harmed if there are fewer employment opportunities from reduced extractive uses like logging and farming on land newly dedicated to ecosystem services. Likewise, if large areas of land are set aside, then production of staple crops could decline and drive up prices. Jack et al. (2008) found that PES policies were most likely to alleviate poverty when the poorest providers have the lowest opportunity costs and highest potential to provision services. Even in those cases, benefits to poor providers still can be constrained by informal and insecure land or resource tenure, power imbalances that silence their voices when developing programs, differential opportunity costs, and high transaction costs for smallholders.[24] Grieg-Gran et al. (2005) recommend that the following three key questions be addressed when designing programs: (1) Do smallholder providers have comparable access to markets and market shares as more affluent competitors?, (2) Do livelihoods and wellbeing of smallholders improve when they have opportunity to sell environmental services, and (3) How do market-based initiatives affect the wellbeing of poor people not directly involved in the transaction?

for stimulating and de-risking investments. For example, in cases where there is a risk-shifting use of public resources towards leveraging and de-risking investments, the public should be informed about the risk burden. In less developed countries, institutions that manage natural resources often advance their own institutional agendas, operating as patronage systems that capture rents from the systems they are intended to support.

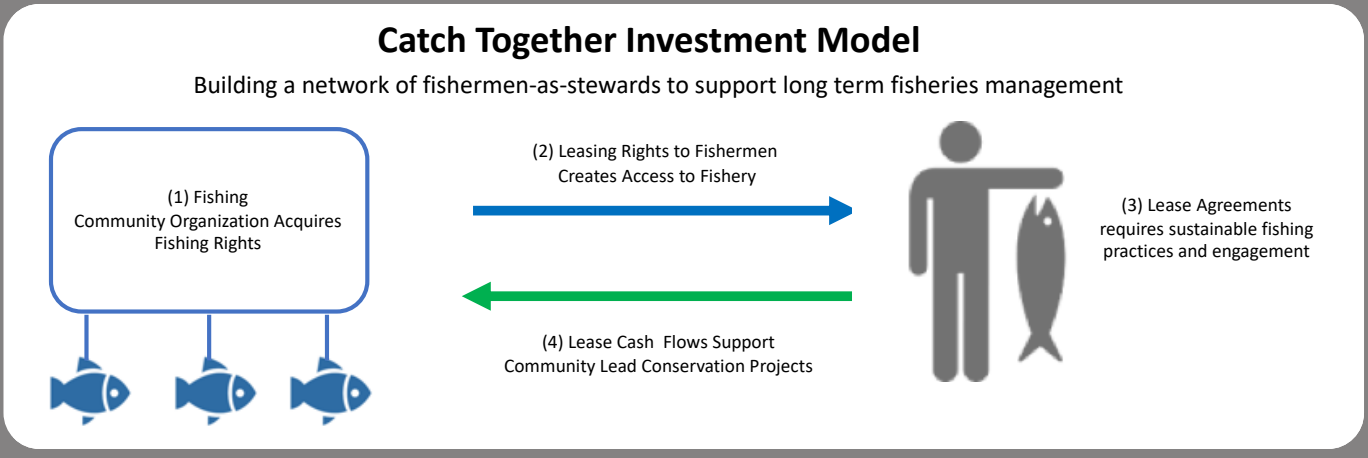
Ensuring transparency and equity in conservation finance depends, in part, on developing explicit and measurable biodiversity and community objectives, a clear understanding of interventions and expected outcomes, and a practical set of indicators of socio-economic, ecosystem, and financial performance. We suggest practitioners achieve these goals by developing an explicit *theory of change* expressed in a way that engages all stakeholders (Need 1), lays out reliable protocols for monitoring system state and performance (Need 2), and makes financial and governance structures and flows, explicit.

ANTICIPATE CHALLENGES RELATED TO GOVERNANCE OR POWER DIFFERENTIALS

Inherent inequalities in power among stakeholders make it clear that governance structures, institutions, and external funders must also be clear and specific about the rights and roles of local people in conservation finance, based on genuine consultation and engagement. Rights and responsibilities affecting resource use and access to land often shape social and conservation outcomes, particularly in regions of the world where severe challenges to biodiversity conservation co-occur with extreme poverty, inefficient markets, and

BOX 8. CATCH TOGETHER

Catch Together provides low-interest loans to community fishing organizations to support their acquisition of fishing rights or tradeable 'quotas.' Communities lease quotas to fisherfolk willing to fish sustainably and participate in conservation programs and advocate for strong fisheries management and systems. Communities can use cash flows generated by leasing activities to fund cooperative research or conservation initiatives. Long term, the Catch Together model could enable communities to build fishing endowments, wherein quota value is linked to the health of the fishery. Within an 18 month period, Catch Together financed $10.5 million of fishing quotas in New England, Gulf of Mexico, and Southeast Alaskan fisheries, supporting the expansion of electronic monitoring programs, bycatch reduction, ocean mapping, and data collection, and commercial fishing support for best-in-class catch share management systems. Catch Together's community partners, in turn, support about 100 fishing businesses, captains, and crews, generating local revenues and economic activity. Importantly, Catch Together is building a cohort of stewardship-oriented fishers committed to sustainability and good management.



Box 9. Source: https://catchinvest.com/catch-together

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weak state actors and infrastructure. This nexus of poverty and weak institutions create a challenging operating environment for conservation finance projects.

Private sector and philanthropic initiatives tend to perform best where governmental institutions are effective and land rights are clear and defensible.[39] Particular challenges to these conditions include (1) inefficient legal systems, implementation, and enforcement, (2) corruption at a cost to local people, (3) factors affecting sustainable livelihoods, markets, and equity, and (4) NGOs that lack a clear mission, mandate, or sufficient capacity to enforce agreements, or are unaware or insensitive to the realities faced by local people. In such cases, strengthening justice systems to facilitate conflict resolution and recourse can reinforce rights and responsibilities among actors, and acceptance among stakeholders.

BE PREPARED TO NAVIGATE UNCLEAR SYSTEMS OF LAND TENURE OR PROPERTY RIGHTS

Uncertainty about property rights can prevent investors from knowing if agreements are sound and payments channeled correctly, but such rights are undefined or contested in many parts of the world.[39] Local stakeholders may also be uncertain about who should receive benefits, their disbursement, and what actions should be taken to receive them. More recently, gains in land tenure rights and co-management agreements among Indigenous peoples have enabled new opportunities to pursue local self-determination. However, such changes may also represent a risk to the global public goods values of forests, such as biodiversity. Conservation initiatives promoting forest retention that are undertaken in areas where people had weak or unclear property rights risk being criticized as a *land-grab*. In contrast, rights-based approaches ensure ethical and equitable investments and minimize social disruption.

ADDRESS INDIGENOUS CLAIMS UNDER TREATIES AND INDIGENOUS LAW SOURCES

Many countries have unresolved land claims involving Indigenous peoples, and such claims can be especially problematic on *unceded lands*. In such cases, common or civil law frameworks of property rights may be clear to settlers on unceded land, but less relevant to Indigenous land claims. A response of many countries in such cases has been to embed a constitutional duty to consult or accommodate Indigenous peoples when pursuing development projects in unceded territory. Although consultation may add to costs of conservation projects, in regions where Indigenous-managed lands support more threatened and total species than existing protected areas, such as Australia, Canada, and Brazil,[40] partnerships with Indigenous communities that seek to maintain or enhance Indigenous land tenure practices on Indigenous-managed lands have the potential to ameliorate global shortfalls in biodiversity conservation and to provide opportunities for innovative conservation finance (*Box 9*).

TAKE-HOME MESSAGE

Genuine and deep engagement with local peoples is critical. A comprehensive understanding of local property rights and land title is essential. It is essential that local or Indigenous peoples are able to represent themselves in the prevailing socio-political or economic climate. The existence of empowered governance and social justice systems, explicit theories of change, and transparent and accessible monitoring data and standards should underpin all in conservation finance. Given the importance of governance, there remains a need for research on how cooperative governance models, Indigenous community-controlled models, and government/community/corporate co-governance models can be conceptualized and grounded in first principles. In the end, authentically addressing the harsh realities of resource-dependent or impoverished communities remains a near-term challenge. Conservation finance should aim to improve the prosperity of local communities. A growing number of international examples, standards, and best practices for engaging local communities in productive and equitable ways are now available to facilitate those aims (Box 10).

BOX 9. PARTNERSHIPS WITH INDIGENOUS COMMUNITIES CAN AMELIORATE GLOBAL SHORTFALLS IN CONSERVATION AND PROVIDE INNOVATION IN CONSERVATION FINANCE

Coast Funds, the first Indigenous-led Project Finance for Permanence (PFP), was developed with CA$118 million in capital to finance First Nations' stewardship of Indigenous territories in the Great Bear Rainforest and Haida Gwaii, an area encompassing 6.4 million hectares. With an aim to invest venture capital in enhancing human well-being in rainforest communities, Coast Funds has approved over CA$89.9 million towards 378 conservation and sustainable economic development projects led by First Nations in the Great Bear Rainforest and Haida Gwaii. This financing has been leveraged to attract over CA$321 million in investment for First Nations led projects in the region. Coast Funds works with First Nations to understand the economic, environmental, social, and cultural outcomes from each project investment, and reports on aggregate outcomes across twenty indicators of community well-being, available at: https://coastfunds.ca/community-well-being/.

Gitga'at First Nation Oceans and Lands Department: Coast Funds has served as a treasury for newly-formed Indigenous public services dedicated to stewardship where other forms of conservation finance are nascent, fleeting, or determined by outside actors in this region. In the case of Gitga'at First Nation, Coast Funds has been a catalyst, financing the start-up and operational funds of the Nation's government to apply Indigenous knowledge in resource management, implement land use plans, and monitor oil tanker traffic, sport fishers, and illegal activity. Gitga'at First Nation's investments have substantially enhanced human well-being, leading to 7 co-management plans with the colonial government for new protected areas, focal species research, training, jobs, and millions invested in local family-supporting salaries.

Kitasoo/Xai'xais Nation's Spirit Bear Lodge: In 2000, the Kitasoo/Xai'xais Nation identified ecotourism as a non-extractive economic opportunity that could help protect their territory. Coast Funds invested over CA$1 million as equity into the start-up and expansion of this globally renowned ecotourism venture. The investment in Spirit Bear Lodge from conservation finance has forged a novel approach where the Kitasoo/Xai'xais people are strengthening Indigenous well-being and economic prosperity in a non-extractive manner that has been scientifically vetted in peer-reviewed studies to sustain, protect, and enhance highly biodiverse marine areas and the last undeveloped watersheds of Earth's largest remaining coastal temperate rainforest. Such activities have enabled these Indigenous People to expand their role in stewardship, protect visual corridors of old-growth rainforests from destruction, educate visitors, and facilitate research. The economic outcomes of the lodge are substantial, by employing more than 10% of the community, with prominent inclusion of both women and youth.

NEED 4

Create tools and blueprints to facilitate the design of projects that allow investors to generate economic returns while ensuring positive, sustainable outcomes for the environment

Despite recognized and growing need for funding across a range of environmental sectors, potential market participants struggle to identify and develop conservation projects with cash flows and risk-return profiles that can attract private, return-seeking investment. Investable conservation projects must be able to demonstrate a clear strategy for the repayment of invested funds, with manageable risk and financial returns that ideally can compete with those offered by other industries. In some cases, the need to deliver stable financial returns on debt and equity investments can conflict with the need to achieve environmental impacts. These structural challenges may require project sponsors to (1) mitigate conflicts and create alignment between impact and profits, and (2) identify and develop projects with a potential for cash flows capable of facilitating high-priority conservation projects. In many cases, neither of these conditions is easily achieved, as economic returns may not always align with environmental returns, and extracting cash flows from conservation projects can, in many cases, prove to be difficult. These facts highlight the importance

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BOX 10. INTERNATIONAL STANDARDS FOR INVESTMENTS IN LAND AND AGRICULTURE

As the number of foreign investments in land and agricultural production continues to grow, so too do concerns about land grabs, which are defined by their lack of transparency and democratic process, violations of human rights and informed consent, and disregard for social, economic, and environmental impacts. Global large-scale land acquisitions in 63 low- and middle-income countries have conservatively exceeded 48 million ha across >1300 separate deals (The Land Matrix 2017; http://www.landmatrix.org/en/), and most acquired lands were originally in small-scale farming (63%) or forest (21%) (Dell'Angelo et al. 2017). Not all large-scale land acquisitions are land grabs, but many still flow from processes rife with injustice and imbalanced power relations and preferentially target communal and traditional lands, including those with multiple access and use claims, and then convert those lands into private property or concessions for exclusive use by investors.

The Food and Agriculture Organization of the UN (FAO) formalized good practices as seven "Principles for Responsible Agricultural Investment that Respect Rights, Livelihood and Resources", or RAI principles (FAO 2010).

1 ***Land and resource rights***
Existing rights to land and natural resources are recognized and respected.

2 ***Food security***
Investments do not jeopardize food security, but rather strengthen it.

3 ***Transparency, good governance and enabling environment***
Processes for accessing land and making associated investments are transparent, monitored, and ensure accountability.

4 ***Consultation and participation***
Those individuals and communities materially affected are consulted and agreements from consultations recorded and enforced.

5 ***Economic viability and responsible agro-enterprise investing***
Projects are viable in every sense, respect the rule of law, reflect industry best practice, and result in durable shared value.

6 ***Social sustainability***
Investments generate desirable social and distributional impacts and do not increase vulnerability.

7 ***Environmental sustainability***
Environmental impacts are quantified and measures taken to encourage sustainable resource use, while minimizing and mitigating them negative impact.

of both innovative structuring and strong environmental safeguards in conservation finance investments.

HELP CONSERVATION PROJECT DEVELOPERS CREATE A FRAMEWORK THAT CLEARLY STATES THE INVESTMENT CASE

Traditional conservation frameworks for identifying environmental priorities are not easily incorporated into conservation finance transactions, and it remains difficult to evaluate conservation priorities with an investment viability screen. This is because specific conservation priorities in one geography, such as sustainable fisheries management, may be a viable candidate for private investment in one geography, but offer limited investment potential in areas lacking easy access to markets or policy frameworks conducive to such investment.

In addition, many projects with a potential for positive environmental impact are too small to generate sufficient revenues over time horizons attractive to many investors, whereas others may be too unfamiliar or risky to attract financing. Thus, to establish viable targets for private finance, project developers should consider the volume, schedule, and risks associated with expected cash flows to a level of precision rarely considered by actors in the environmental arena.

However, cash flows need not begin immediately after closing a transaction. For example, some investors have longer-term investment horizons (e.g., pension capital) and/or are willing to provide 'patient' capital that provides returns over longer periods. Some investors also have objectives beyond immediate returns on capital, such as progress on sustainability goals; such expectations can be considered in the design

of project performance metrics. Many other investors, comprising a large majority of the potential market, seek attractive economics alongside environmental impact and are unwilling or possibly unable (due to their roles as fiduciaries for others' investments) to accept below-market returns in exchange for improved environmental outcomes. Indeed, the potential for trade-offs among investment objectives, such as delivering cash flows versus environmental benefits, highlights the need for reliable, transparent, and accessible monitoring and reporting criteria, and for including rigorous non-financial metrics, while recognizing the need to manage and reduce costs.

CONSTRUCT HIGH-LEVEL MODEL BLUEPRINTS TO FACILITATE STANDARDIZATION AMONG CONSERVATION INVESTMENTS

There are many ways in which blueprints might be used to overcome some of the difficulties inherent to estimating risk-adjusted financial and socio-environmental returns while accommodating local context. The concept of a *strategic blueprint* has been used to provide asset owners, investment managers, and service providers with a set of recommendations for reviewing their investment practices & policies to attract more capital, better manage risk, evaluate opportunities for investment, and enhance investment returns. Strategic blueprints provide a practical set of recommendations designed to align investments and investors with the long-term priorities of traditional and emerging asset classes. In the context of investments in conservation projects, an *investment blueprint* is a model of a financial transaction structure that aims to facilitate replicable and scalable investments in categories of priority conservation projects or portfolios of projects. An investment blueprint outlines the general enabling conditions required for project development, identifies stakeholders best placed to recognize specific conservation needs, defines the project outputs and expected conservation outcomes, and describes the business, investment, and revenue models, the financial structure, and the anticipated cash flows and risk parameters. Likewise, an investment blueprint seeks to identify the types of investors and *capital stacks* that are required to structure a financial transaction that delivers both economic and conservation returns. Investment blueprints have been identified by the Coalition for Private Investment in Conservation (CPIC) as a priority area of activity to facilitate the entry of private, return-seeking capital into the area of conservation finance (CPIC and PwC 2018).

APPLY BLUEPRINTS TO CIRCULATE AND IMPROVE KNOWLEDGE AMONG POTENTIAL AND ACTUAL PROJECT DEVELOPERS

In connection with its goal of increasing the flows of private capital into conservation, CPIC aims to standardize, replicate, and aggregate conservation deals to increase deal flow using a *blueprinting process*. Applying the step-by-step process described by CPIC and PwC (2018), a variety of thematic working groups affiliated with CPIC have developed investment blueprints in sectors including sustainable agriculture, water quality or provision, and coastal resilience. Box 11 outlines the CPIC blueprinting process for developing an investment blueprint in general terms, and Box 12 illustrates the development of a specific investment blueprint using the environmental impact bond issued by the DC Water and Sewer Authority (DC Water), the water utility of the Washington, DC metropolitan area, as a case study.

In 2016, DC Water, working with Quantified Ventures as a technical advisor and Goldman Sachs and Calvert Investment as investors, issued the first environmental impact bond (EIB) to finance the reduction of stormwater runoff and combined sewage overflow (CSO) through the use of green infrastructure solutions (Quantified Ventures and CPIC 2019). An EIB is an innovative financial product that uses a *pay for success* model for repaying investors that seeks to align public spending with desired outcomes and ties repayments to specified performance indicators. EIBs (and the closely related concept of social impact bonds, or SIBs) have been developed to raise risk capital for the financing of novel, untested solutions that would be difficult to fund using public monies. Potentially scalable and replicable, an EIB can be used to spread the performance risk associated with green infrastructure to impact investors and others willing to invest risk capital, allowing for greater adoption of green infrastructure solutions and meeting desired outcomes of the project (CPIC 2019).

As described in Box 12, the EIB is an

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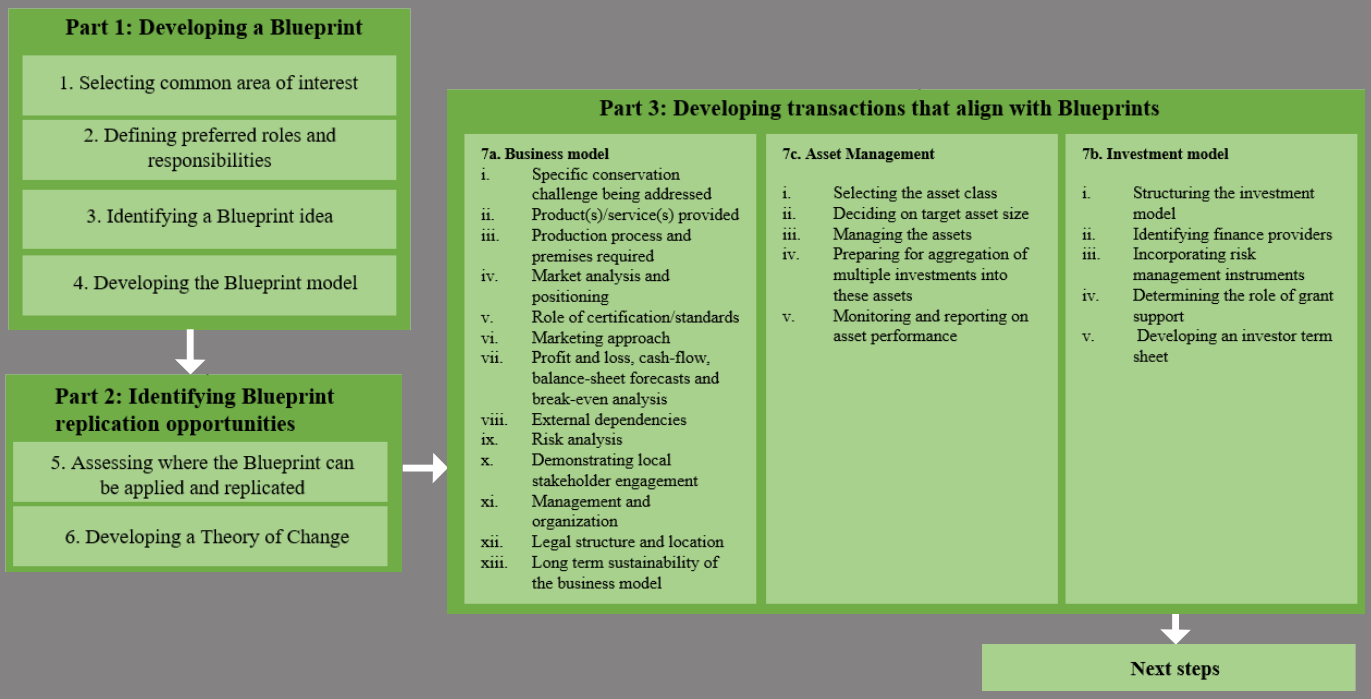
BOX 11. CPIC OVERVIEW OF THE BLUEPRINT DEVELOPMENT PROCESS



innovative conservation finance structure that allows DC Water to pay the costs of green infrastructure projects by issuing a public utility subordinate revenue bond that is based on the attainment of certain objectives, and wherein the performance risks of managing stormwater runoff are shared between DC Water and the investors. Box 13 summarizes the DC Water EIB investment and business models, as described in the CPIC blueprint.

DESIGN BLUEPRINTS TO HELP STANDARDIZE, REPLICATE, AND AGGREGATE DEALS THAT ACHIEVE SCALE

Boxes 11–13 illustrate how investment blueprints can be used to generalize individual transactions or transaction ideas and to make the key features of replicable transactions broadly available. By identifying the components of cash flow, the business plan, and risk profile, investment blueprints facilitate project replication and aggregation. Replication results in economies of scale in risk mitigation because capital with different appetites for risk can be deployed across a range of projects. Aggregation, in turn, results in portfolios of projects with similar risk profiles being bundled into a financial portfolio large enough to interest larger investors.

USE BLUEPRINTS AS CAPACITY-BUILDING TOOLS

Investment blueprints also provide a framework for investable conservation projects to improve the evaluation and selection of available tools for project execution, outcome delivery, impact measurement, stakeholder outreach, and investor management. Promising solutions are being developed to assist in the achievement of critical conservation goals, including capacity-building tools, improved metrics, and platforms for convening parties able to deliver project plans/blueprints, experts in financial structuring, and investors (Need 1–3). A successful investment in conservation depends on a strong investment thesis. Third-party technical and financial assistance providers can help conservation organizations develop business and investment models that are investor-ready. In the case of the DC Water EIB, Quantified Ventures, as a technical advisor in the area of conservation finance, helped DC Water explore, develop, and structure

BOX 12. SUMMARY OF CPIC BLUEPRINT ON THE DC WATER ENVIRONMENTAL IMPACT BOND FOR GREEN INFRASTRUCTURE. FROM QUANTIFIED VENTURES AND CPIC (2019)

Part 1: Developing a Blueprint

- ***Step 1 - Selecting common area of interest:*** Environmental restoration and conservation
- ***Step 2 - Defining blueprint stakeholders roles:*** Conservation needs and opportunity (Environmental Defense Fund, The Nature Conservancy, US Department of State, DC Water), business and investment model (Quantified Ventures), capacity building (Quantified Ventures, Rockefeller Foundation)
- ***Step 3 - Identifying a blueprint idea:*** Green infrastructure for watershed management
- ***Step 4 - Developing the blueprint model:***
  - i. **Overview of the conservation need/opportunity:** Managment of stormwater runoff/use of green infrastructure for watershed management
  - ii. **The overall objectives of the blueprint:** Develop a model of a financial transaction structure using an environmental impact bonds (EIB) that aims to facilitate replicable investments in watershed management.
  - iii. **The business model used to achieve these objectives:** The EIB can be structured on the basis of a recurring revenue model where utility water payors pays for access to water services in an specific location.
  - iv. **The investment model used to finance the business model:** The EIB can be structured with a public or private pay for success model. Private sector investors can purchase subordinate debt from a public utility subordinate revenue bond (e.g., $25M by Goldamn Sachs and Calvert Capital from DC Water EIB in 2016). In the alternative, public sector can offer a publicly traded EIB with private underwriting (e.g., $14M issuance by Atlanta DWM EIB in 2019 with Neighborly and KeyBanc underwriting).

Part 2: Identifying Blueprint Replication Opportunities

- ***Step 5 - Assesing where the blueprint can be applied and replicated:*** In the United States, as over 850 municipalities served with a combined sewer overflow (CSO) can replicate this investment. This can also be replicated at the state and international levels for other CSOs. Beyond storm water runoff, this investment blueprint can be applied to multiple projects, including costal and wetland protection, forest landscape management, agricultural runoff reduction, energy resilience, and others (CPIC 2019).
- ***Step 6 - Developing a theory of change:*** As an EIB is structured using a pay for success model, the inputs, activities, outputs, outcomes, and impacts are clearly outlined in each project's technical evaluations and investment factsheets. Specific outcomes are tied to risk share payments (such as the percentage reduction in storm water runoff per acre). Specific environmental and social metrics were developed to measure water quality, climate resilience, and quality of life improvements.

Part 3: Developing ransactions that Align with Blueprints

- ***Step 7a - Business model:*** DC Water issued a $25M EIB that was purchased by impact investors (in this case, Goldman Sachs and Calvert Foundation). DC Water used the proceeds to provide the upfront capital to construct a 20-acre green infrastructure project in the Rock Creek sewershed. DC Water collects revenue from utility rate payors across Washington, D.C. and adjacent jurisdictions. These revenues go to pay bondholders for the term of the bond. DC Water benefits by receiving funds for the Clean Rivers Project and by meeting the Clean Water Act standards more quickly and at lower cost (CPIC 2019).
- ***Step 7b - Investment model:*** The pay for success model allows impact investors to share part of the risk involved in an innovative conservation solution such as green infrastructure. If the green infrastructure fails to meet the storm water runoff reduction performance goals (<18.6%), the investor will make a $3.3M *risk share payment* back to DC Water, allowing DC Water to recover part of its investment. If projects overperform the runoff reduction goals (>41.3%), DC Water will repay the $25M principal and make an additional performance payment of $3.3 M to investors.
- ***Step 7c - Asset management:*** Asset class (fixed income, bond), financial instrument (environmental impact bond structured on a public utility subordinate revenue bond). Enviromental service provider and outcome monitoring (DC Water), investors (Goldman Sachs & Calvert Impact), transaction advisors (Quantified Ventures).

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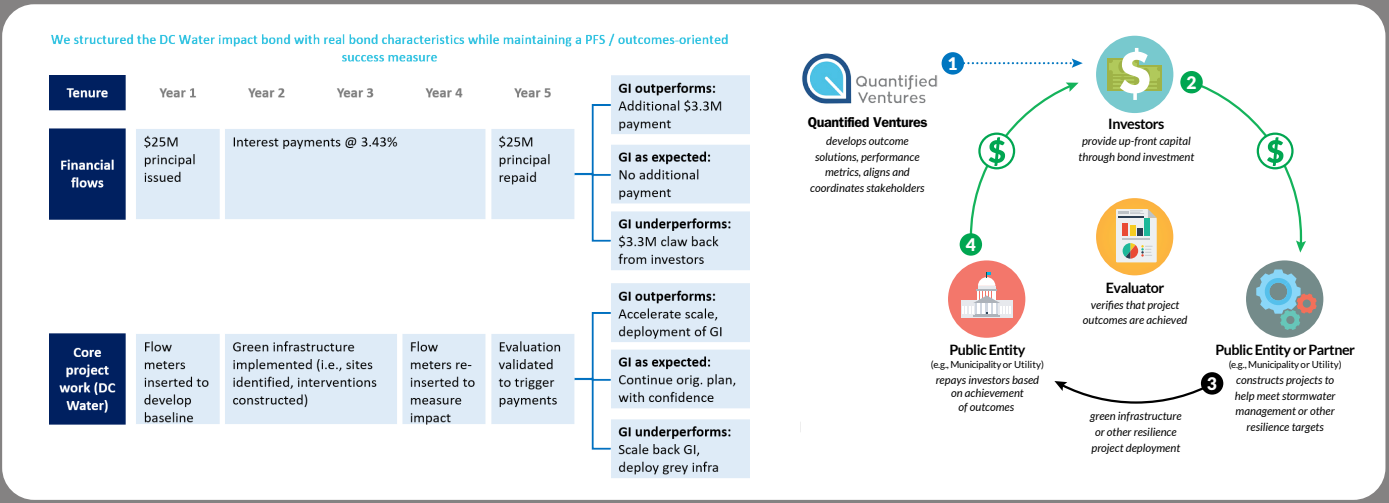
BOX 13. DC WATER EIB INVESTMENT MODEL AND BUSINESS MODEL



Box 13. Sources: Adapted from Gonnella 2017; Chesapeake Bay Foundation 2018

the EIB, and supported DC Water in business model generation, due diligence, project implementation, and impact evaluation.

IDENTIFY SOCIAL AND ENVIRONMENTAL IMPACT METRICS AS PART OF THE BLUEPRINT PROCESS

A critical challenge facing any conservation investment is the monitoring, evaluation, and reporting of social and environmental impact. Metrics are crucial to understanding the strengths and weaknesses of projects, improving transparency and trust among project participants, and communicating the value of the investments. However, identifying relevant metrics and measuring conservation investment impacts remain challenging (see Need 2). Even with appropriate impact metrics identified and measured in a cost-effective manner for one category of transaction, it may be difficult or impossible to apply the same metric in a different transaction, thus limiting the rigorous comparison of environmental impacts across categories of transactions.

TAKE-HOME MESSAGE

Conservation investment currently relies on entrepreneurial project developers to design their own structure for prospective deals. Using blueprints as models for deal development should facilitate the upscaling of conservation investment within sectors by speeding the project development process and ensuring that potential deals include all aspects required to engage investors. Blueprinting should also help alleviate investor concerns that conservation projects are niche, high-risk investment deals. Once blueprinted, conservation projects come with a set of common, transparent characteristics and content.

NEED 5

Reconsider existing financial vehicles and structures of investment projects to improve flexibility, performance, and salience for stakeholders

Efforts to mainstream conservation finance require innovating and maturing sustainable models of finance and governance, along with new vehicles and structures. As important as single project financing is, public, private, and philanthropic funding could be enhanced by analyzing and further conceptualizing permanent sustainable structures that

recognize the social, environmental, and economic benefits of conservation finance and thereby facilitate good outcomes. We offer insights and recommendations by reviewing existing models.

APPLY LESSONS FROM PROJECT FINANCE FOR PERMANENCE (PFP): MODELS TO INTEGRATE SOCIAL, ECOLOGICAL, FINANCIAL, AND ORGANIZATIONAL ELEMENTS REQUIRED TO ENHANCE CONSERVATION

Several PFP models now exist to protect and/or restore ecosystems globally. Project Finance for Permanence brings concentrated organizational and financial resources to bear on large-scale, long-term conservation programs. By designing projects for permanent protection, creating strong organizations and agreements among them, and using tested financial processes, such as rigorous financial plans and having a single transaction closing, PFP builds a foundation for the durable conservation of ecologically important places. A single closing means that all the required capital is raised from different sources (e.g., debt, equity investment, philanthropic donations), but then held in trust until the entire amount of the proposed financing has been raised; then the financing is completed in a single transaction closing, and the various capital *tranches* are paid out as the project requires. A single closing encourages early investors, whose capital is protected, and, in the event the conservation project does not meet its capital-raising target, returned to them.

Examples of PFPs include the Great Bear Rainforest, which represents the world's largest relatively intact coastal temperate rainforest (Box 8), and the Amazon Region Protected Areas ("ARPA") program, which funded and protects a 60-million-hectare network of protected areas in the Brazilian Amazon. Financial sustainability for this network was guaranteed through a PFP called "ARPA for Life." However, PFP models could be studied further to identify effective strategies for designing private and public investments and governance structures accountable to partners, investors, and local communities, while also meeting sustainability goals. Within the context of PFPs, there is a special need to innovate shared governance or co-governance structures that engage all stakeholders, enhance sustainability, safeguard against regulatory capture, and protect debt and equity investors using derivatives, insurance, or other devices.

INNOVATE AND REFINE CONSERVATION TRUST MODELS

Trust models also include those wherein conservation funding involving public and private capital. Philanthropic financial support might be combined in legal structures that protect a particular ecosystem by establishing a lasting governance structure (e.g., Boxes 8 and 9). Knowledge gained by researching existing trust models and their finance and governance structures may help conceptualize models that are financially sustainable, protect biodiverse ecosystems, and maintain governance structures that are accountable to stakeholders.

In common law countries, trust models may offer tremendous potential for sustainable conservation initiatives and provide advantageous investment opportunities in terms of tax benefits to private investors. However, implementing such models requires a better understanding of underlying design, governance, and accountability principles, the requirements or qualifications to be considered a beneficiary, the appropriate use of charitable purpose trusts, available safeguards in countries with limited infrastructure, legal or regulatory protections, or the legislative mechanisms potentially suited to civil law countries lacking common law trusts.

PROMOTE LARGE-SCALE CONSERVATION WITH LANDSCAPE BONDS

"Landscape bonds" denote a form of "green bond" where companies commit to positive outcomes at large spatial scales. Landscape bonds represent a relatively new financial instrument promoted by the Global Landscapes Forum. When first issued by the Tropical Landscapes Finance Facility in 2017, it provided $95 million to finance the creation of a sustainable rubber plantation on heavily degraded land across two provinces in Indonesia. The project, run in partnership with the World Wildlife Fund (WWF), incorporates extensive social and

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environmental objectives, and as well as safeguards to protect a national park (Bukit Tiga Puluh) threatened by encroachment.

While landscape bonds and similar initiatives appear to have considerable potential, several issues require attention. First, challenges may arise if bonds are issued to companies that are influential actors but lack jurisdiction over the landscape in question. Second, care is required to ensure that the "landscape bond" moniker is only applied to situations wherein companies go beyond simply complying with prevailing laws to improve conservation and socio-economic outcomes at landscape scales. Third, the arbiters of performance, such as third-party certifiers, must be better defined and trained to discriminate among local and landscape project goals. For example, the Forest Stewardship Council might develop a "Landscape Certification" whereby companies are evaluated based on the protections and impacts recorded in landscapes in which they operate. However, new approaches are likely to be required to achieve landscape-scale certification based on land protections that will work outside of industrial fiber plantations. Fourth, because landscapes are often under multiple jurisdictions, many landscape bonds will require a governance structure that can deploy funding to multiple independent actors in ways that achieve better, landscape-level outcomes.

DRAW GUIDANCE FROM GREEN FINANCE INITIATIVES

With a longer lead-time than conservation investments, green finance includes a series of practices that have facilitated its wide acceptance. The UK Green Finance Taskforce ("Accelerating Green Finance") has advocated for: (1) boosting investment into innovative clean technologies; (2) driving demand and supply for green lending products, (3) establishing Clean Growth Regeneration Zones, improving climate risk management with advanced data, (4) building a green and resilient infrastructure pipeline, and (5) issuing a sovereign green bond. For example, the UK Government created a green venture capital fund (GBP 20m to be matched by the private sector) to support clean technology companies, fund new green initiatives, and develop standards in green finance (e.g., the British Standards Institution is developing two new Publicly Available Specifications in Sustainable Finance). Another example is the Climate Bond Initiative, designed to mobilize the $100 trillion bond market in the transition to a low carbon, climate-resilient economy. Goals could include building a large and liquid green and climate bond market that will reduce the cost of capital for climate projects, facilitate mechanisms for aggregating fragmented sectors, and help governments tap debt capital markets.

CONSIDER HOW ACTIONS TO RECOGNIZE ECOSYSTEMS AS LEGAL PERSONS MIGHT SUPPORT INVESTMENT MODELS

The recognition of ecosystems as legal persons, which originated largely with Indigenous peoples, is an increasingly common strategy for conservation. As legal persons, ecosystems may contract with private investors, potentially simplifying conservation investment projects and facilitating market-based transactions. Such a status also gives investors more direct remedies (against the legal person) if the terms of the agreement are breached. For example, New Zealand has enacted two such bills creating legal personality. First, the *Te Urewera Act* (2014) converted a national park into a separate legal entity for whom board members act as trustees of the Te Urewera Board, comprised jointly of Tūhoe and Crown members. Second, the New Zealand Parliament enacted the *Te Awa Tupua* (Whanganui River Claims Settlement) Bill in 2017 to provide for the Whanganui River's long-term protection and restoration by making it a person in law. This legislation also provided a settlement of NZD 80 million to redress actions and omissions of the Crown, and an additional NZD 1M to establish a legal framework to support the Whanganui River.

Recognition of an ecosystem as a legal person can also occur through court decisions. In India, in 2017, the river Ganges was recognized as a living entity by the Uttarakhand High Court, with the court ordering government to form a Ganges Administration Board to enhance and manage the river. Similarly, a referendum in February 2019 approved the Lake Erie Bill of Rights (LEBOR), which recognizes the rights of the lake and its watershed, and empowers citizens — as part of that larger

ecosystem, with "the right to a healthy environment"— to stand up for the lake when those rights are violated. This last example is the first-of-its-kind in the United States to acknowledge rights of an entire specific ecosystem, but it only applies within Toledo city limits, so with limited effect. In August 2019, a private entity brought a federal lawsuit against the City of Toledo and the Lake Erie Bill of Rights (LEBOR), and the State of Ohio has challenged Toledo's jurisdiction to pass the law (e.g., www.courtlistener.com/docket/14573310/drewes-farms-partnership-v-city-of-toledo-ohio/). Much research is therefore required to understand such initiatives, including the appropriate preconditions and necessary governance structures, assurances, and protections to investors and other stakeholders.

TAKE-HOME MESSAGE

Several new and evolving financial tools have potential to support conservation investments, but all require careful conceptualization to ensure that the goals of private profit do not usurp conservation goals or stakeholder protections. At the same time, conservation finance advocates must continue to innovate strategies that link investors with conservation projects, while improving familiarity with and trust in conservation finance in both the investment and conservation communities. The potential for private finance to deliver conservation outcomes will be hampered by suspicions of green-washing, bank-driven asset stripping, and the commoditization of nature. Existing uncertainties related to risk and return, exit strategies, track records, and the absence of robust performance metrics represent additional challenges. Current efforts to embed climate risk as a factor in credit-ratings (e.g., Moody's Investor Services) could help to advance credit-rating tools in conservation. Interdisciplinary engagement will be needed to address the needs and potential impediments noted.

CONCLUSION

Private investment in conservation is growing rapidly and already benefitting people and the environment. However, further expansion and success requires diligent attention to the development and maintenance of good practices for engagement of stakeholders and communities, creation of enabling legal structures, and development and validation of standardized, transparent, and reliable monitoring and evaluation programs. Local context and culture will remain as major determinants of the success of interventions, and a fine balance must, therefore, be achieved between the application of general models and local conditions. To do so, credibly will require that practitioners consider carefully the many potential tradeoffs arising in the delivery of social-ecological goods and services and private profits while also advancing biodiversity conservation and human well-being.

The maturation of conservation finance will require innovation to address long-standing challenges linked to land tenure, stewardship practices, resource ownership, governance, equity, and perverse subsidies capable of eroding biodiversity. Our review offers a starting point for ecologists, conservation biologists, natural resource practitioners, social scientists, business and finance professionals, and legal scholars interested in transdisciplinary collaborations with local stakeholders wishing to develop, apply, and evaluate privately financed projects designed to conserve biodiversity and improve human livelihoods. Despite shortcomings, false-starts, and pitfalls reviewed here, we are encouraged by a large and growing literature, active projects, and assessment models now available to advance the field while safeguarding those involved. Rather than setting the bar so high that good ideas fail before they are applied, evaluated, and refined, we see substantial promise in efforts to advance the role of private finance in environmental stewardship in ways that simultaneously benefit local landowners, private investors, and the environment.

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GLOSSARY

Accumulation by conservation
A manner of accumulation that seeks to transform the plans to monetize the uses or conservation of natural resources or ecosystems as a long-term mode of capital accumulation for public, private, and non-governmental sectors. Potential examples could include payments for ecosystem services, green bonds, or similar contractual arrangements.

Big data
Massive data sets gathered actively or passively to analyze computationally to reveal patterns, trends, or associations used to predict an event or interaction.

Capital Stack
The capital stack refers to the legal organization of capital investments in a company or secured by a given asset that determines legal rights, priority recipients of payment in the event of default, and the order in which investors are repaid or given authority to take over assets in the event of a bankruptcy.

Citizen science or crowd-sourced data
Data collected, at least partly, by the general public, typically in collaboration with professionals and/or scientists.

Command-and-control regulation
Environmental policy that relies upon regulation (e.g., permits, restrictions, standards, enforcement) rather than economic incentives.

Commodification of nature
The transformation of natural resources, ecosystem services, or other natural elements into objects that can be exchanged or traded through markets.

Commodity problematique
A pattern whereby nations, governments, or communities develop a dependence on the production of commodities linked to low economic growth and social well-being, aka the 'natural resource curse.'

Co-benefits
Unintentional or secondary benefits that result from policies, investments, or other actions.

Conservation finance
As used herein, an emerging discipline that seeks to meet conservation challenges by developing environmentally sustainable financial products and investment strategies designed to generate returns for investors while maintaining or enhancing the delivery of beneficial ecosystem services and safeguarding natural capital.

Concessionary finance
Finance arranged at zero or below-market rates of interest and/or more lenient or flexible terms.

Ecosystem services
Benefits that humans freely derive from ecosystems and that directly or indirectly support human health and well-being, such as provisioning services (e.g., food, fiber, clean water, medicines), regulating services (e.g., climate regulation, water purification, pest control), supporting services (e.g., habitat that supports biodiversity), and cultural services (e.g., recreation, aesthetic values, spiritual values).

Expert elicitation
Expert knowledge is substantive information on a particular topic that is not widely known by others. An expert is someone who holds this knowledge and who is often deferred to in its interpretation. We refer to predictions by experts of what may happen in a particular context as expert judgments. Expert elicitation is the structured process by which expert judgments are gathered.[31, 25]

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Goodhart's law
When an index becomes a target, it also risks becoming an unreliable measure of performance if users manipulate policies, interventions, or other actions to improve metrics.

Greenwashing
The practice of making misleading or unsubstantiated claims about environmental benefits with the intent to make a company, organization, or entity appear more environmentally friendly than it is.

Institutional investor
An organization that has significant assets under management, investing in both equities and debt.

Impact investor
Investor seeking positive social or environmental impacts as well as financial returns.

Land-grab
Traditionally refers to acquiring land opportunistically or unlawfully, but now includes buying or leasing of large land areas by domestic or transnational companies, governments, organizations, and individuals.

Land tenure
An institution of rules that define how property rights to land area are allocated within a society, including access, right to use, control, manage or transfer land.

Natural capital
The world's natural assets, including soil, air, water, species, also commonly referred to as ecosystem services.

Natural resource curse
The paradox whereby nations or regions with abundant natural resources tend to have poorer economic and social performance than countries with fewer natural resources. Also called the commodity problematique.

Neoliberal environmentalism
A theory of political and economic practices that posit that human well-being is best supported by maximizing entrepreneurial freedom, private property rights, open markets, and free trade. As related to the environment, this involves commodification of natural resources or ecosystem services.

Poverty traps
A situation wherein poverty becomes almost inescapable due to underlying economic systems that require capital for upward mobility.

Private investor
A person, rather than a company or organization, who invests money.

Rent-seeking behavior
A behavior that involves increasing one's wealth or resources without creating new wealth or resources.

Socialized Risk
Investments eligible for taxpayer-funded subsidies or bailouts in the case of failure effectively 'socializes' investment risk while insulating investors from financial harm, leading to privatization of profits and socialization of losses.

Standard & Poor's 500 Index
A market-capitalization-weighted index of the 500 largest U.S. companies that trade publicly.

Tranche
A portion of a monetary instrument or payment.

Theory of Change
A comprehensive description or illustration of how and why the desired change is expected, given a context and set of inputs

Unceded land
Land on which Aboriginal Title has neither been surrendered nor acquired by the prevailing (usually 'colonist') government.

Working landscapes
Rural areas that are comprised of extensive areas of agriculture, forestry, or other actively managed natural resources.

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