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Can financialization save nature? The case of endangered species

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Abstract: The current biodiversity loss is dramatic. Over the past 50 years, more than 68% of the mammals, birds, amphibians, reptiles, and fish on earth have disappeared, putting the planet's survival and its inhabitants – including human beings – at risk (WWF, 2020). Financialization, or the transformation of nature into financial assets, is increasingly proposed as a solution to the biodiversity crisis. Proponents of financialization believe that assigning a monetary value to nature will incentivize human beings to protect habitats and their species. This article offers a four-mechanism model of nature's financialization, explaining why it is virtually impossible to financialize nature. We collected data through a unique two-stage data collection process, including a single case study and additional interviews with conservationists and conservation finance specialists. We analyzed the development of a calculative device, the "Index," designed to assess the impact of conservation efforts on the survival of endangered species. Conservationists hoped to use the Index to calculate the financial return of a conservation impact bond (CIB), a financial instrument designed to finance conservation projects. However, they did not achieve their goal. We discuss the implications for the financialization and conservation literature and the role of accounting therein. We notably question previous accounts of financialization, including the need for financial numbers or financial actors. We ultimately show that a financialization *project* can transform practices towards financialization, even if the financialization *process* is not complete.

Keywords: Biodiversity, Conservation, Financialization, Impact Bond, Nature

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1. Introduction

The financialization of nature has gained considerable traction in recent years, notably with the multiplication of carbon and biodiversity offsetting markets (Cuckston, 2018a; MacKenzie, 2009; Tregidga, 2013). Financialization processes involve introducing a financial rationale into fields previously outside the economic sphere (Arjaliès and Bansal 2018; Büscher et al. 2014). Financialization transforms the world through practices, theories, and technologies that typically originate in the financial sector (Chiapello 2015, 2018).

There have been numerous attempts to financialize nature, yet most projects have been unsuccessful (Dempsey, 2016). For instance, studies examining water privatization experiments indicate that rivers and seas refuse to be domesticated, remaining "incomplete commodities" (Bakker, 2005, 2007). Likewise, and despite showing their financial value, ecosystem valuation services often fail to convince investors to finance natural infrastructure, notably due to the difficulty of financializing conservation[2] practices (Hahn et al., 2015). Sophisticated carbon offset projects are also regularly abandoned by governments due to the questions that arise regarding their complexity and their lack of effectiveness.

Although nature appears to resist most financialization attempts, financialization projects continue to abound. In some instances, such as in the case study below, a financialization project can be pursued without completing the financialization process, particularly when it comes to nature. At the heart of the problem is the lack of understanding of how nature can be financialized (or not). We still know little about why financialization encounters difficulties when applied to natural resources or living beings, such as endangered species. Researchers have observed many unsuccessful attempts to financialize nature (Büscher, Dressler, & Fletcher, 2014; Dempsey, 2016), but the reasons for such failures remain elusive – leading us to formulate the following research question: *Can financialization save nature, and if not, why not?*

In this article, we distinguish between the financialization *project*, which encompasses the work efforts to define, redefine, give meaning, and strategize on how to reach financialization, and the financialization *process*, which refers to the implementation of the project. The financialization project should be understood in both its dimensions: at the macro and micro levels. At the macro-level, our study allowed us to reflect on how the ideals attached to financialization succeeded in penetrating a field that had, until that point, been shielded from it, i.e., conservation, without the need for financial devices or financial actors. At the micro-level, it offers a very detailed account of a specific financialization project in a conservation organization. The article shows that the financialization *project(s)* and *process* are linked.

The present article addresses the role of financialization in saving nature by examining how a team of conservationists worked on the early steps of the design of a conservation impact bond (CIB). A CIB works as follows. Investors provide upfront capital under an established contract, and governments and donors act as the outcome payers. Conservation organizations receive money from the investors to implement a conservation project. In the case studied, the potential CIB was designed to protect insular endangered species. If the project achieves the quantifiable benefits defined in the contract – "the impact" – governments or donors pay the investors the principal plus a pre-determined return. CIBs are also known as pay-for-performance or pay-

[2] Conservation science is defined as the interdisciplinary study of the care and protection of ecosystems and their biodiversity. Conservationists, the professionals in charge of protecting biodiversity, are at the forefront of the fight to save endangered species.

for-success approaches. The impact would be a "saved" species, measured via the change in IUCN[3] endangerment status, for example.

This article analyzes the development of a calculative device, the "Index,"[4] developed by conservationists inside the studied organization to measure "the impact" of their work on species' survival. Conservationists are the professionals in charge of protecting ecosystems and their biodiversity. The conservationists hoped that the return on investment of the CIB they were planning to develop would match the impact of their conservation efforts on the protection of species, as measured by the Index. The assessment's idea was simple: the more effective a conservation organization was at saving species, the more resources it should receive. However, as shown below, the financialization project encountered many difficulties, and no CIB was developed. Conservation practices nonetheless became financialized. By examining the reasons for these difficulties, we explain: a) why the financialization of nature is nearly always incomplete and, therefore, impossible, but b) how the financialization *project* can be sufficient to transform conservation practices profoundly.

Our study employs a two-step data collection process inspired by Actor-Network Theory (ANT) and pragmatic methods of collective inquiry (Dewey, 1939; Latour, 1987, 2013; Lorino, Tricard, & Clot, 2011). This approach involved co-investigating the "strangeness" observed (Macintosh, 2009) in the fieldwork – in our case, the struggle to financialize the endangered species under the conservationists' care. We first conducted an in-depth study of the Index and the conservation organization that created it based on 26 interviews (with conservationists, employees, investors, and donors) and analyzed the available documentary evidence. Our first analytical step showed that the conservationists were aware of the financialization *project* and its potential implications. They had neither studied business nor been persuaded by financiers. Nevertheless, they believed that financialization would help them save endangered species by demonstrating the value of conservation to society financially, despite their inability to launch the CIB they had initially envisioned.

We decided to conduct a second round of interviews following this unique case study. We hoped to understand whether the conservation organization we considered was representative of the field or an exception. Moreover, we were puzzled that the conservationists themselves were leading the financialization of their field in the belief it would contribute to saving species. We discussed our findings with 29 conservationists and conservation finance specialists. The conservationists we interviewed approached financialization through different lenses. However, all of them envisioned potential positive effects for conservation, once again despite little evidence of such success, confirming our initial findings of a profusion of financialization projects in conservation. The conservationists recognized that the emergence of financialization in conservation stemmed from a collective failure of science, politics, and society to preserve biodiversity.

We make a threefold contribution to the literature on financialization, conservation, and accounting. Firstly, we address several calls to understand financialization, particularly the financialization of nature. We notably make the distinction between financialization *projects* and *processes*. We argue that practices can be financialized even if the financialization process

[3] IUCN, International Union for Conservation of Nature (https://www.iucn.org/), and its Red List (endangerment status): (https://www.iucn.org/resources/conservation-tools/iucn-red-list-threatened-species), accessed November 26, 2021. See online Appendix for further details.

[4] "Index" is a pseudonym.

is not successful. A financialization project can be sufficient to introduce a financial rationale and transform practices accordingly. We also offer a model that theorizes the process of financialization and presents the difficulties encountered throughout the process. Our systematic literature analysis led us to identify four mechanisms – pacifying, commodifying, calculating, and marketizing – which we develop theoretically and empirically. Elaborating on this model, we argue that most financialization projects fail because protecting nature entails nurturing the uniqueness of the relationships between humans and ecosystems (Chan, Satterfield, & Goldstein, 2012; Cuckston, 2018a; Sangha et al., 2018), while financialization instead involves abstracting nature to transform it into a "passive object" to be commodified, calculated, and marketized. If, conceptually speaking, we may think of material relationships being built between nature and investors, however, the abstraction needed for financializing nature is virtually impossible. There is a fundamental contradiction between what conservation entails and what financialization forces conservationists to do.

Secondly, our findings call into question traditional views of financialization, particularly the types of "carriers" involved in the process of financialization (Arjaliès & Bansal, 2018; Davis, 2010; Himick & Brivot, 2018). In previous research, scholars have emphasized the critical role of financial actors and the importance of calculability in the form of financial numbers (Chiapello, 2015; Déjean, Gond, & Leca, 2004; Giamporcaro & Gond, 2016). However, our findings demonstrate that endangered species were financialized, primarily through what we name "societal visuals" and conservation science support. Our case study also shows that conservationists themselves are leading the financialization of their practices – not financial actors, consultants, or accountants. These findings suggest that society might already be so financialized that the roles played by financial numbers and financial actors to spur such a transformation may now be of secondary importance.

Thirdly, we show the potential contribution that accounting can make to conservation and to solving significant challenges such as climate change (Atkins & Macpherson, 2022; Cuckston, 2021; Feger et al., 2019; Feger & Mermet, 2018). Biodiversity needs to be tackled using a global approach beyond corporate control (Milne & Gray, 2013; Whiteman, Walker, & Perego, 2013). In the case study, the Index created one of the first opportunities to measure the effects of a conservation organization on the protection of species. This type of Index may thus provide a pivotal link between humanity and nature, and as such, it may help organizations account for their biodiversity impacts (Atkins & Maroun, 2017; Jones & Solomon, 2013; Zhao & Atkins, 2021). We nevertheless cast doubt on the ability of financialization alone to address the current biodiversity crisis, despite conservationists' growing interest in the topic.

The remainder of the article is structured as follows. In the next section, we theorize the project and process of financializing nature before describing our research context and design. We then analyze how conservationists gradually financialized the endangered species under their care by creating the Index yet never succeeded in creating the CIB they had initially envisioned. We discuss our findings and their implications for the literature on financialization and conservation and the role of accounting therein. Because the specifics of conservation measures are essential, we touch on conservation technicalities that need to be considered because they affect overall outcomes. Understanding conservationists' work is crucial to assessing whether financialization can potentially respond to the crisis of biodiversity loss.

2. Literature review: The financialization of nature

2.1. The *project* of financializing nature

Financialization has gradually permeated all dimensions of society (Crane, Graham, & Himick, 2015; Davis, 2009, 2010; Glaser, Fiss, & Kennedy, 2016) – to the point that it is sometimes viewed as one of the main ways of governing people (Kurunmäki, Mennicken, & Miller, 2016). Krippner (2005: 174) defines financialization as "a pattern of accumulation in which profits accrue primarily through financial channels rather than through trade and commodity production." In other words, financialization does not aim to generate returns from the production or trade of goods and services – unlike the so-called "productive" or "real" economy. Financialization instead seeks to generate value from the financial capital invested in the apparatus underlying this production and exchange (Van der Zwan, 2014).

This article distinguishes between the financialization *project* and the financialization *process*. The financialization *project* is the individual or collaborative enterprise planned and articulated to achieve financialization. The financialization *process* refers to the implementation of the financialization project. Many financialization projects never come to fruition (Dempsey, 2016). The case study below in which conservationists failed to launch a CIB is a good example. We will argue that such projects can nevertheless lead to a profound transformation of the practices at stake towards financialization. As Büscher, Dressler, and Fletcher (2014: 97) thus note: "In short, Peck (2010: 6) observes, 'It is both an indictment of neoliberalism and testament to its dogged dynamism, of course, that laboratory experiments do not 'work.'' They have nonetheless tended to 'fail forward,' in that their repeated manifest inadequacies have—so far anyway—repeatedly animated further rounds of neoliberal intervention."

Financialization has become a project for society. It has also become a project for nature (Hahn et al., 2015; Latour, 2009, 2013; Loftus & March, 2015). Nature is understood in this article as a social construct and certainly not as an objective entity separated from "culture." There is no "nature" per se, but rather a multiplicity of relationships between humans and their environment, which has led them to qualify this environment as "nature" (Latour, 2009, 2013). We could equally have evoked nature(s) in the plural to insist that nature(s) constantly evolve and unravel in multiple ways. Financialization is one of the potential relationships humans can pursue when trying to appropriate this environment's value(s). In conservation, financialization has been portrayed as "a process in which financial actors invest in units of conserved nature and turn these investments into financial instruments which are traded on financial markets" (Hahn et al., 2015: 78).

The literature on financialization is multiple and complex (Bayliss, Fine, & Robertson, 2017). French, Leyshon, and Wainwright (2011) identify three main approaches. Articles on nature's financialization abound and span these three approaches (Castree, 2008a, 2008b). Studies belonging to the *regulation school of financialization* (1) have investigated the penetration of the financial sector into the field of conservation, notably through the shaping of carbon offset markets, mitigating and biodiversity banks (Pawliczek & Sullivan, 2011), or the penetration of financial professionals into leading conservation organizations (Dempsey, 2016).[5] There is also

[5] The Nature Conservancy and WWF, for instance, have appointed former bankers as leaders of their organizations and collaborated with financial firms such as Goldman Sachs and Credit Suisse (see the references for some jointly published reports on conservation finance). They have also developed conservation investing units, for example, NatureVest. See https://www.nature.org/en-us/about-us/who-we-are/how-we-work/finance-investing/naturevest/ for further information, accessed November 26, 2021.

abundant literature in the *critical social accountancy school* (2) exploring the privatization and transformation of nature into assets to be managed and financially valued. Studies belonging to this second approach include analyses of ecosystem valuation services or attempts to commodify natural resources (Hahn et al., 2015). The *financialization of everyday life* (3) has been mainly explored through the evolution of individuals' preferences for environmental projects that can demonstrate direct benefits to their communities rather than projects aiming to save nature for its intrinsic value (Besser, 2010). In the aftermath of the neo-liberalization of public policies, conservationists have felt increasingly compelled to use monetary, rather than ecological, justifications to protect habitats and their species (Hahn et al., 2015; Sandbrook, Fisher, Holmes, Luque-Lora, & Keane, 2019). These three approaches are not mutually exclusive, and the project to financialize the endangered species studied in this article is undoubtedly an outcome of these three phenomena.

2.2. The *process* of financializing nature

While the phenomenon of financialization has been well studied, we are only starting to understand the "considerable efforts" and "investments in form" required to make financialization "work" through the development of systems, metrics, databases, policy documents, laws, and contracts (Chiapello, 2018; Glaser et al., 2016). Chahed (2021), for instance, shows that narratives that complement financialization technologies, such as calculative devices, are essential for gaining the support of key individuals. Financialization hence involves an array of activities and requires many actors and technologies to be mobilized in multiple arenas, particularly in conservation (Dempsey & Bigger, 2019; Robertson, 2004).

The assemblage of practices, devices, and people to transform living beings, such as endangered species, into financial assets varies and is often tailored to the environmental issues at stake (Ouma, Johnson, & Bigger, 2018). However, a systematic literature analysis indicates that four mechanisms are typically involved in financialization processes. We refer to these mechanisms as 1) pacifying, 2) commodifying, 3) calculating, and 4) marketizing and argue that they together form the process by which nature is financialized. If one step is missing, the process will be incomplete (Chiapello, 2018). The mechanisms are intertwined and are not strictly chronological.

1) *Pacifying* (Çalışkan & Callon, 2010) involves transforming living entities into passive, compliant, and non-resistant (akin to dead) entities, thus introducing "peace" into the chaos of life. The qualities of passive goods create the stability necessary for financialization. Pacifying is essential for projects aiming to financialize nature. Such endeavors attempt to transform complex and constantly evolving living beings into steady passive objects that can be desired and possessed. For instance, conservationists create inventories of species and focus on manipulating them rather than engaging with the animals themselves, which may have multiplied or died. Pacifying erases life from species, depriving them of their agency capacity. Species are thereby "normalized" as objects of financial calculability and rendered "governable" through financialization technologies (Miller, 2001; Miller & O'Leary, 2007; Miller & Power, 2013; Vinnari, Chua, & Baxter, 2022). Such pacification is also found in projects involving human beings, such as social impact bonds, where humans are dehumanized and considered "assets" (Birch & Muniesa, 2020; Cooper, Graham, & Himick, 2016). Pacifying species is difficult since ecosystems change constantly, habitats refuse to be domesticated, and nature is a complex system. Nature has a long-period lifespan (Scales, 2015). For example, it takes 30 to 50 years of conservation efforts before a species can potentially

be declared saved. Such time horizons are much longer than those typically at stake in financialization projects (Sydee & Beder, 2006). In other words, ecosystems are interconnected, complex, and constantly evolving, making it particularly difficult to control their fauna and flora independently.

2) *Commodifying* turns something that is not by nature commercial into something that will be valued chiefly for its monetary worth, making the rules of the market our culture's default setting (Strasser, 2003). It involves incorporating the commodified element into the overall system of capitalist social relations (Strasser, 2003). More specifically, commodifying attaches property rights, or the rights to privately appropriate the value assigned to pacified goods so that they can be considered in calculation and judgment operations by creating market compatibility (Çalışkan & Callon, 2010). Numerous studies have examined projects to commodify nature through market mechanisms, such as financial actors' creation of permits or rights to exploit and sell what is typically regarded as "commons" (e.g., oceans, air, biodiversity) (Smessaert, Missemer, & Levrel, 2020). Research also abounds regarding the commodity market (e.g., crops and cattle) and its vital role in creating sophisticated financial instruments, such as futures (MacKenzie & Millo, 2003). However, research also suggests that very few natural resources are likely to behave like commodities since nature resists and cannot be easily fragmented and possessed (Hahn et al., 2015; Büscher et al., 2014). Lohman (2014) reports that "tradable pollution permits are generally claimed in legislation not to be property rights of any kind" (p.160). Those tradable units for carbon emissions are usually defined by what the buyer is allowed to do (i.e., pollute) rather than by its access rights to "global carbon cycling capacity" (p.161). Besides, property rights are not easily assigned to habitats and species, which often transcend legal boundaries (e.g., rivers or migrating birds). The time horizon of nature is poorly aligned with the world of finance, and its agency also complicates its possession.

3) *Calculating* refers to creating calculative devices and practices that support the creation of a market by offering collectively agreed valuation processes applicable to nature (Chiapello, 2018; Déjean et al., 2004; Giamporcaro & Gond, 2016). Calculating contributes to stabilizing the assemblage of devices, practices, and actors involved in the financialization process (Çalışkan & Callon, 2010). Calculative devices usually take the form of financial models or accounting metrics, which are often developed by accounting and financial professionals to standardize practices (Arjaliès & Bansal, 2018; MacKenzie, 2009; MacKenzie & Millo, 2003). Additionally, calculating can also be envisioned as assigning a monetary value to the objects to be financialized, aligned with a financial market vision of performance. However, a financial rationale can also be adopted using ratios such as risks and probability, which do not involve financial numbers per se (Chiapello, 2018). When a monetary value is adopted, it usually reflects what market actors would pay to acquire the goods. This value can be estimated using different accounting techniques, such as contingent valuation models (Fourcade, 2011), ecosystem valuation services, or market value, notably when natural resources are already traded (Hahn et al., 2015). However, such an assessment is prone to criticism since the intrinsic value of nature is typically broader than the services it offers or its appraisal by economic actors. It includes elements such as joy, spirituality, and beauty that are not easily financialized (Arjaliès, 2022; Beckford, Jacobs, Williams, & Nahdee, 2010; Huber, 2018; Kosoy & Corbera, 2010; Quattrone, 2022). Through financialization, calculative practices thus become "intrinsic to and constitutive of social relations, rather than secondary and derivative" (Miller, 2001: 392).

4) *Marketizing* involves trading the invested nature/conservation units on the market to generate cash flows, i.e., financial returns. Financial actors mainly lead this phase since their support is essential to creating a market. However, biodiversity is not readily marketable because financial actors are often reluctant to pay to acquire the items or the services rendered since they are typically considered commons, i.e., of benefit to all. Although many habitats have demonstrated their financial value via calculations of ecosystem services,[6] very few have generated financial returns through market transactions, except for some carbon and biodiversity offset markets (MacKenzie, 2009). Unless a direct and exclusive benefit can be extracted from the purchase, exploitation, or protection of nature, financial actors are unlikely to create a market for those environmental goods and services. This is notably the case for the endangered species under study in this article, namely amphibians and reptiles living in insular regions, for which no market exists. Accordingly, the processes for financializing nature tend to remain incomplete.

It is essential to understand that nature loses its specificities and life ontology in the financialization process (Fredriksen, 2017; Mitchell, 2016). Commodities such as wheat or fish are transformed into passive objects exhibiting undistinguishable features so that they can be traded interchangeably, leading to the production of a small number of species whose traits please consumers and their market behaviors, thereby leading to an overall reduction in biodiversity (Fowler & Mooney, 1990). Financialization technologies also enable biodiversity losses in one location to be equated with biodiversity gains in another via biodiversity offset markets (Cuckston, 2018b; Tregidga, 2013). The same applies to carbon, which is considered identical wherever the pollution occurs (MacKenzie, 2009). This commensuration process (Espeland & Stevens, 1998) fails to acknowledge that living beings are unique and can never be replaced. Habitats relate to a specific location and cannot be reproduced elsewhere (Vinnari et al., 2022). Financialization is, therefore, antinomic with conservationists' work (Dempsey, 2016; Dempsey & Bigger, 2019). As we will explain in further detail in the rest of the article, financialization aims to commensurate and abstract nature's value(s). Conservation instead searches to singularize and connect to nature. Accordingly, many conservationists are attempting to design new types of financialization projects to reconcile these contradictory goals (Fletcher, 2013).

2.3. The specifics of conservation finance

Projects to financialize conservation have multiplied following the expansion of the financialization project pursued by society more broadly (Brockington & Duffy, 2011; Büscher, Sullivan, Neves, Igoe, & Brockington, 2012; Sullivan, 2013). We designed Figure 1 to provide an overview of the leading conservation finance approaches currently in use, depending on the land ownership structure (i.e., commons vs. private and public land) and the externalities addressed. Financiers are likely to invest in projects that easily generate cash flows, which typically involve private and public land whose conservation benefits can be easily appropriated (e.g., through a permit or the exploitation of natural resources) or negative externalities for

[6] Ecosystem services are the benefits people derive from ecosystems. Besides provisioning services or goods like food, wood and other raw materials, plants, animals, fungi, and micro-organisms provide essential regulating services such as pollination of crops, prevention of soil erosion and water purification, and a vast array of cultural services, like recreation and a sense of place. (Source: http://www.millenniumassessment.org/en/index.htm, accessed May 30, 2022)

which a premium could be obtained (see columns 2 and 3 of Figure 1). Calculative devices have been developed for these projects to enable financialization, such as carbon accounting (e.g., via REDD mechanisms[7]), biodiversity offsetting and in-setting (e.g., via biodiversity net loss calculations), or ecosystem valuation services. These devices typically involve a counterfactual calculation,[8], comparing ecosystems' states with and without conservation intervention. This calculation acts as proof of "added value."

---Insert Figure 1 about here---

Conservation-focused financialization projects targeting commons with positive externalities are typically referred to as "underlying" – hence unlikely to generate cash flows (see column 1 of Figure 1). Such projects include natural systems whose benefits are difficult to privately appropriate, such as urban forestry or wetlands, in which financiers are reluctant to invest. Conservationists specifically aim to channel private money towards these projects, typically underfunded by public sources due to their transboundary features.[9] Examples include ecosystem corridors, which enable animals to cross a specific region. To build corridors, private and public owners (e.g., farmers, real estate developers, municipalities) must abandon some potential value extraction from their land for the collective good.[10] Conversely, while everyone wants to benefit from the green infrastructure provided; no one is willing to compensate for the resulting financial losses.[11]

To address this problem, conservationists have attempted to create conservation impact bonds (CIBs), such as the forest resilience bond in California, designed to prevent wildfire through forest restoration.[12] Like a social impact bond, a CIB compensates for the loss of value caused by transforming land into a biodiversity reserve (see Figure 2 for an overview). This financial compensation unfolds by transferring cash flows between outcome payers, investors, and conservation organizations. Investors finance the restoration of ecosystems; conservation organizations do the conservation work; outcome payers pay for the protected ecosystems' services, plus an interest amount, once the project is successful. CIBs incorporate impact assessment metrics to evaluate the conservation project's success. These impact metrics also determine whether investors will receive their capital plus interest to compensate for their risks. In other words, if the project is successful, investors are paid; otherwise, they are not. Outcome payers can include any individual, public or private organization, or authority that wants to have

[7] REDD represents "countries' efforts to reduce deforestation and forest degradation emissions, foster conservation, sustainable management of forests, and enhance forest carbon stocks" (https://www.forestcarbonpartnership.org/what-redd, accessed April 8, 2019).

[8] In conservation science, counterfactual means the ability to compare species' survival to a scenario in which there has been no human intervention. The ability to provide counterfactual scenarios is critical to "prove" the benefits of conservation efforts.

[9] Nature often needs to be conserved at "bioregional" levels, because natural systems do not correspond to legal or ownership boundaries. Consequently, the nature to be conserved is often transboundary, as are the drivers of negative impacts (pollution) that affect those natural ecosystems. Ecosystems and ownership structures are often misaligned.

[10] See the Yorkshire Water example. Following the results of its "six capitals" sustainable accounting system, it has encouraged farmers to use fewer pesticides, which were negatively affecting water quality (source: https://www.yorkshirewater.com/news-media/2019/farmland/, accessed September 23, 2020).

[11] In 2007, the President of Ecuador asked the world to compensate the country for the loss of oil "kept in the ground" to save the Amazon rainforest. He asked for $3.6 billion, half of the oil's value at the time (source: https://www.npr.org/sections/money/2013/09/02/216878935/ecuador-to-world-pay-up-to-save-the-rainforest-world-to-ecuador-meh?t=1599984035339, accessed September 23, 2020)

[12] https://www.forestresiliencebond.com/. See the Conservation Finance Network for further initiatives, https://www.conservationfinancenetwork.org, accessed June 3, 2020).

a well-functioning green infrastructure without bearing the risks of investing in the infrastructure – which means anybody potentially living or extracting value from the land. The conservationists launching CIBs believe that such biodiversity projects are unlikely to be funded without these financing mechanisms and the private appropriation of value they enable (William, 2017).

---Insert Figure 2 about here---

As explained above, attempts to financialize nature are not new. Conversationists have previously been involved in various experiments, from biodiversity offsetting markets to water commodification. CIBs can be considered the latest and most ambitious contribution to such financialization projects. These tools are historically the most recent, but they also aim to go further in terms of financialization. Conservationists no longer "only" attempt to assign a monetary value to nature or transform it into commodities. They hope to design financial instruments that will help them generate cash flows based "only" on the idea that biodiversity is valuable and that some market actors are eager to pay for it. The financial transaction in a CIB indeed prevails over the market transaction. Investors or outcome payers do not "appropriate" any piece of nature; they only receive the financial value assigned to nature by the market. Nevertheless, this approach has been widely criticized for enabling the private appropriation of commons' (financial) value by capital owners (Kay, 2018; Sullivan, 2012).

In this article, the conservation organization under study developed a conservation performance index, referred to as the "Index," which they hoped to use as the "success metric" for a CIB. When they saw that the Zoological Society of London and the WWF had launched a "rhino impact bond" project in 2014,[13] the organization developed the idea of establishing their own "species impact bond." The rhino impact bond aims to save rhinoceros by paying for their protection and incentivizing conservation rather than poaching (Okolo, 2022). Outcome payers include individuals and organizations willing to protect rhinoceros, primarily for their love of the species. Unlike these feelings for the rhinoceros' species, our research will show that investors were unwilling to engage with a "frog impact bond" project. By uncovering the process through which the conservation practices under study were gradually financialized, we will explain why the abstraction and valuation mechanisms supported by the Index were not sufficient to generate cash flows (Huber, 2018; Kay, 2018). We will demonstrate that extracting the (financial) value obtained through investments in nature depends on the material and emotional relationships between investors and the type of nature in question. Although often portrayed as unconstrained (Buscher & Fletcher, 2020), we will argue that the financialization of conservation is hampered by the reality of the natural world it attempts to tame. We will address the following research question: *Can financialization save nature, and if not, why not?*

3. Research setting

3.1. The biodiversity crisis

Between 1970 and 2016, over 68% of the population size of the mammals, birds, amphibians, reptiles, and fish on earth disappeared, and more than 85% of wetlands were lost (WWF, 2020). Over 10,000 species become extinct each year, an estimated rate between 1,000 and 10,000 times higher than the natural extinction rate (WWF, 2017). We are now facing the sixth period of mass extinction (Ceballos et al., 2015).

[13] See https://undp-biodiversity.exposure.co/results-for-rhinos, for more information, accessed April 7, 2021.

Protecting biodiversity is essential for many reasons. Firstly, the recent loss of species is so severe and dramatic that it could propel the world into a state of mass extinction (Barnosky et al., 2011). Secondly, animals and nature, in general, must be protected because the planet does not belong solely to humans (Atkins et al. 2018; Gray and Milne 2018; Mistry and Berardi 2016). Thirdly, according to the Gaia hypothesis (Lovelock, 2000; Rodrigue & Romi, 2022), the Earth is a complex self-regulating system akin to a living organism. Healthy ecosystems are more likely to survive disasters, and greater species diversity ensures sustainability for all life forms – humans and animals alike.

Biodiversity is also essential to our economy. According to the Convention about Life on Earth, at least 40% of the world's economy and 80% of the needs of the poorest people on the planet are derived from biological resources,[14] while 75% of global food crops rely on animals and insects such as bees or bats to pollinate them (IPBES, 2019). The ecosystem services delivered by biodiversity, such as crop pollination, water purification, and carbon sequestration, are vital to life and are estimated to be worth between USD 125 and 140 trillion per year, more than one-and-a-half times global GDP (OECD, 2019). New business opportunities from investing in natural resources are expected to reach between USD 2 and 6 trillion per year by 2050 (The Economics of Ecosystems and Biodiversity Consortium (TEEB) 2011).

Between 2004 and 2015, members of the private sector had already invested USD 8.2 billion in projects with a demonstrated potential to yield measurable environmental benefits. However, this investment represents only a tiny fraction of the capital needed for conservation (Hamrick, 2016). It is estimated that USD 200 billion to 300 billion of additional capital is required every year to finance the preservation of the world's most precious ecosystems by creating healthy habitats or changing the ways natural resources are exploited (Huwyler, Käppeli, & Tobin, 2016). Unfortunately, conservationists lack the necessary resources to safeguard nature. Faced with this challenge, some conservationists attempt to demonstrate to society and financiers that their work matters. Our interviewees explained, "We are a conservation results business – and we have to prove it" (Internal Presentation of the Index, 2014). In our study of this conservation financialization process, we focus on the Index, the calculative device used by the conservation organization.

3.2. The Index

The conservation organization that designed the Index is over 50 years old and has three branches: a wildlife park, field programs,[15] and a training and education program. The conservation organization comprises approximately 150 employees and 120 volunteers. The executive director is responsible for the organization's daily management and is assisted by a team of senior managers responsible for its eight key teams: animal collection, conservation, conservation science, training and education, marketing, fundraising, accounting, and human resources. This top management team is accountable to a board of trustees who serve on various committees covering audit, governance, investment, remuneration, and risk. Of the conservationists we interviewed in the organization, only one had pursued an (online) MBA; the others had no background in business, finance, or a similar field.

[14] https://www.cbd.int/, accessed September 22, 2020.
[15] A field program is an on-the-ground conservation program run where the species is situated and needs to be saved (for example, in Madagascar for Lemurians).

The conservationists from the organization aimed to measure their actual impact on protecting endangered species. The Index differs from previous conservation assessment efforts in three ways. First, the Index was one of the first metrics to assess an organization's holistic conservation performance, not just performance related to specific conservation projects. The conservation science team considers the measure to be essential to attract funding. Second, the Index evaluates the organization's impact on species conservation by explaining what the situation would have been without its intervention. This implies counterfactual reasoning that is extremely difficult to implement in conservation contexts. Until then, species conservation was only "evaluated" using activities and output measures, meaning that only their total numbers were "monitored," but without linking this number to the effects of the organization on the actual survival of species or "outcomes" after intervention (internal documents). Third, the Index estimates the "return on investment"[16] of species survival to demonstrate conservation success to potential future investors in the "species impact bond."

The Index is composed of a data collection process that the organization was still implementing in 2015 when one of the authors visited the conservation science team. The goal was to be able to gather monthly species and program information. The Index relies on a scientific framework used to calculate impact, published in an academic journal. It comprises the work to measure the counterfactual scenario (based on previous work by other conservationists), the Red List Index (see Online Appendix), and the extinction threat category lists.

Based on these calculations, the organization designed different outputs for the public. The first output was a PDF with "global indicators" to estimate the organization's conservation success. The team developed three types of global indicators: pressure, response, and impact. The second output comprised four types of species indicators to assess the organization's impacts on the species it aimed to protect: status, pressure, response, and impact (see Table 1). Both outputs were published online in 2015. Since then, these data have not been updated, although new data on new species have been regularly added.

---Insert Table 1 about here---

As of 2015, all the indicators have been presented on the organization's website; however, the Index was initially communicated in 2014 in a single PDF that illustrated each global indicator through three types of visuals: a societal visual, a management visual, and an animal photo accompanied by an animal "story" (see Figure 3 a,b,c for an example). For instance, for the indicator "threats to species survival," the threats are presented via a lighthouse with a threat score (societal visual, Figure 3a). The further (thus bigger) the light is, the bigger the threat to species is. The most critical threat is "Invasives" both currently (5.5 units in green) and in the future (3 units in yellow). This threat refers to the multiplication of invasive species (i.e., species that do not come from an eco-region) that "invade" ecosystems and gradually lead to the disappearance of native species. In comparison, the urban development threat only comprises a half unit of threat (green) – and is, therefore, the closest to the lighthouse as you need to get closer to notice this (relatively) smaller threat. The low importance of the urban threat can notably be explained by the type of insular ecosystems in which the organization works. Likewise, the organization used a representation of the percentage of the organization's species under threat via a management-type visual, a stick chart (Figure 3b). The information comprised by the management visual is the same as the societal one but represented in a more management-friendly way. Finally, the organization offers a story and photo of one of the most

[16] The return on investment is the difference between the Red List Status achieved with conservation efforts and what the status would be without these efforts.

threatened species under their care – the mountain chicken frog, to illustrate a real example of what is explained in both the societal and management visuals (Figure 3c). The conservation science team defined the Index as:

> Our approach for *measuring the conservation performance* of the [conservation organization] – it's a tool, or strictly speaking, a set of tools, that allows us *to measure our actions* on the ground, how we are trying to battle the threats to our species, and the results of that. So, *what impacts we're having* in terms of our mission to save species from extinction. But essentially, it's about our *conservation performance*. (Conservation Science Team)[17]

---Insert Figure 3 a,b,c about here---

3.3. The creation of the Index

In 2011, the conservation organization was in financial turmoil, as monetary donations had decreased significantly since 2005. Trustees were concerned about the organization's survival. They constantly questioned the management team about these financial problems, which worried that financial decisions would be made at the expense of protecting species. The conservation science team wanted to refocus discussions with trustees on the conservation projects themselves and suggested creating a calculative device that would enable trustees to better understand the excellence of the organization's conservation work by measuring – and thereby proving – conservation success. The conservationists also believed that these indicators would help them improve their conservation practices: "We can make management decisions in a way that's timely and make the best possible decisions to get the best possible effect on the ground." (Conservation Science Team)

The conservation science team benchmarked the indicators used by other conservation organizations and quickly realized that the conservation success measures could be improved. The organization's conservationists wanted to be the first in the conservation field to design a calculative device that could measure the conservation impact of an entire conservation organization, thereby enabling them to demonstrate the success of their efforts. The conservationists believed that this type of organizational tool was lacking and that developing it would strengthen their reputation. They also thought measuring conservation success would help them educate the public about the need to protect endangered species and convince donors to continue financing species conservation programs. When they came across the rhino impact bond project, they integrated the possibility of persuading investors to finance conservation through innovative financial instruments such as CIBs into their project.

In 2011, while presenting the need to "monitor conservation outcomes," the skeleton of the future Index was presented as "a suite of quantitative indicators targeted at the information users/monitoring audiences" (internal documents), including donors and funding bodies. It was defined as a "[conservation organization] 'Dashboard' – a tool to measure and communicate institutional operational effectiveness." The state of biodiversity was measured using the IUCN Red List Index.[18] The dashboard would also monitor conservation responses, pressure on

[17] Italics in this quote, and in the other quotes throughout the article, indicate emphasis added by the authors.
[18] The IUCN Red List Index is defined by the IUCN as a tool that "shows trends in overall extinction risk for species and is used by governments to track their progress towards targets for reducing biodiversity loss" (source: https://www.iucnredlist.org/assessment/red-list-index, accessed September 23, 2020). See Online Appendix.

biodiversity, and benefits to humans and communities. The presentation included a "conservation hub" that would capture the monitoring data monthly.

In 2012, the goals of the Index were further specified as "tracking conservation actions, monitoring the outcomes of its conservation program, showing progress, evaluating, and measuring [the conservation organization]'s long-term impact, demonstrating what would have happened to species without [the conservation organization]'s intervention and guiding long-term management decision making and conservation strategy." (Internal documents) What we refer to as "societal visuals" (see Figure 3a) were created at this point, to "create a strong visual identity," to "represent the information in a way that is clear and easy to understand," and to "ensure scientific robustness is maintained" (Internal documents).

In 2013, in an internal presentation to the board of trustees, the first slide mentioned "the rise of impact" in the third sector, citing the examples of Solar Aid and St Giles Trust ("Charities used to be measured by the size of their halos. What we have done … is to make sure that everything is properly evidenced." St Giles Trust CEO). A chart validated that the organization's most important reason for continued donation was "success in saving species." The objectives of the work on the Index were stated slightly differently and illustrated the shift from measurement to impact to return on investment that we will uncover below: the objective was "to track our conservation actions and measure the long-term impact of the Trust, to provide evidence of the long-term impact of our work, so key stakeholder groups understand their 'return on their investment', to guide long-term strategy to be leaders in conservation impact evaluation and communication" (Internal documents). The Index was at this stage split into organizational conservation KPIs, program KPIs, and species scorecards. The measurement efforts addressed 53 species, and the work was considered "a massive data-gathering exercise and trawl of institutional memory." The Red List Index was also compared with financial risk assessment, stating the need for a "counterfactual scenario" to prove "what would have happened if we hadn't intervened" (Internal documents). The Index was considered ready for implementation in the organization once employees had been trained and was communicated to the public in 2013/2014.

In 2014,[19] the Index was rolled out to the public and defined as "a set of quantitative indicators, narrative timelines, and tracking tools – data visualization, the over-arching term for all our conservation monitoring and evaluation systems, target audiences are those that can influence our future: donors, supporters, trustees, staff, partners, peers, policymakers…" (Internal documents). The reference to the "impact" approach was reiterated, as well as a statement on the conservation sector being "way behind." The Index allegedly allowed the organization to answer questions such as "Which programs give the best bang for the buck? Which programs are performing well, which are under-achieving? What difference are particular donations making?" (Internal documents). At that stage, the movement toward "financialization" was reinforced, "the Index concept has created support and buy-in for investing in M&E [monitoring and evaluation] systems," consequently "we need to be better at M&E than others in sector … and get ready for ROI [Return on Investment]" (Internal documents). The organization asserted that "We are a conservation results business – and we have to prove it." The Index had therefore become "a tool to enable innovative and more sustainable conservation investment" (Internal documents). The Zoological Society of London started working on its rhino impact bond project that year. Our study organization's conservationists became aware

[19] Note that the Index was made available online in 2015.

of that program and its specifics because of the close interactions between the two organizations.

In 2015, when we performed our first fieldwork at the conservation organization, the last presentation we gathered mentioned that they needed to "establish a sector-leading position to help change our financial position – need to get ready for 'impact investment.'" In various additional informal conversations with the conservation science team, the conservationists made it clear that they hoped to use the Index as the backbone calculative device for a species impact bond.

Since publishing its Index in early 2015, the conservation organization has been judged by its peers to be one of the most advanced organizations worldwide to measure its ability to conserve species. Measuring conservation impact is crucial for using financial instruments to finance conservation efforts. In 2016, the Index was rated as the most advanced tool for assessing conservation success in an international consultancy study. That same consultancy firm has been a crucial pillar in developing the rhino impact bond with London's Zoological Society. Therefore, the conservation organization can be considered an ideal setting for a revelatory case study of the financialization of conservation practices (Yin, 2013).

4. Research methods

4.1. Data collection

We followed a two-stage data collection process inspired by the collective inquiry methods developed by pragmatists and Actor-Network Theory (ANT) researchers (Dewey, 1939; Latour, 1987, 2013; Lorino et al., 2011) and proposed in previous accounting research in scientific contexts (Power & Power, 1996). This method involves co-investigating what we observe as "strange" (Macintosh, 2009) in the case under study with the practitioners involved in the fieldwork – in this example, the conservationists' struggles when attempting to financialize an endangered species. The first stage involved studying the Index developed by the conservation organization. In the second stage, we discussed the findings with conservationists and conservation finance specialists not affiliated with the conservation organization. Our aim in this second stage was to understand whether the financialization was unique to this case or whether the case was representative of the conservation field more broadly.

1st stage

During the first stage, we performed semi-structured interviews and collected documentary evidence. We conducted interviews with the conservation organization members face-to-face and via Skype; these interviews lasted between 36 minutes and 2 hours. Face-to-face interviews took place at the conservation science and conservation trust teams' head offices at the end of 2015. We interviewed the field conservationists via Skype in May 2016 and 2017. External organizational stakeholders were also interviewed via Skype, except for one respondent with whom we communicated by email. Of the 26 interviewees, 11 were internal stakeholders in the Index, nine were directly involved in the Index's construction phase, and six were external stakeholders.

Our questions explored the following general themes: the organization, its governance, and its stakeholders; conservation calculability; the Index and visuals; the current internal and external

use of the Index; and the tool's construction and future, notably its potential use in impact bonds. We explored some topics in greater depth within these themes, depending on the interviewee's background, notably the Index's construction or its use and consequences for conservation practices. Informal exchanges with the conservation team provided a more nuanced understanding of plans to financialize their funding processes. The interviewees mentioned several times that they viewed the rhino impact bond as a potential model for other species. We collected secondary data to complete and confirm interviewees' stories about the Index, including board meeting presentations, notes from three workshops, and external communications. Internal data cover the period from 2011 to 2015. We organized a feedback session with the conservation team in May 2016 to present the findings and obtain their initial reactions.

2nd stage

Our findings from the first stage prompted an additional question: Was the financialization project representative of the field of conservation more broadly, or was it unique to this organization? We needed to discuss our findings with conservationists and conservation finance specialists outside the organization (September 2017 to March 2019). We selected interviewees representing the types of conservation organizations described in Appendix A to understand different approaches to saving endangered species. During this second research step, the conservationists we interviewed belonged to diverse conservation organizations, which we believe represent the field (see Appendix A for further details). Likewise, interviewees included conservation specialists who had adopted various conservation finance approaches (e.g., carbon offsetting, project financing, conservation impact bonds, ecosystem valuation services). We sent emails to potential interviewees explaining our research, including a previous working version of this article focused only on the conservation organization and the Index. We sent emails to a wide range of individuals, including well-known conservationists involved in policymaking and academia and members of small conservation organizations with no online presence, whom we expected to be less exposed to discussions about conservation finance. Where possible, we combined interviews with visits to the ecosystems under the conservationists' care. We also deliberately contacted conservationists we believed would have reservations about financialization, such as Indigenous conservationists. We also read Twitter accounts and press articles and explained to our potential interviewees that we wanted the voices of conservationists less enthusiastic about financialization to be heard. All interviews were recorded and fully transcribed for analysis as in the first stage. In total, we interviewed 29 people during this second phase. The data collection ended in 2019. Appendix B summarizes the data sources.

To enhance our overall understanding of the field, we continued to participate in some conservation events, where the topic of financialization was openly discussed. After the data collection was concluded, and as part of our subsequent scholarship and teaching engagement, one of the authors participated, with some conservationists, in a community-based participatory research project to calculate ecosystem valuation services and design carbon offset models and impact bonds on a pro bono basis. This choice was not triggered by our own belief in the mechanisms (which we made clear to the conservation organizations) but by our desire to understand such calculative devices and contribute to conservation. The other author also co-led a report that made recommendations to public authorities about managing biodiversity in the food sector. These subsequent personal experiences, post-data collection, enabled us to better understand conservation science and the related financial challenges by being deeply immersed in the field.

4.2. Data analysis

Our analysis was informed by performative approaches used in visual accounting research (Davison & Warren, 2017; Justesen & Mouritsen, 2009) and collective inquiry methods inspired by pragmatism (Dewey, 1939; Latour, 1987, 2013; Lorino et al., 2011). Performative approaches draw on ANT (Latour, 2005), assuming that realities are constructed through interactions between individuals and their inscriptions. This method thus follows the trajectories of calculative devices and considers their effects on practices. The collective inquiry method, on the other hand, involves co-investigating phenomena with the practitioners involved in the fieldwork.

1st stage

We began the first stage of our analysis by engaging in a standard form of coding. We first used *focused coding* to identify relevant emerging codes (Charmaz & Belgrave, 2002: 321), i.e., terms consistent with respondents' meanings and words. Focused codes included managerial and financial terms relating to the discussion of the Index, such as "return on investment," "risk management," "planning," and "production of results." As the codes emerged, we began comparing our findings to the literature on biodiversity accounting, NGOs, and financialization – an approach known as *pattern matching* (Yin, 2013). At this stage, we were surprised by conservationists' use of what we called "societal visuals." We wondered how a process of financialization could unfold without visible financial numbers.

To better understand the relationships between the different codes, we refined our data structure using *axial coding* (Strauss & Corbin, 1998). In a similar vein to grounded theory (Strauss & Corbin, 1998), we wanted to generate theoretical findings from the data themselves. We booked a room specifically designed for innovative thinking with walls and tables on which we could write. On one wall, we described all human actors. On another wall, we analyzed the Index itself. On the last wall, we defined the specificities of conservation and the animals themselves. We used the table in the center of the room to physically draw the modes of connection between these three groups (see Figure 4). While walking around the ecosystem we had reproduced, we realized that the Index's content mirrored the construction of the Index by conservationists, in other words, the process of financialization.

---Insert Figure 4 about here---

2nd stage

In the initial version of this article, we identified four phases through which the Index financialized conservation practices. Each phase of the financialization process corresponded to a layer of the Index itself: first, a scientific project, then a societal one, before becoming a management and ultimately a financial project (see Appendix C). We sent this working version to the interviewees involved in the second stage of our analysis. We first asked conservationists and conservation finance specialists to explain their conservation work and the specificities of the ecosystems under their care. We then discussed the role of financialization in their practices and frequently pointed to the conservation organization's Index as an example. We asked interviewees whether they believed financialization was a good idea and, if so, whether they were developing metrics themselves. Some of our interviewees started drawing on the conservation organization's figures, sketching their visions of what financialization should look

like. These exchanges enabled us to understand better what was unique to the organization we had studied and its broader significance.

3rd stage

As the revision process unfolded, reviewers asked us whether the process we had observed was about financialization or whether it was instead a story of "trust in numbers." The lack of financial numbers and cash flows indeed raised questions as to whether the conservation practices could be said to be financialized. To answer this question, we contacted researchers who specialized in the financialization of nature but in adjacent fields (e.g., geography, anthropology, conservation biology). We conducted six online conversations involving more than ten specialists between March and June 2020. These exchanges helped us understand that most projects to financialize nature were challenging to complete. Throughout our discussions and thanks to the insights shared by our interviewees, we also realized that the financialization of nature envisioned by those disciplines was very diverse and often excluded cash flows, contrary to standard assumptions in accounting. This extensive interdisciplinary deep dive confirmed our initial analysis – the financialization of nature can unfold without financial numbers, accountants, and cash flows. Such exchanges also helped refine the four mechanisms underlying the financialization process (see Figure 5). A theorized account of these findings is presented below and further explained in the following sections.

---Insert Figure 5 about here---

5. Findings: The process of financializing endangered species

5.1. The financialization project

At the time of the interviews, both the conservationists inside the organization and the external stakeholders from the conservation field that we interviewed had concluded that developments in the field of "impact investing" (e.g., the privatization of prisons, homelessness) foretold the future of conservation. The new CEO of the conservation organization under study accordingly explained that the organization needed to adopt an "investment paradigm."

> [The Index] is an interesting tool to be able to go to investors and say, "You are an investor; you want to see the line go up. Our line goes up; we are a good investment." It gives confidence to the investors that we are a good bet. (New CEO, 2017)

In line with the rhino impact bond project, most of our interviewees believed that conservation would soon take the form of "investment programs" where the value of conserving specific species would be monetized.

> I've been very keen on pushing for stronger management and the selection of projects and their evaluation and assessment, and absolutely see it as an investment paradigm where there are limited resources, and you have to apply some form of selection, prioritization, assessment, and then check that your investment is actually working. (External Stakeholder, CEO peer organization, 2016)

Several members of the conservation science team also acknowledged that they were keen to follow the "social investment-type stuff" in their next strategic plan. The administrative team planned to use the Index as an impact prediction tool to leverage fundraising and future development.

> In the end, somebody has to spend money on this, so however you structure a financial product, it still involves risk, and it still involves a return. Somebody has to give money so that we can do our work. And could it be a loan, a grant, could it be success-related? Of course, it could be. (Administrative Team, 2015)

Conservationists inside the organization argued that the Index shared the same cognitive financial frameworks as investors and funding agencies. In internal presentations, the Red List Index was compared to "financial risk assessment." Moreover, the urgency of protecting species was emphasized using financial terms: "We need to be better at M&E [monitoring and evaluation] than others in the sector ... and get ready for ROI." (Internal presentation, December 2014)

> The original idea was to find a way to represent what we had attempted and what we had achieved in a way similar to a share investment or a portfolio investment so that people who were used to seeing figures and successes and graphs would see it in that way and would hopefully see the light. (Board of Trustees, 2016)

The Index itself was promoted as the way "to verify the impact of our work so that key stakeholder groups understand the 'return on their investment'" (Board of Trustees). The transformation of the Index into a financial device also appeared in the final visual (of the original communication report in pdf) itself, where a curve mirroring a return on investment is visible. However, no financial number is present on the curve, only animals (see Figure 6). Informal exchanges with the conservationists who had designed the Index revealed that they intentionally mirrored financial devices, such as credit ratings. Financial terms, such as ROI or M&E, were not accidental.

Figure 6 was designed by the organization to show that the return on "investment" in their conservation activities grows over time. The blue line with the animals refers to the species' population size that benefited from their intervention since 1988. This line should be compared to the red line (without animals) that shows what the species' population size would have been without the organization's intervention. The difference between both lines referred to as "impact," is the difference in terms of population size between both situations represented by the Y vertical axis, as estimated in 2012 (i.e., an increase of 67% of species' survival with intervention vs. a decrease of 23% without intervention). In this case, the accuracy of the representation was of secondary importance (e.g., the units of the Y vertical axis do not match the percentages of population size). What mattered was to visually show that the organization was a "good investment" by mirroring a financial chart.

---Insert Figure 6 about here---

The endangered species tracked in the Index generated no financial returns during our fieldwork. The species impact bond never came to fruition. However, we will show that the conservationists did financialize the species under their care. In the following sections, we will uncover the mechanisms through which the Conservation Science team, in interaction with the public, donors, and their management team, attempted to pacify the animals to be protected, commodifying them by transforming them into product lines, and building the necessary calculative devices and practices for a potential species impact bond. The attempt to create a market was not, however, successful. The external conservationists' comments (step 2 of our data collection) will be shown in italics throughout our article to differentiate them from the

conservationists inside the organization. These accounts will help us shed light on the critical features of the process of financializing endangered species.

5.2. The attempt to pacify: Normalizing animals into species while re-engaging society to connect with animals

Despite having a wildlife park within its structure, the organization viewed itself as more closely related to academic conservation organizations than traditional zoological societies. According to the interviewees, the organization wanted to be seen as a scientifically based conservation organization that provided scientific evidence of its strategic and operational conservation decisions. Its conservation programs spanned over 50 years and involved many PhDs and academic partnerships. Because the organization strived to promote conservation through training, it had developed an in-house conservation academy to diffuse its best practices. The conservation organization also distinguished itself from other organizations by its desire to save the least glamorous and most isolated species on Earth. It has been estimated that 41% of the most endangered vertebrates on earth evolve in insular areas (Spatz et al., 2017). Such species include frogs, groundhogs, and snakes on remote islands. For instance, conservationists affiliated with the organization tried to save the last 48 mountain chicken frogs alive on the planet, principally on the Caribbean islands of Dominica and Montserrat.

The Conservation Science team was a group of leading conservationists who hoped to reinstate conservation as their organization's primary focus. The conservationists also aimed to transform how conservation success was measured more broadly. The team believed that the financial pressures on conservation organizations worldwide had led most conservationists to focus on funding at the expense of their conservation work. The conservationists wanted to refocus stakeholders' attention on conservation success, but they wanted to do it in their way by proving their measurement of conservation performance. The idea was to attract funding, not only from donors but also from investors looking for investment opportunities in species conservation. The Index would be the perfect tool to demonstrate the impact of their conservation efforts.

The "unit" of measure the conservationists chose for the Index was the "species," unlike other large conservation organizations focused on habitats. During the second stage of our research, the conservationists we interviewed understood why the conservation organization had developed a species-based assessment method. Firstly, this lens was aligned with the organization's zoological origin since zoological societies tend to envision nature as a sum of independent species. Secondly, monitoring species was the most obvious way to assess the conservationists' impact in the field. A species could only be classified as "at-risk" if population numbers decreased; hence numbers had to be counted. The first task of the conservationists was, therefore, to make inventories. If the animals were not visible, the species would never be saved.

> *This is the problem with freshwater fishes; nobody sees them. They are under the water. So, people don't even know that they are disappearing. We need to make some inventories to show policymakers that they need to be protected. This is the first step to any conservation work. (Freshwater Fishes Specialist, Academia)*[20]

[20] Quotes collected during our second round of interviews (i.e., individuals external to the conservation organization under study) are shown in italics.

The Index rendered conservation efforts calculable by pacifying the animals monitored by the team, categorizing them into species units with threat status levels. However, the Indigenous conservationists we met in the second stage of our research warned us that this "Westernized" form of scientific calculability had failed to save endangered species.

> *We have done it for years, and here are the results. We manage the problem the wrong way. We look for scientific evidence; then we suggest a plan, policymakers check the plan based on evidence. Once everything is proven, they implement the plan, collect more evidence, and then decide what to do, and then it is too late. If this approach worked, we would not be in such a situation. (Indigenous Conservationist, Reserve)*

Moreover, external conservationists worried that rationalizing and pacifying animals into calculable units would disconnect people from nature.

> *You need to make people realize that our habitats are dying and that we need to save them. They need to feel the natural environment that surrounds them, to go out there, to see it, to connect. This is the only way we can protect our wilderness. (Wilderness Endangered Species Specialist, Wilderness Advocacy)*

From the external conservationists' perspective, collecting scientific evidence and measuring "conservation success" were insufficient to make the Index effective. Society needed to be enrolled, too, so that conservation success could become a shared responsibility between conservationists and citizens. As described below, conservationists inside the conservation organization also stressed the importance of enrolling society. In the project's second step, and after finalizing the calculability of the Index, the conservation science team convinced a donor, a trustee of the organization, to support developing the Index into a general public-friendly tool. The conservationists wanted non-conservationists to "enter" the conservation world by using a "story-like" approach, something that the public could use to connect with the team's conservation work (Administrative Team, 2015).

> It tells you the story of how we … did research, built up the knowledge; we plan actions, empower local people … So, it tells a story of what we're doing here very nicely. I mean, a child could follow that, really … my little boy can understand it. (Wildlife and Training Team, 2015)

The conservationists and the marketing team chose to transform each indicator in the Index into an analogy that anyone could understand. To do so, they used what we refer to as "societal visuals" (see Figures 3a and 7). Figure 7 explains the conservation approach used by the organization through a simplified drawing and illustration of an actual journey as a path, because "when a species is on the brink of extinction, it might require decades of sustained conservation" (Index pdf document). There is a signpost in black where it is written, "Are the actions effective?" If "yes," the path goes to "Conservation success: the species is safer, so we step back and local partners take the lead," represented by a sun. If "no," then there are different paths that go across the ecosystems whose people and animals represent the various conservation activities led by the organization locally, such as "Monitoring impacts" (in blue represented by an eye) or "Planning actions" (in green represented by the book). All the paths are linked to each other to show that all activities are linked. Saving species requires the application of different actions, sometimes combined and at different times.

---Insert Figure 7 about here---

In another visual, the conservationists described the total surface of preserved habitats as football pitches. They transformed the need to monitor threats to ecosystems into the readings on a car speedometer. Analogies with commonly used references (football, cars) or illustrations recalling children's books were used to draw society's attention to critical scientific indicators or processes relating to their biodiversity conservation actions. The conservationists tested these visuals on friends and family outside the organization and noted that "they could see [our work] instantly." Societal visuals were not only easy to understand but also readily available.

> You can do this when you like, in your home with your slippers on, and that's also a powerful tool in today's world, I think. Have it on demand. (Wildlife and Training Team, 2015)

These visuals were consequently considered to be powerful devices: "Sometimes if you try and communicate data to people, they might be switched off; however, I'd assure them that it's not quite what you think, it's not just all charts." (Administrative Team, 2015)

While the Index transformed animals into passive and abstract objects, the societal visuals made them living, tangible creatures. They spurred emotions and helped establish a relationship between the public and the animals to be protected. Instead of allowing the species to merely become a fictitious unit of a future financial instrument (i.e., through abstracting and standardizing animals via the Index), the Conservation Science team aimed to restore a connection between the public and the physical reality of the animals. Pacifying the animals required conservationists to build a fragile equilibrium that enabled them to disconnect and connect themselves, the donors, and the public with the living beings under their care.

During the second phase, all the conservationists we interviewed explained that an essential part of their daily job was to explain to the public why their work mattered. Indigenous conservationists and conservationists working on public land considered themselves stewards of the land on behalf of the planet and its inhabitants. Most conservationists positioned themselves as educators who needed to explain that ecosystems mattered to humans deprived of their natural environment. This education mission was evident for zoological societies and conservation organizations in urban areas. It was also the case for Indigenous conservationists, who hoped to add a spiritual layer to this engagement with nature.

> *The only way you can protect the land is to connect to it. It does not need to be your land. You can go anywhere on earth and connect to the spirit of the plant, the spirit of the animal, the spirit of the water. But for this, you need people to be in nature, outside, to close their eyes, listen, and smell. (Indigenous conservationist, Reserve)*

External conservationists, therefore, understood the conservation organization's need to communicate with the public. Most members of the conservation organizations we interviewed had similar "societal visuals" that complemented measures such as education events, flyers, and individual discussions. The conservationists' goal was to help form a "bond" between humans and nature to realize that species were valuable beings that needed to be saved.

Pacifying species by transforming the latter into abstract "calculable units" was essential to designing the Index. However, the attempt to pacify species by the organization was never fully achieved. Being alive, species kept their agency and could never be totally "controlled" by conservationists. For instance, the numbers used to count them were always "late" compared to the numbers in real life – some species died, others were born. Maintaining a relationship between humans and the species was vital to conservation work. To build this connection,

conservationists notably used "societal visuals." Unlike the "inventories" that aimed to transform species into "akin to dead" beings, "societal visuals" searched to restore the living connections between humans, species, and their ecosystems. Conservationists had to navigate an impossible tension between what their conservation job required them to do, "nurturing life," and the financialization process demanded, "taming life."

5.3. The attempt to commodify: Transforming pacified species into product lines

For years, the conservationists had been against what they viewed as a "managerial approach" that failed to consider the specifics of conservation work: "In evaluating our success, it is important we are viewed as a charity and not in terms of profit and loss." (Annual Report, 2005) However, ten years later, in 2015, the conservationists began to believe that the Index could attract donors and help assess the organization's conservation performance. Accordingly, they began to use the Index to guide their activities. We were told that everybody inside the organization considered this new form of management transformative and a huge step forward. The Conservation Science team observed that the Index had led them to change their entire strategy. The Index became a way to adopt a managerial approach that served its own managerial goals.

While the conservationists insisted that their main goal was conservation, they started envisioning species as products that could be virtually manipulated, monitored, and traded. "Some species have a Species Survival Plan. Not all species we work with will have one; it's only the really high investment species." (Conservation Science Team) Over time, presentations of the Index to the board of trustees began to communicate the need for "bottom-line, financial information." An internal presentation reflected that conservation programs had to be "managed": "How is the Trust performing in delivering its mission? Which programs give you the best bang for your buck? Which programs are performing well, which are underachieving?"

Figure 8 shows how species were transformed into product lines to be managed, enabling their potential commodification. The Conservation Action Score is presented as a stick chart, a visual traditionally used in management presentations, notably to compare the performance of different products. In this Figure, the species are compared in terms of the time spent to conserve them; seven activities are listed in the chart, represented by pictograms, the same used in Figure 7. For instance, the green book refers to "planning actions" and the blue eye to "monitoring impacts." The organization used the chart to support a discussion around the "performance" or "time cost" of activities for different species. The chart notably shows that protecting the ploughshare tortoise requires a very significant amount of time to "empower local people" (represented by the pink pictogram of people). The organization could then use this chart and compare it to Figure 6, which measures the "impact" of conservation activities on the survival of species to develop "efficiency" measures and re-allocate their resources accordingly. This measurement could potentially lead to abandoning species that did not offer a good return on an investment expressed in terms of impact on species survival vs. time spent to protect the species. The conservation organization was evolving into a business-like organization that produced and sold "conservation results" (Conservation Science Team).

---Insert Figure 8 about here---

The conservation science team acknowledged that this approach made measuring each program's success, species, and field manager easier. "You can aggregate and disaggregate

across different organizational levels." (Conservation Science Team, 2015) Consequently, they began using the Index to structure and monitor their conservation projects and link them to their operations and strategy. Doing so also enabled them to shorten their time horizons.

> For monthly and annual reporting, the field managers will get asked in the report, "This is what you told us your indicators were. This is your target. Are you on track, yes, or no? If not, why not?" If they've achieved it, they just need to tell us. (Conservation Science Team, 2015)

Meanwhile, the management team began monitoring species not "delivering results." "It's a big fight because people feel we're here exactly not to do that – not to give up on species."[21] They dreamed of creating a "species scorecard" with red, amber, and green lights to compare programs and identify issues with their progression. By doing this, they were allowing themselves the right to assign a different value to species, depending on the ability of the latter to "cooperate" with the conservationists' work and thus to survive.

> On the mission success side, we need something similar. We need to track progress. "Okay, so we've got red here, and red here; it's not funded, and it's not progressive, it's not progressing. So, let's talk about this one, [X], are we going to continue with it; shall we pull out; where is the money going to come from? This is what you would typically have in business if you had product lines. (Administrative Team, 2015)

Despite comparing the species to product lines, one step in the commodification process was missing. A commodity must be tradable to potential buyers and sellers. The reptiles and amphibians under the care of the conservationists were, in fact, not tradable, unlike edible fish or corals. There were no property rights and no rights to privately appropriate those species' (financial) value.

Moreover, the conservationists did not want to pit species against each other. "The philosophy of the Index … is not to try and compare the performance of different projects or different people, to therefore make decisions about whether we emphasize one or the other." (Conservation Science Team, 2015) Despite top management's willingness to improve efficiency, the possibility of comparing their programs and using the bottom line as the only way of deciding whether to continue conservation efforts was never concretely implemented.

Most of the external conservationists we interviewed disagreed with this product approach, developed based on the Index results and re-emphasized by the management team for making financial decisions. A wilderness specialist said, "*They lost their mind on the way! I mean, this is crazy. Transforming animals into products, really?*" There was a difference between counting species in the field and deciding what the conservation strategy should be based solely on the project's efficiency in saving species (a mix of the species inventory and the cost vs. time of the conservation program). Despite their reluctance to treat species as product lines, the conservationists we interviewed also admitted they had to choose which species to prioritize daily.

[21] This quote illustrates the constant tension between conservation efforts and the funding received. The interview continued with the following: "The way to present it to people is 'If we're doing this, we can't be doing something else. So, wouldn't you rather be doing this thing?' You've got this choice. We can't save all the species, for goodness' sake. We've got limited resources; we have to do the things we know will make a difference; do you honestly think there's nothing better to do with our resources than this? Can we not scale back; can we not do something else?"

> *On this land, there are what we believe to be the last two specimens of this plant. I mean, on Earth. Should we focus all our efforts on this plant or try to save the habitat as a whole? We do not like it, but we have to … decide which species to save. (Restoration Ecology Specialist, Trust)*

Some external conservationists shared their visions of an effective impact measurement system. They moved some parts of the Index, eliminated others, and added graphs, reflecting their relationships with nature. Although external conservationists criticized the organization for wanting to manage species as "products," they also sought to "manage" their conservation work in ways that demonstrated their value to the rest of the world. Specifically, they were willing to use "impact metrics" to restore influence in political and societal arenas.

> *I mean, this is a bit sad. But yes, we clearly use topics such as "climate change," "impact," or "reconciliation"*[22] *to push our agenda. We re-shape our conservation work in those terms to be better aligned with the priorities of the government and the financiers. They want to be sure that their money goes towards organizations that can demonstrate their impact. I understand that. (Restoration Ecology Specialist, Trust)*

Although conservationists were reluctant to apply the "business" label to conservation work, they wanted to seize the opportunity to show the importance of their work to ultimately gain some power in society. An experienced academic explained:

> *Conservation is a political matter. You have to decide which ecosystems you want to save, convince the public authorities, find the resources, and shape humans' behaviors accordingly. The conservation you see in textbooks does not exist. It has never existed. (Head of a Department of Biological Sciences, Academia)*

Although the forms through which conservationists transformed species into products to manage varied across conservation organizations, all the conservationists we interviewed attempted to commodify the species under their care. This commodification was deemed necessary to manage their limited resources in a way that increased the impact of their work. In the organization under study, the attempt to commodify led conservationists to focus their efforts on the species that were more likely to survive – i.e., that offered the best impact/time spent to be saved ratio. This choice was potentially going against the core of their job, which was instead to save the most endangered species. But the scarcity of resources (time, money) and the urgency of the situation forced them to prioritize the species offering the best "returns on investment" to show that they were indeed a "good investment."

5.4. The attempt to calculate: The difficulties of mixing conservation science and finance

The conservationists worked on an "impact indicator" to measure the organization's impact on seventeen species they had been working to conserve for a long time. The long-term horizon of conservation projects (30-50 years) enabled the conservationists to gather data on threats and species recovery. They developed calculative practices by drawing on conservation science methods. The actors involved in developing the Index (the calculative device) were all from a conservation background.

[22] Reconciliation is how the Canadian government engages Canadians in dialogue and transformative experiences to revitalize the relationships among Indigenous peoples and all Canadians.

The first element of the calculative device was a counterfactual, citing academic references such as "to fully evaluate the impact of conservation actions, it is necessary to ask what would have happened if there had been no intervention" (Young et al., 2014). The conservation science team met a scientist from the IUCN who had just published an academic paper on species conservation success to calculate the counterfactual. The article studied the impact of conservation on the "threat status" of a particular set of species. The author argued that it was possible to demonstrate that species' "threat status" in the Red List Index would have been different if conservationists had not intervened. This finding was highly encouraging for the conservation science team because it signified that they could demonstrate their impact on species protection. After three years of work, the conservation science team eventually designed a complex calculation method based on counterfactual scenarios. The team felt this new impact indicator enabled them to demonstrate the long-term impact of the organization's conservation programs on target species.

> I think it shows how much effort has to be put in, what these things actually require. I think there's a misunderstanding sometimes that conservation is easy once you start, whereas actually, for the [individual species in question], after 30-odd years, we're now worse off than we were when we started. But the species would be extinct altogether if we hadn't done anything. (Conservation field team, 2016)

The second set of elements making up the Index calculation were the standardized conservation science-led structures that enabled the calculation to be performed. The organization explained:

> At the species indicator level, in order to track observed changes in the extinction risk of our species, we use – where available – conservation status categories published on the IUCN Red List, which are reviewed and verified by independent experts. If a species does not feature on the Red List, [name of organization]'s conservation scientists, who are trained in the Red List methodology, conducted the assessments following the 2001 IUCN Red List Categories and Criteria version 3.1. Counterfactual Red List categories for our target species (the Red List category that we predict a species would have in the absence of conservation actions) are determined by [name of organization]'s Conservation Science team. Many of these counterfactual assessments have been externally reviewed by the scientific community during the peer review process during publication of the paper [title].[23]

By embedding their tool into existing frameworks and higher-level indicators such as the Red List Index, the conservation science team wanted to make the tool credible and reliable in the eyes of their peers, as the above quote shows.

The last element of the calculative device was the dataset of document conservation actions needed to match improvements with actions. The conservation organization had gathered sufficient data for an extended period (over ten years) for seventeen species to show that their actions had affected over 50% of a given species.

> So, it's accepted that this is factual. So, we're the only organization, I would say to the donor, that has actually been able to show results, not just activity. So, we can talk to you about the change your money is making. (Administrative Team, 2015)

After that, the conservationists' priority was collecting evidence and demonstrating the "Index's verifiability." Specifically, they sought to connect with the broader scientific community and "draw on external research to add weight" (internal presentation to the board of trustees) to their calculative device. Insisting that the Index had to be recognized by the scientific

[23] Organization website, accessed April 27, 2022.

community, the team submitted their impact measurement to an academic journal. They also made all the data and methods used for the calculation freely available on the organization's website.

Despite the scientific anchorage of the Index, the conservationists we interviewed during the second phase expressed doubts about whether the approach could ultimately help increase conservation impacts. Firstly, most conservation organizations would be unable to employ the Index to monitor their ecosystems due to a lack of capacity and historical data. Conservationists also wondered how this approach could apply to protecting habitats in non-insular regions, where many social factors shape conservation work. Secondly, they believed it was impossible to accurately measure every species that had disappeared because conservationists alone could never monitor ecosystems. The rhythm of natural life by far exceeds human capacity.

> *Every year, there are more species at risk that appear on the list. We will never catch up with the mass extinction that is going on. We cannot spend all our money counting species that disappear. We are beyond this point in terms of urgency. (Invasive Species Specialist, Trust, 2017)*

Despite these difficulties, scientific calculative devices, such as the Index, were supposed to be the foundation for all future financial (species) conservation instruments, as the designer of another species impact bond explained.

> *What we did is we worked very closely, building off the back of the work that these guys had done. We then developed, in conjunction with the University of [city], a bespoke population estimate model, where the whole idea is to provide the probability of [species name] appearing in a certain state. Right. So, are they born, are they dead, are they alive, etc.? And so now the idea is that, obviously, the more we monitor, the more our confidence intervals increase, and we are then able to essentially say with some degree of confidence, we have achieved outcomes, or we have not achieved outcomes. (Conservation Finance Specialist, 2019)*

However, it was impossible to build a calculative device for financial actors due to the lack of comparative datasets. Habitats and their species are unique, but financiers look for standardization and commensuration. One of the Conservation Finance Specialists we interviewed (from a finance background) mentioned that for conservation products, practitioners were missing a "Bloomberg terminal" where they could easily find the market performance of a given species. For investors, slotting data into their existing work practices was more important than the quality of the data (which would imply less standardization and more complexity). "*The reality is that that data has been incredibly difficult for us to piece together.*" The scientific measurement system developed by conservationists could not be so easily used to support a financial system.

> *Guys, we can find the best asset in the world. But if we don't have the management team to extract the value from that asset, it's worthless. And the same applies here. We have, you know, hundreds of really valuable protected areas. But not all of them have the management teams to extract the outcomes or impact from that. (Conservation Finance Specialist, 2019)*

Although the conservation science team worked on a calculative device designed to prove conservation success, they did not engage in lengthy discussions on the financial valuation process of conservation. No mechanism was envisioned to "price" the difference between the two curves showing their conservation impact; there was just the idea that this difference was worth something. Most discussions thus revolved around the cost of conservation for a particular species, for example, "We spent $500,000 on this program." The new CEO, in 2017,

evoked concerns regarding the (im)possibility of reaching a consensus on the "intrinsic worth" of a species.

> How do you measure evolutionary history in financial terms? What does the evolution of the planet look like? Can we put a figure on it? On what it's worth to us in terms of how we feel about a certain planet? A lot of this is beyond money … if we monetize this too far … can we use the language of economics to talk about conservation in a way that will benefit conservation? (New CEO, 2017)

This observation was confirmed by some external conservationists who had developed a conservation impact bond. They explained that they used a return of 5% solely because this was the ROI that impact investors usually received, not because the returns on biodiversity investment were estimated to 5%. Therefore, the relationship between the 5% and the intrinsic value of the biodiversity preserved was arbitrary and more a reflection of the ROI on the mainstream market for bonds.[24] In the case of the organization under study, there was no valuation of potential cashflows (e.g., ecosystem valuation services) and no ability to price the natural capital preserved. The same problems encountered when valuing species conservation was discussed in an interview about another species financialization project. The person in charge of the financial product explained that it was challenging to compare species with each other and that there was a resulting bias towards species able to produce some "volume."

> *Conservation Finance Specialist: Internally, at a portfolio level, we also acknowledge that each site has got a different starting population and therefore has a different weighting in the portfolio. So, we're very pragmatic in the sense that we can't say that a site that has 50 [species name] that grew at 13%, you know that that's more important than the site with 200 [species name]. The reality is that the bigger sites generate more [species name]. So that's important.*
>
> *Researcher: So, really, the return on investment is the net growth?*
>
> *Conservation Finance Specialist: Indeed.*

When designing the Index, conservationists assigned more value(s) to specific species at the expense of others. The innovative calculative device prioritized volume and favored species that were more likely to "perform" (i.e., survive) over those whose protection was more challenging to achieve. Consequently, species previously deemed essential from an ecosystem perspective could be abandoned within the new device. Using a "return on investment" approach thus made conservationists shift from a conservation science lens to a financial lens. From then on, species had become financial assets whose ultimate (outcome) payer had to be satisfied.

> There is talk about, well, you say to your donors, "Give us the money; if it's successful, the World Bank will pay, or the government will pay if it's successful. If it's not successful, you have paid." But if I was a donor, I would say, "So, I end up paying not to save species, then?" Whereas a lot of donors really are excited by the idea of saving a species themselves: "I can say I saved a species." (Administrative Team, 2015)

[24] Although, it could also be argued that this is the value given to the bond by the market under the economic rationale of supply and demand. In any case, conservation organizations aim to mobilize different forms of arguments to attract more money while aiming to fund the actual costs of their programs. Such bonds therefore include a mix of valuation regimes.

5.5. The attempt to marketize: The reluctance of financial actors to pay for the protection of faraway endangered species

The last mechanism in financializing nature is the ability to sell the protection of biodiversity on a "market." For the endangered species in our study, this required persuading financial actors to pay for the value provided by protecting neglected and insular species. To convince potential donors and investors, conservationists decided to compare the populations of the species targeted by their conservation efforts to the polar bear population (see Figure 9). Iconic animals such as polar bears attract funding that the conservationists wanted to redirect towards their target species. In Figure 9, the rarity of the "product/species" to be saved is emphasized to attract funds, a little bit like luxury products versus standard, off-the-shelf, popular "product/species."

> I personally think the "population size" one with the concentric circles and the polar bear on the outside and the skink, not that I have a particular affection for skinks, but it illustrates that the kinds of animals we work with are incredibly endangered, compared to the things we popularly think of as being endangered. (Board of Trustees, 2016)

---Insert Figure 9 about here---

Our second-round interviewees confirmed that creating a market for these insular species would be very difficult, with money instead of being channelled toward iconic species.

> *You know, and our concern is that well, you know, I can take the tourism money for the big five [lion, leopard, rhino, elephant, and African buffalo[25]], but pangolins, which are the most trafficked animal in the world, no tourists are going to look at pangolins, because you can't see pangolins. Right? There would be no money for pangolins.*[26] *So, our view is very much that you have to get away from species focus. (Conservation Finance Specialist, 2019)*

On the other side of the equation, the organization's current donors insisted that they evaluate grant applications based on qualitative, and often informal, information about past applicants and particular projects acquired through personal networks (External Stakeholder, Donor, 2016) or by building personal relationships (External Stakeholder, Donor, 2016). For example, a new project would be analyzed to examine the people who would manage the project and the capacity and support those people could expect to receive within the organization. The traditional way of funding conservation was at odds with the conservationists' conservation finance approach.

The donors we interviewed said they purposely did not develop any key performance indicators to assess projects. Doing so would not align with their aim of long-term conservation success. Donors were highly unhappy with the conservation organization's move towards financialization. Overall, they doubted that a particular conservation success could be attributed to one organization, as conservation is often based on collective success (External Stakeholder, 2016). Additionally, they complained that the Index had little to say about what could go wrong during the "conservation journey."

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[25] The term "Big Five" originally referred to the difficulty in hunting the lion, leopard, rhino, elephant, and African buffalo. These five large African mammal species were known to be dangerous, and it was considered a feat by trophy hunters to bring them home. Source: https://www.worldwildlife.org/blogs/good-nature-travel/posts/ten-wild-facts-about-the-big-five, accessed April 27, 2022.

[26] This interview was performed prior to the COVID-19 pandemic. The need for regulating the traffic of pangolins (which was said to be at the origin of the pandemic) has certainly proved to be of major importance since then.

> Quantifying the overall performance of an NGO will still only give you a feeling for a particular project that the NGO might be implementing. So, in other words, even if an NGO has a good track record in implementing conservation projects for threatened species, it doesn't necessarily follow that the project that has been submitted to us … is a project that they can implement. (External Stakeholder, 2016)

A Conservation Finance Specialist thus explained that conservation was not "investment-ready" – both for investors and management. Another specialist observed, "Who is going to manage those financial products inside conservation organizations?" Nevertheless, many conservationists continued to hope that conservation finance would eventually take off, not only among impact investors but also within mainstream investment.

> *Because just as we talk about blended finance coming into deals, we don't talk enough about the blended impact and blended returns. Right? And just as we know we want to keep the cost of capital for our conservation impact really low at 3%, the reality is that nirvana for us is that we stop talking about impact investors and we start talking about pension funds and insurance companies investing. Now, I'm never going to be able to sell them the product at 3%. Right? However, if I can invest across the landscape, and at a landscape level, my top portfolio is actually generating 10%, suddenly that's more feasible again." (Conservation Finance Specialist, 2019)*

Internally, some people seemed increasingly aware that the Index could become a double-edged sword, creating a tendency for specific donors to focus on more attractive investments, namely shorter, simpler, and less risky conservation projects.

> The positive thing is that I guess you're going to be funded for the activities that you're best at because if you can prove that you can return a certain amount based on the investment you're given, you're a more attractive investment, as it were. But I guess that may tend towards funding simpler short-term projects rather than projects where you're going into the unknown a bit because there is no expertise in dealing with that threat, which might be the species that most need help. (Conservation Science Team, 2015)

The external conservationists we interviewed all admitted that they understood why the conservation organization ultimately perceived itself as an investment. "*I mean, this is how people think today; you have to put a dollar value on everything you do*." (Stewardship Coordinator, Trust) The conservationists valued nature for its intrinsic value, but few expressed solid anti-financialization views. When we asked them whether they worried that the financialization process would eliminate the intrinsic value of nature, many offered similar answers*:*

> *If putting a dollar on the environment helps people value nature, why not? It does not take away the intrinsic value of nature. I will still value nature for what it is; it will not take that away from me. And if we can save more ecosystems thanks to that, we have to do it. Nothing we tried before worked … so we should stop convincing people to protect nature for its intrinsic value. It does not work. (Restoration Ecology Specialist, Trust, 2017)*

The consequences of building the Index and its use in a hypothetical species impact bond are necessarily speculative. We left the team in 2017 when they were building the internal

infrastructure to collect the necessary data to pursue their conservation impact calculations.[27] We nevertheless suspect that by implementing a calculative device that rewards species with a higher likelihood of survival, the conservationists might have inadvertently built a system that distracts them from their mission. Conservationists recognize the importance of protecting all species. In contrast, the Index encourages the valuation of species that conservationists are better at saving or more highly valued by the public and financiers. This development could cause conservationists to abandon their core focus on insular and neglected animals. It also conveys a highly anthropocentric and transactional approach, negating other living beings' rights to govern themselves. Furthermore, society might not be willing to save such species. Individuals might not see the benefits of spending money on faunae that are not part of their day-to-day lives. By involving the public and funders in the accountability process, it is financial providers, rather than conservationists, who may potentially choose which animals will be saved.

While our case study demonstrated that conservationists financialized the species under their care, the financialization work of the Index was only partial. The pacifying element, which requires the species to be transformed into passive goods, was only half-completed because of the re-connection performed through societal visuals. There were no property rights to commodify species, and no financial valuation was assigned to conservation. Finally, no market or cash flows were generated by protecting endangered species. As such, the financialization of nature appeared to remain a dream, as some conservationists pointed out. Although the mechanisms of financialization were present, they were incomplete. Marketization was therefore not achieved. As one of our interviewees noted, the financialization project may well have been a "myth":

> *I mean, everybody is talking about it. But did you find any conservation organization that attracted money thanks to a financial product of some sort? Did this [organization] attract more money? If you prove to me that this works, yes, why not. But I think that this whole story of financialization is a myth. (Wilderness Specialist, Public Land)*

6. Discussion

6.1. The (quasi) impossible financialization of nature

Our identification of the different mechanisms constituting the financialization process – pacifying, commodifying, calculating, marketizing – helped us understand why the process of financializing the endangered species under study was complex and incomplete. It also helped explain why conservation practices were financialized despite the absence of financial returns, even if this ultimately failed to lead to a marketable financial instrument (i.e., a species impact bond). In addition, it revealed the importance of the material and emotional relationships between investors and the objects to be financialized, i.e., why the relationships between humans and animals affect the overall outcomes. Conservationists struggled to balance the abstraction required by financialization and the connection required by conservation throughout the entire process.

[27] At the time, they were thinking of devising their own species impact bond following the example of the ZSL rhino impact bond. This first emblematic project regarding the rhino impact bond was finally launched in early 2021, after having been initiated in 2014, leaving us to speculate that they have now opened the way for the design of further species impact bonds. See https://www.bloomberg.com/news/articles/2021-03-24/world-s-first-wildlife-bond-to-track-rhino-populations-in-africa, accessed 7 April 2021, for coverage of the Rhino Impact Bond by the financial sector.

Previous research has primarily explored the role of calculative devices, such as standards and financial models, in the financialization process (Chahed, 2021; Chiapello, 2018). More often than not, the ability of these devices to assign a monetary value to specific practices or outcomes has been deemed key to financialization (Hahn et al. 2015; Dempsey 2016). Such examples can be found in the creation of carbon markets and carbon accounting (MacKenzie, 2009) or in the use of contingent valuation models to financially appraise the damage to natural resources (Fourcade, 2011). Our study of conservation confirms the importance of these devices and their calculability. The creation of the Index indeed exhibits many features that can be found in other devices used to financialize practices, such as the desire to compare species and assign a standardized value to each unit to be able to trade them interchangeably (Chahed, 2021; Cooper et al., 2016; Himick & Brivot, 2018).

Abstracting value (Cuckston, 2018a; La Berge, 2014) through calculability is central to financialization. The inability of conservationists to marketize the species under their care nevertheless shows the limitations of calculability. Financialization results from a broader societal process in which actors need to be enrolled and practices transformed for a market to be built (Chahed, 2021; Chiapello, 2018; Himick & Brivot, 2018). The conservation finance specialists we interviewed found it very difficult to link the calculative devices used by conservationists to the ones used by financial actors. Investors were also not ready to fund the protection of endangered species such as frogs and skinks. This choice was explained by the lack of perceived (financial) benefits resulting from protecting such species. Conversely, investors were willing to fund the protection of iconic species, such as rhinoceros or sharks, or species whose services to humans were prominent, such as corals for pharmaceutical companies or pollinators like bees or bats for agribusiness organizations (Büscher et al., 2014; Okolo, 2022). In other words, demonstrating the (financial) added value of investing in nature through the help of calculative devices (e.g., ecosystem valuation services or the Index) does not guarantee that the necessary investments in nature will be forthcoming. To fund conservation, investors first need to *believe* in biodiversity's actual material (and financial) benefits and emotionally connect with the latter (i.e., form a “bond”).

Such findings are also evoked in the literature on ecosystem valuation services, albeit in another form. Research shows that individuals are more likely to safeguard ecosystems if they can culturally, emotionally, and physically relate to them (Chan et al. 2012; Sangha et al. 2018). In other words, showing the financial value of biodiversity is not enough to transform people into stewards of the land; individuals need to feel the land to connect to it and protect the biodiversity it supports. To build a relationship, the conservationists we studied attempted to form a bond between capital owners and animals by using societal visuals, placing human beings inside the ecosystems themselves. However, investors were not convinced that frogs merited a species impact bond, unlike the rhinoceros.

Material relationships, in the form of cultural, emotional, and physical connections between humans and nature are also needed for conservationists to protect the species under their care. Conservation work praises the importance of uniqueness in protecting nature (Beckford et al., 2010). However, financialization requires the opposite. Species are expected to be transformed into abstract units that can be managed and traded accordingly (Hahn et al. 2015). There is, therefore, an essential contradiction between the work required by financialization and that employed by conservation. In this case, the pacifying process is incomplete and impedes the subsequent steps of assigning propriety rights and valuing the species to be conserved.

The contradiction between the unique, evolving, and complex life of nature and the abstract, stable, and simple (dead) approach to nature required for financialization is not unlike studies of the financialization of human beings in social impact bonds. The transformation of (homeless) people into social impact investments negates their individuality, wholeness, and humanity (Cooper et al., 2016). However, the benefits of addressing social issues might appear more evident to impact investors than environmental issues. Social impact investors are social beings, and hence share the same ontological nature as the financialized objects. Indeed, the disconnect between nature and human beings – who tend to live in cities – renders building a relationship between the two very complicated.

Despite the constant efforts of conservationists to maintain a relationship between individuals and the species under their care – notably through the evolution of the way the animals are presented in the Index – while also attempting to financialize the latter, they never succeeded in achieving both aims. Instead, donors we interviewed who were financing the organization based on their caring relationships with the species felt rejected by the financialization efforts. Additional studies of the phenomenon could further examine this finding. Further research could also explore the possibility and conditions through which financialization could unfold as a project for society without compromising the bonds that link human beings to other human beings and nature, notably through the use of alternative forms of (counter) accounts (Arjaliès, 2022; Arjaliès et al., 2021; Quattrone, 2022).

Despite the initial rejection of the financialization project by the individual donors, the organization kept the Index, which in 2022 was considered part of the organization's DNA and made it central to their communication strategy. Between 2014 and 2019, the revenues almost tripled – although a causal mechanism between the increased revenues and the Index is challenging to prove. However, no species impact bond was launched. In 2020 the organization still mainly relied on private donations (60% legacies, 11% commercial income, 9% fundraising and other charitable income, 6% admissions, 5% grants, 5% donations and 4% memberships – 2020 Financial Statements). The financialization project will probably keep being a dream pursued by the organization for a long time, as the ability to fund their conservation activities remains a top priority, particularly after the Covid-19 pandemic: “One of the positive aspects to come out of the pandemic has been the way we have adapted and diversified our income streams to continue to generate income, albeit at lower levels.” (2020 Financial Statements)

6.2. On the new carriers of financialization

Our study unfolds in the field of conservation, which has experienced a shift toward financialization in the aftermath of the rise of neoliberal states (Hahn et al., 2015; Loftus & March, 2015). Faced with a decrease in public funding and an increase in funding needs stemming from the ongoing biodiversity crisis, conservationists hope to attract private capital to fund their work through conservation finance. The attempt to create a species impact bond in the organization under study was inspired by the rhino impact bond and social impact bonds in other societal arenas, such as shelters and prisons (Cooper et al., 2016; Okolo, 2022). Although not explicitly mentioned by the interviewees, we believe that this appetite for financialization has also been encouraged by adjacent financial technologies in the field of conservation, such as carbon markets, or the shift of iconic conservation organizations towards conservation finance, such as The Nature Conservancy (Buscher & Fletcher, 2020; Dempsey, 2016).

Since financialization involves importing techniques from the financial industry, carriers of financialization have typically been portrayed as members and technologies from the broader finance field. Such intervention involves creating financial numbers (Arjaliès & Bansal, 2018), using benchmarks to evaluate the performance of an organization vis-à-vis others (Hwang & Powell, 2009), implementing standards (Himick and Brivot 2018; Chahed 2020), or directly introducing financial incentives within organizations (Cooper et al., 2016). As a result, it has often been assumed that financialization depends on such devices and carriers. Nevertheless, and unlike previous findings (Chiapello, 2015; Déjean et al., 2004; Giamporcaro & Gond, 2016; Himick & Brivot, 2018), our study shows that the financialization process did not include visible financial numbers or typical carriers of financialization (e.g., investors, consultants, accountants); instead, it involved societal visuals and a calculative device anchored in conservation science and used by conservation scientists. Overall, these findings question the financialization process as it has been envisioned so far.

Studying the conservation field enabled us to examine financialization not from the perspective of financiers but through a new lens: society (Latour, 2013). Conservationists, anticipating the financial preferences of the public, aimed to select the species to be saved based on their expected return on investment. In the current "post-natural" era, many conservationists expect scientific practices to be questioned and potentially replaced with economic decisions (Schmidt et al. 2016; Wapner 2014). Latour (2011, 2013) and social and environmental accountants have made similar observations, noting the "death of environmental debates" (Brown & Dillard, 2013). However, the form and content of the Index were not typical of a calculative device borrowed directly from the financial markets (Chiapello, 2018; Cooper et al., 2016). Although the conservationists deliberately aimed to mirror specific devices, such as a return-on-investment curve or credit ratings, the Index itself included no financial numbers, only drawings of birds and monkeys on a curve. Conservationists also used societal visuals that played the role of affective technologies (Arjaliès & Bansal, 2018; Boedker & Chua, 2013; Busco & Quattrone, 2015). Such devices aimed to awaken the feelings and emotions of individuals to connect them to the species under the conservationists' care, strengthening the importance of visuals, emotions, and affect in accounting settings. Lastly, the Index merged rationales, numbers, and epistemologies that belonged to different realms, such as conservation science, accounting, finance, and societal epistemes. Such observations might make it challenging to identify the financialization process. Without the conservationists' explicit desire to launch a species impact bond and in the absence of the second round of interviews, the Index could indeed have been interpreted as the outcome of a political process involving only accounting and science. Our findings, therefore, reveal that financialization does not necessarily require financial numbers or financial actors to unfold but can emerge via alternative carriers (Himick & Brivot, 2018), including scientific ones.

The appraisal of financialization by conservationists is probably where our account of contemporary scientists differs the most from previous research, whether in accounting and science (Power & Power, 1996), new public management (Oakes, Townley, & Cooper, 1998), or social and environmental accounting literature (Gray, 2010). The conservationists in our study did not need financial numbers to be interested in and to sign up for "The Economy" (Latour, 2013); they were already part of it. Nor did they reject it, unlike the behavior observed in other settings, such as social enterprises (Amslem & Gendron, 2019). However, the conservationists' reaction did not mean that they were happy with this move. They perceived financialization as the only response to address the urgency of their challenges. Conservation efforts assume that humans – if appropriately incentivized – can reverse the ecological crisis (Buscher & Fletcher, 2020). Because *The Economy* has become the default mode of governance

in our societies, the conservationists under study assumed that the general public would prefer to incentivize conservation efforts based on a financial "impact" rationale rather than a scientific one (Barman, 2015; Castree, 2008a, 2008b; Cooper et al., 2016). The conservationists' experiences reveal how financialization has gradually become one of the only imaginable ways to govern our lives (Kurunmäki et al. 2016). Such findings evoke similar observations in corporate social responsibility, where social and environmental actions are often justified with a market rationale (Malsch, 2013), or in studies of the development of accounting practices without accountants (Viale, Gendron, & Suddaby, 2017). These commonalities may indicate a broader societal shift that would benefit from further research, notably to better understand standard financialization technologies' role (or absence thereof) and their human carriers – such as consultants, accountants, or standard setters.

6.3. On the role of financialization and accounting in (preventing) the mass extinction of species

Many social and environmental accountants have asserted that moving away from financial numbers towards societal inclusion could help avoid financialization or help conservation organizations financialize in the "right way," thereby restoring "legitimacy in the public's eye" (Balanoff, 2013). A key to this change would be the ability to transform accounting into an "emancipatory device" (Jones & Solomon, 2013) that would include not only the organization but also its stakeholders and society as a whole (Andreaus & Costa, 2014; Mook, 2014; O'Dwyer & Boomsma, 2015). Our study qualifies this approach by demonstrating that the involvement of citizens and other stakeholders is not necessarily a counterforce to financialization if the society is already financialized. Such reasoning relies on the opposition of the economic and societal spheres (i.e., shareholders against stakeholders), yet this division barely holds anymore; as the project to financialize conservation shows, Nature, The Economy, and society are now inseparable (Latour, 2013). In our case, including society might lead to less conservation, not more.

This finding raises questions regarding conservation governance and the potential role of accounting in it and in society more broadly (Cuckston, 2021; Rahaman, Neu, & Everett, 2010; Rinaldi, 2019; Spence & Rinaldi, 2014). If all stakeholders are potentially already financialized and intertwined in the nexus of decisions, new governance structures must be envisioned to act as potential counterforces to maintain a plurality of values (Kay, 2018; Latour, 2013). The inclusion of Indigenous perspectives and their form of relational accounting – i.e., established on material and spiritual relationships with nature (Arjaliès, 2022; Beckford et al., 2010) – might be a way to channel money towards the protection of ecosystems without losing the connections between humans and nature (Beckford et al., 2010; Buscher & Fletcher, 2020; Sullivan, 2010). Further research is needed to explore the modalities through which such views could be included in conservation finance.

The conservationists we studied nevertheless perceived an opportunity in conservation impact bonds (CIBs). However, it is also clear that they were worried about the potential consequences of such financialization processes (Sandbrook et al. 2019). Underlying their reasoning is the failure of their previous attempts to enrol society in protecting habitats and their species based on arguments involving the ecological and intrinsic value(s) of nature (Hahn et al. 2015). Financialization projects might enable conservationists to further engage society in conservation efforts by speaking the language that governs societies. The creation of CIBs could also allow them to enroll the financial industry in their fight for biodiversity. This powerful and wealthy sector could help channel (new) capital towards the cause. Since

investors carry the risks (i.e., a pay-for-performance project), CIBs can encourage public funders to act as outcome payers (see Figure 2). In addition, if implemented, CIBs can offer conservation benefits. Indeed, by providing all the funding in year one, instead of over five years (which is the grant model[28]), CIBs can scale the effects of the restoration efforts (e.g., 125 trees planted in year one would spur more biodiversity than 25 trees planted over five years). Besides, contrary to what is currently being described in social fields, such as hospitals or shelters, the financialization of conservation does not necessarily mean privatizing a public logic. There is often no public money, only private donations, and volunteering. Financialization might be the last option in a race where any gain may be valuable.

Additionally, our study shows that conservation organizations may offer rich sites for studying how accounting could play a key role in achieving biodiversity conservation (Atkins & Macpherson, 2022; Cuckston, 2018b; Vinnari et al., 2022; Zhao & Atkins, 2021). Despite its limitations, the Index enabled the organization to shift from accounting for outputs to measuring socio-ecological system impacts (Cuckston, 2018a, 2018b, 2021). The conservation organization achieved this by linking itself to a global boundary via an organizational indicator (Rockström et al. 2009). By linking species to organizational performance through the Red List Index, the conservation organization under study may have paved the way for biodiversity accounting practices to connect the local and global management of conservation efforts (Feger et al. 2019; Feger and Mermet 2018).

7. Conclusion

Overall, our study casts some doubts on the ability of free-market mechanisms such as CIBs to save nature. The study uncovers the discrepancy between the financialization project, as envisioned by the conservationists, and the reality of the financial benefits of such projects. Similar to previous accounts of financialization as appealing to a form of fictitious capital (Cooper, 2015), or fictitious conservation (Büscher et al., 2014), it shows the powerful performative effect of the financialization project itself. Financialization is now considered the "solution" to address environmental problems, resulting from practices and policies reflective of financialization and neoliberalism. As Peck (2010: 6) observed, experiments such as CIBs tend to "fail forward" and encourage the pursuit of the financialization project despite their inability to deliver their (financial) promises. This raises whether it will ever be possible to reconcile the worth of nature and its perceived value for investors apart from under a "public interest" umbrella. A promising avenue for future research would be to study how accounting can help produce a sense of legitimacy and normalcy in such neoliberal initiatives to compensate for the negative consequences of neoliberalism.[29] Most scientists agree that the biodiversity crisis may be one of the most disruptive events in the Earth's history. Since humans seem to choose finance as the default institution for governing societies, scholars who study accounting and financial practices probably have even more responsibility than others to consider the consequences of this transition. Beyond the financialization of conservation, this study raises questions about how social and natural scientists, citizens, and financiers, among

[28] The grant model is a funding model where the conservation organization applies for "grants" either public or private to fund specific projects. Like research grants to which academics apply, they require conservationists to spend time and shape their conservation activities so that they fit the call for proposals. They also need to report on the use of money, that is often distributed on a yearly basis. Conservationists often complain about the grant model for funding since the efforts put toward those proposals utilize their scarce resources and fund projects that they do not always consider to be their priority from a conservation perspective. Often, grants need to be spent within the year, which raises additional issues since plants and seed need to be purchased sometimes several years in advance.

[29] We are grateful to the editor for his proposal of this avenue for research.

others, can work together to tackle the challenges the planet and its inhabitants are facing. We hope that our interdisciplinary account will encourage further researchers, particularly accountants, to engage in such endeavors.

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LIST OF TABLES

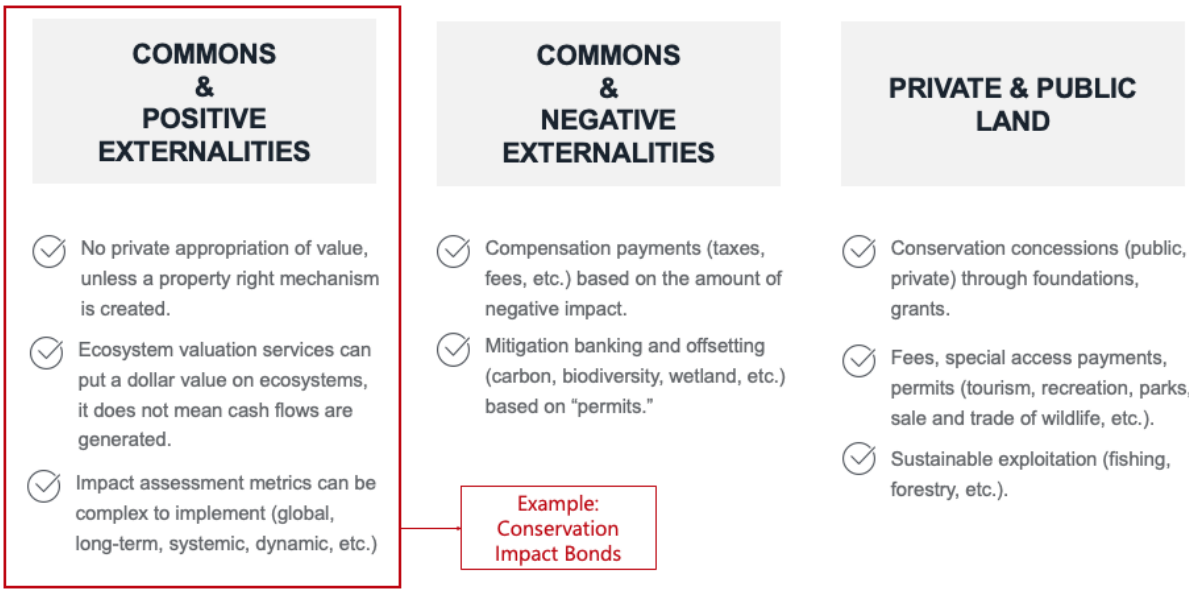
Table 1 - Global and species indicators in the Index

Type	Sub-type	Indicator
Global	Pressure	Threats to species survival
	Response	Acting to save species
		Building the scientific evidence base
		Advancing the [Organization] Ark[30]
		Rebuilding wild populations
		Protecting threatened places
		Controlling invasive species
		Training for conservation success
	Impact	Species trends: successes and challenges
		The Index of species survival
Species	Status	Range
		Population size
	Pressure	Threats
	Response	Actions
		Species survival journey
	Impact	Population trend
		Extinction risk

[30] Name for the overall mission of the organization.

LIST OF FIGURES

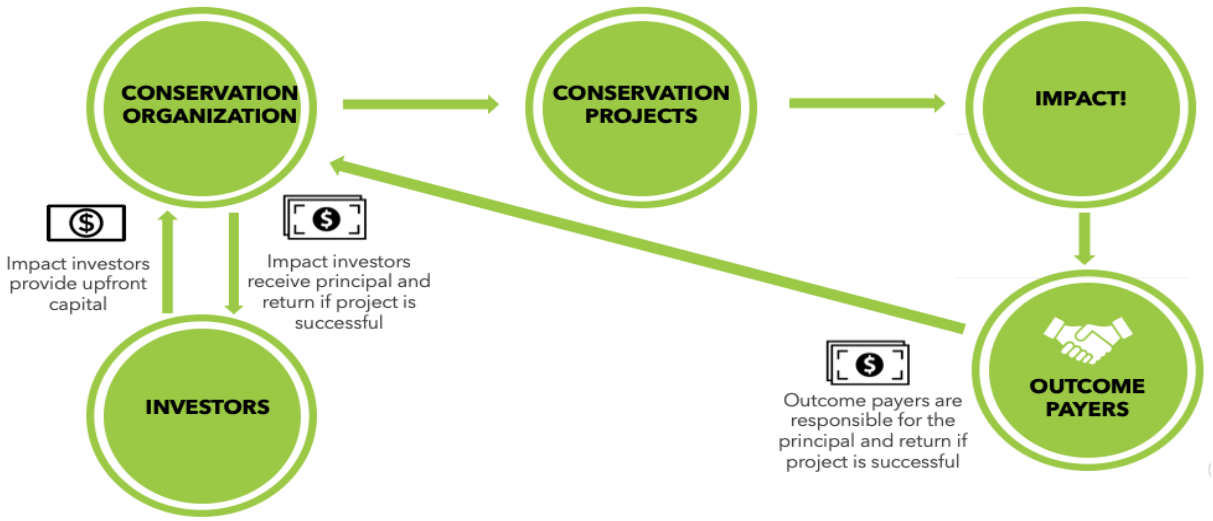
Figure 1 – Types of conservation finance approaches[31]



Source: Authors

[31] Commons & Positive Externalities refer to ecosystems from which everyone benefits, but whose (financial) value cannot be privately appropriated, such as green corridors within cities or alquifers. Commons & Negative Externalities include impacts on biodiversity that negatively adverses everybody, such as carbon emissions or over-exraction of a natural resource. Private & Public Land encompasses privately or publicly owned ecosystems, such as national parks or forestry.

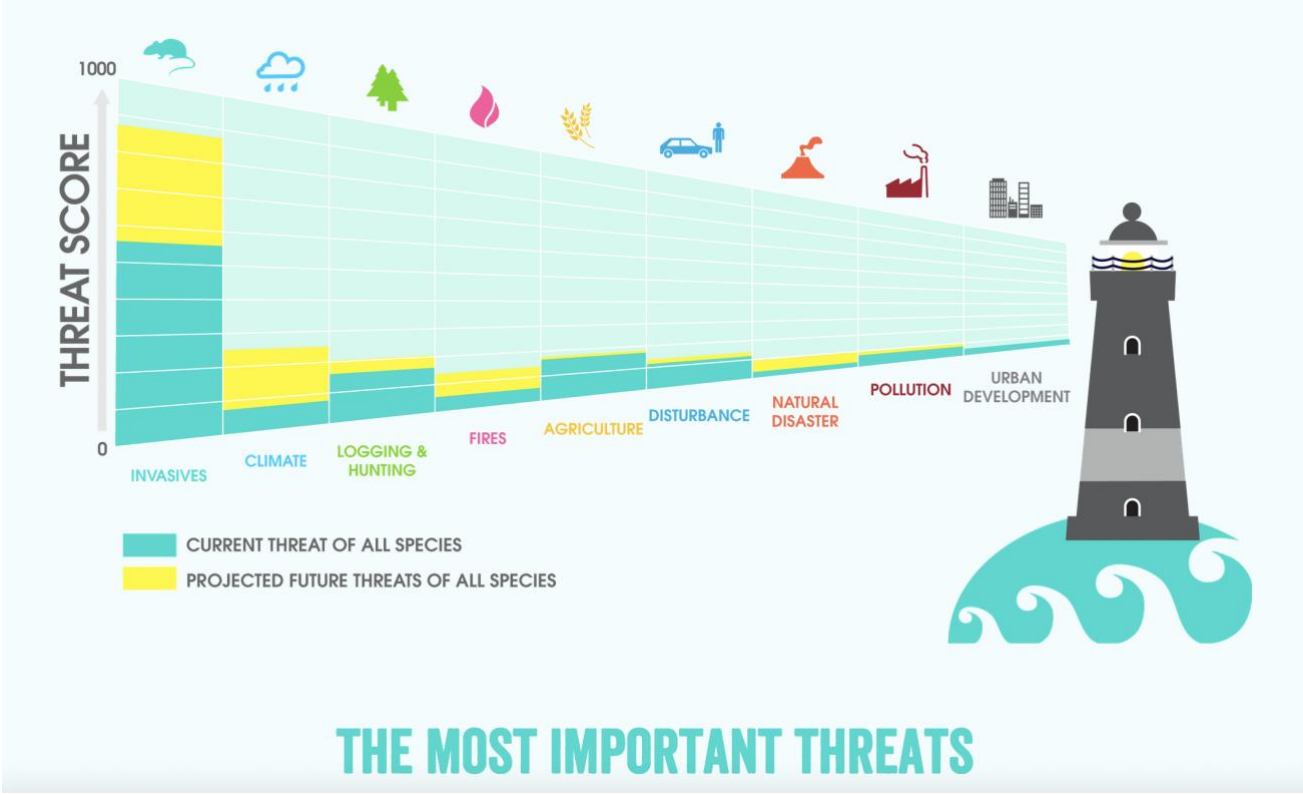
Figure 2 – The workings of a conservation impact bond



Source: Authors

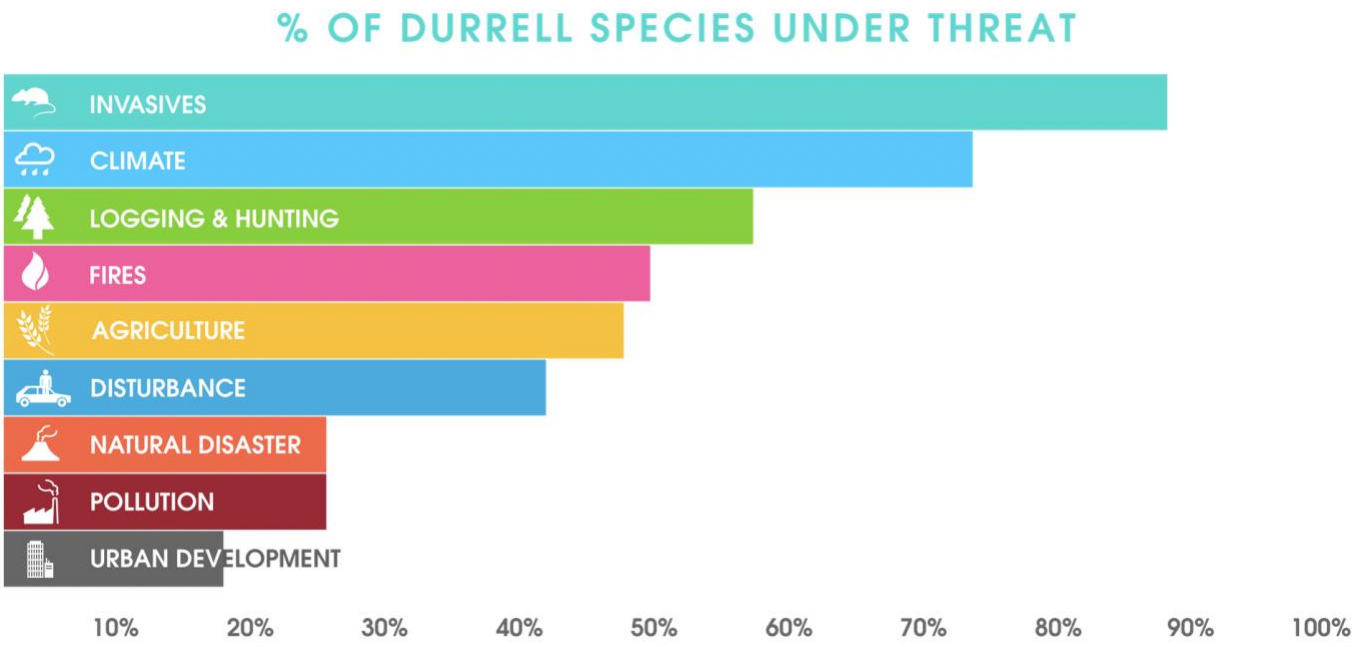
Figure 3 – Visual representations of the indicators used in the Index

(a) Societal visual



Source: Case study organization

(b) Management visual

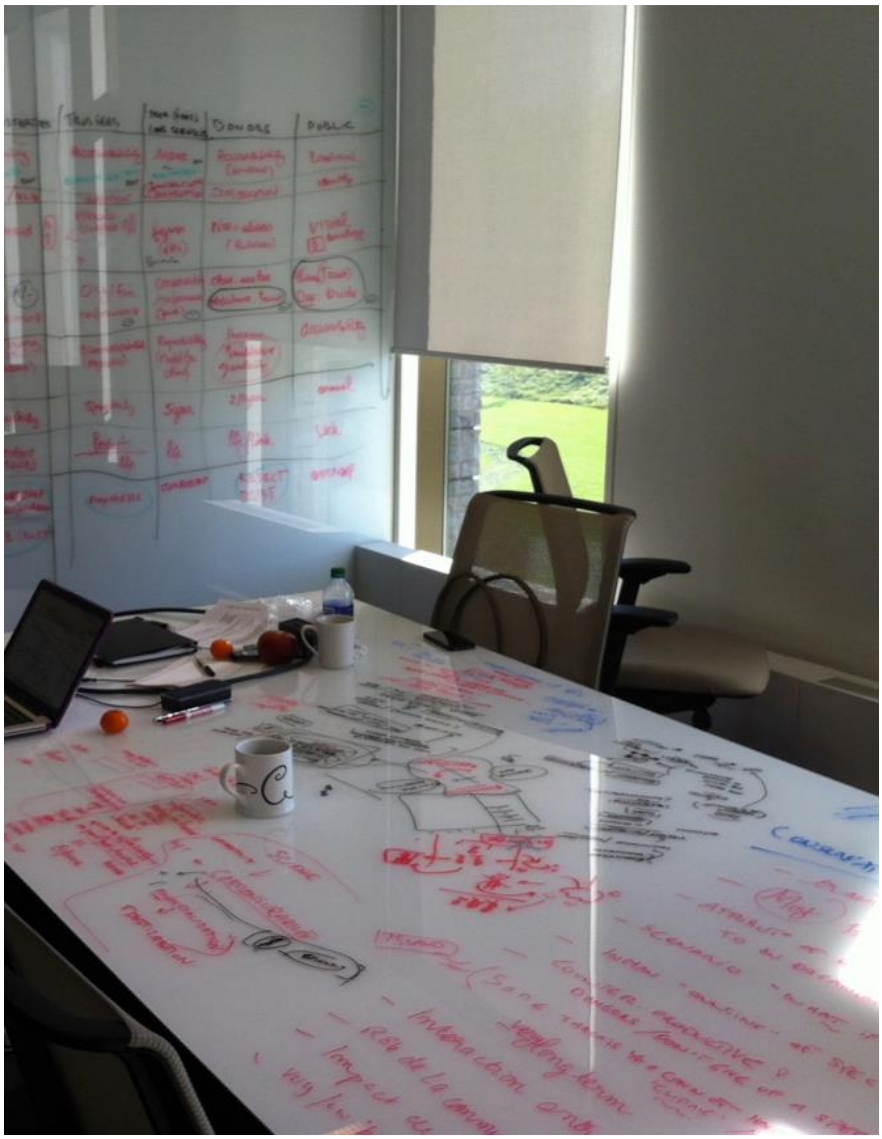


Source: Case study organization

(c) Animal photo and story

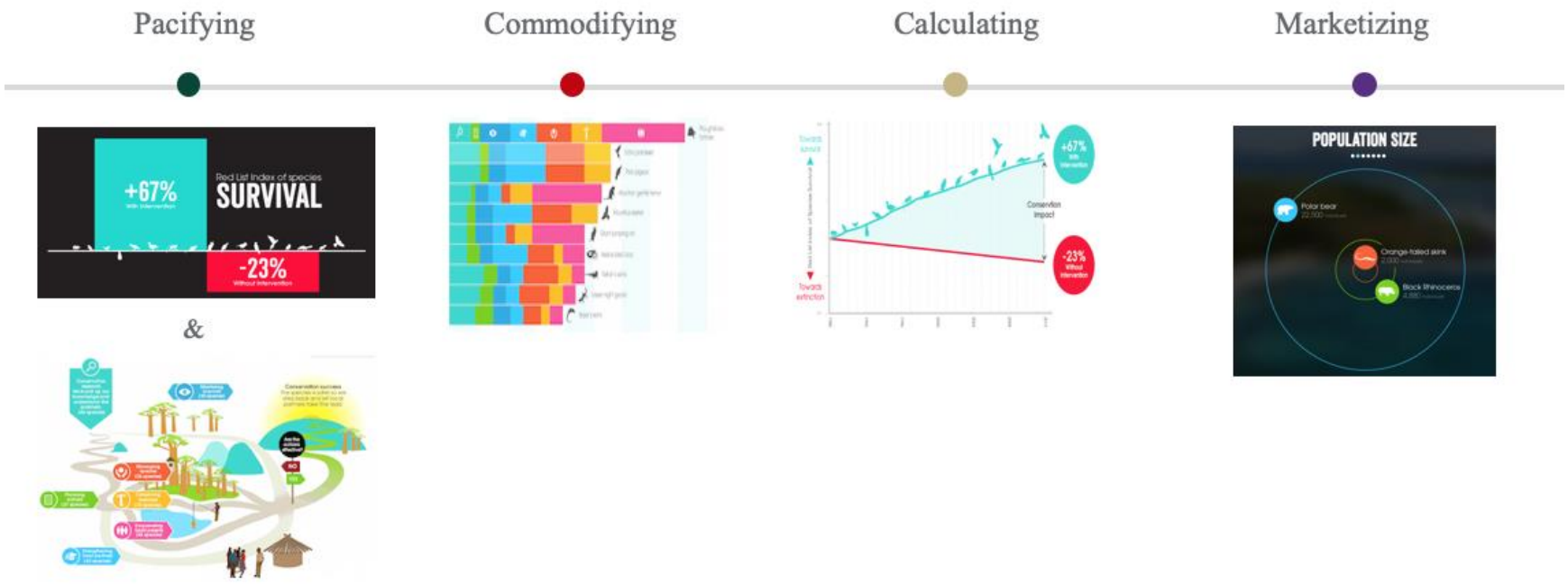
Source: Case study organization

Figure 4 – Data analysis process



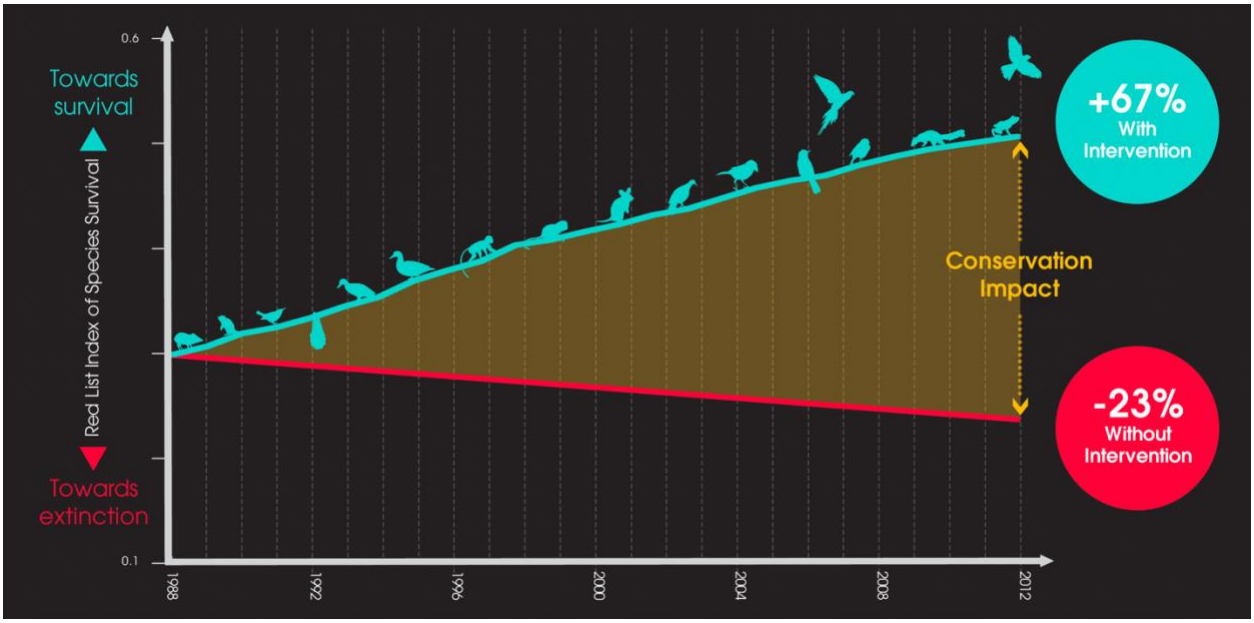
Source: Authors

Figure 5 – The four mechanisms underlying the process of financializing endangered species



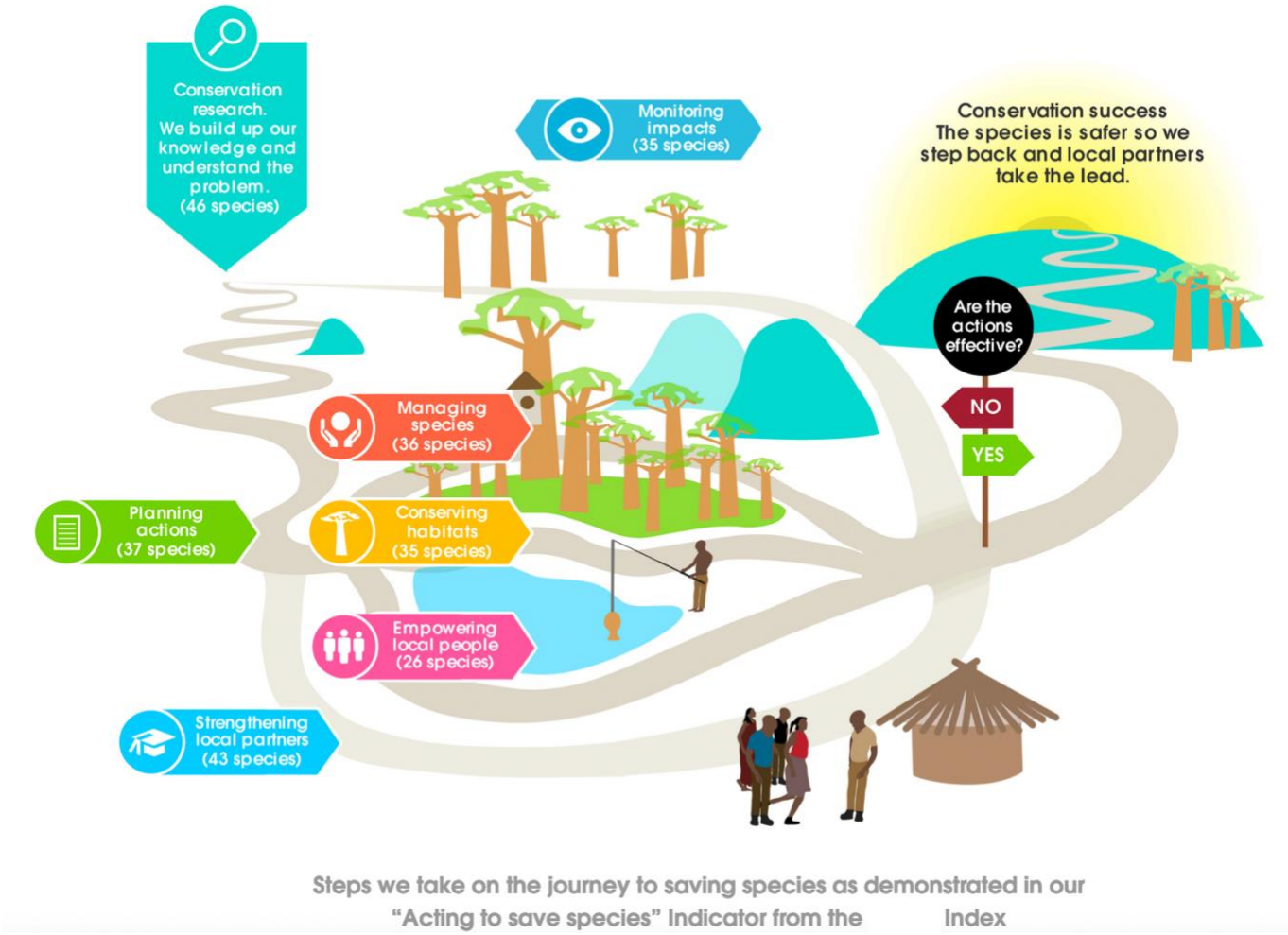
Source: Authors based on images from the case study organization

Figure 6 – The Index of species survival



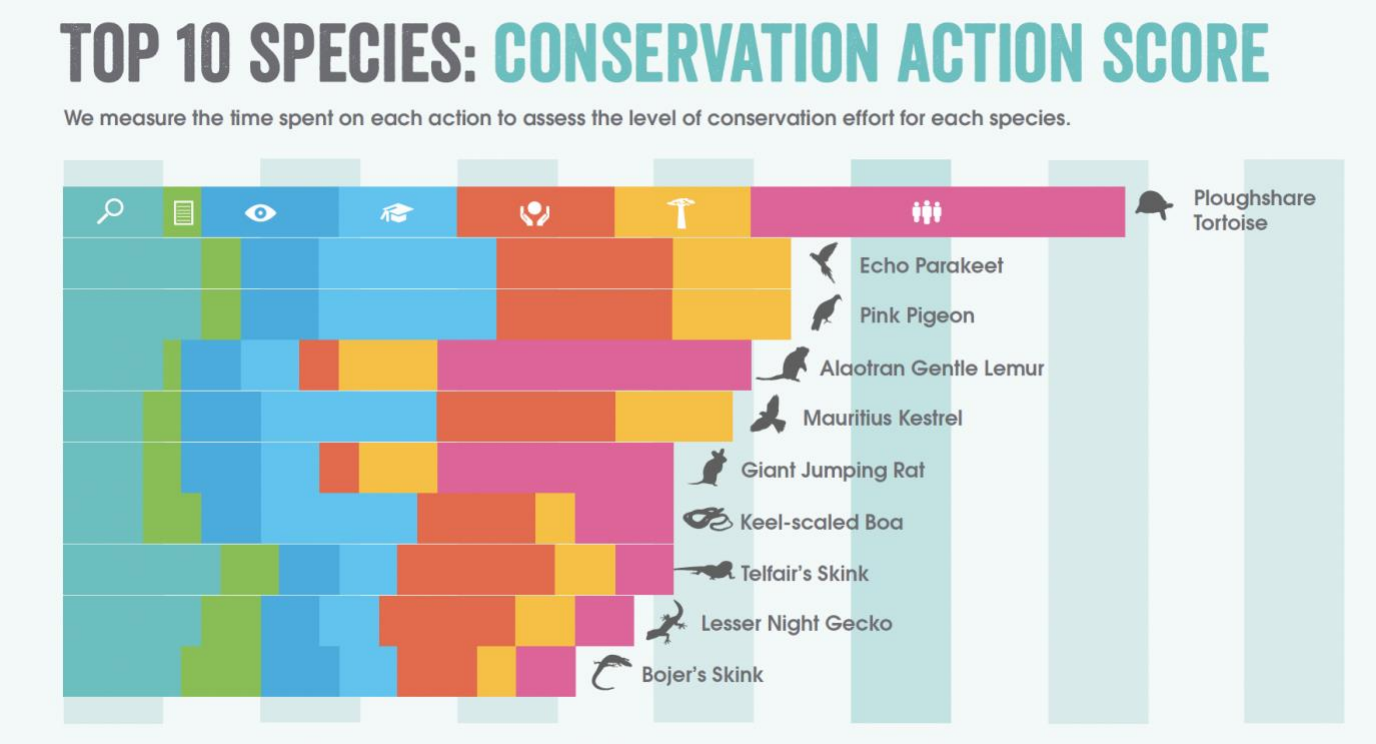
Source: Case study organization

Figure 7 - Visual representation of the conservation journey



Source: Case study organization

Figure 8: Visual representation of species conservation (as product lines)



Source: Case study organization

Figure 9 - Visual representation of population size

Source: Case study organization

LIST OF APPENDICES

Appendix A: Types of conservation organization

There are six main types of conservation organization:

- *Public lands*. Many conservation organizations protect public lands; members are appointed and their activities are funded by governmental authorities. Conservationists in these organizations consider themselves to be stewards of the land on behalf of citizens. The public status of such land is usually protected by laws and any private exploitation must be legally approved. In emerging countries, however, the protection of ecosystems and their species is difficult to implement, due to a lack of resources.
- *Trust*. Other conservation organizations own the lands they protect. Known as trusts, they buy or inherit properties through donations. They aim to protect the ecosystems under their care by preventing any transformation or exploitation of the faunae, including at-risk species.
- *Private lands*. Some conservation organizations work with private owners to help protect their plots of land. Such properties include farms, forests, tourist attractions, fisheries, or mining sites. The conservationists who work with private owners try to accommodate the owners' financial need to exploit resources while strengthening the protection of habitats.
- *Reserves*. Indigenous or natural reserves also function as conservation organizations. Indigenous reserve status does not necessarily imply that Indigenous communities own the land, but recognizes that the land is of cultural and spiritual importance for native people, and that this mode of existence should be accommodated. Indigenous conservationists consider themselves to be stewards of the land on behalf of every living being on Earth and those that have not yet been born. Natural reserves benefit from a specific protection status that acknowledges the exceptional character of the natural environment and its faunae. Depending on the country, natural reserves can be privately or publicly owned and subject to conservation laws.
- *Zoos*. Contemporary zoos, zoological societies or wildlife parks are usually found in urban areas and mainly aim to educate the general public by introducing them to at-risk species. They play a key role in conservation, notably through captive breeding, citizen education programs, and conservation work in the field.
- *International organizations*. Transnational conservation organizations aim to protect areas of the planet that do not belong to any specific nation. These organizations strive to protect the oceans and Antarctica, as well as migrating birds and freshwater fishes whose habitats cross national borders.

Conservation organizations can span this typology and adopt different conservation approaches. Some conservation organizations target uniquely urban settings (e.g., by focusing on increasing the number of trees in a city), others aim to protect wilderness areas, while others specialize in advocacy, policymaking, or coordination efforts. All of the conservation organization members we interviewed wanted to save at-risk species as part of their engagement with the land. To achieve this goal, some organizations tend to adopt an "ecosystem" or "habitat" approach, which involves working on the ecology of the system as a whole, rather than focusing on the species themselves. Others, like the conservation organization we studied, employ a species-based approach, which involves channeling efforts toward specific animals (e.g., through captive breeding or advocacy).

Appendix B: Data sources

1st stage (case study organization)

Interviewees	Number of Interviews	Involvement in Index Construction	Duration
Board of trustees	2	External stakeholders	75 minutes
External stakeholders	4	External stakeholders	110 minutes
Members of conservation science team*	8	Directly involved	588 minutes
Members of field conservation team*	2	Internal stakeholders	73 minutes
Members of wildlife park team	4	3 internal stakeholders and 1 directly involved	211 minutes
Members of administrative team	6	Internal stakeholders	246 minutes
Total	26	(9 directly involved, 11 internal stakeholders, 6 external stakeholders)	22 hours

* The managers of the three teams (i.e., Head of Animal Collection, Head of Conservation Programs, and Head of Conservation Science) all had zoology degrees. Only one conservationist on the team later obtained an MBA.

Type of Secondary Data	Number of Documents
Board meeting presentations	5
Index workshop documents	3
Annual reports	10
Public documents related to the Index	1
Blog about the Index	1
Scientific communication about the Index	1
Public documents related to the organization	2
Total	23

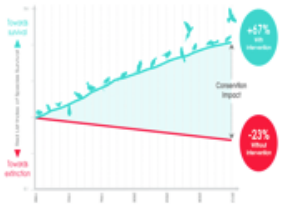
2nd stage (members of the conservation field not affiliated with the case study organization)

	External Interviewee	Specialty	Organization Type	Duration
1	Head of a Department of Biological Science	Conservation ecology and evolution	Academia	122 minutes
2	Head of a Department of Anthropology	Primatology with an ecological focus that incorporates conservation	Academia	99 minutes
3	Professor of Biological & Geological Sciences, Conservation Property Manager	Restoration ecology and invasive species management	Academia, trust	91 minutes
4	Stewardship Coordinator	Land stewardship, environmental outreach, and partnership development	Trust	91 minutes
5	Conservation Project Manager	Ecological restoration, rehabilitation, and environmental assessment	Urban forestry	84 minutes
6	Partnerships and Marketing Manager	Environmental outreach and partnership development	Urban forestry	88 minutes
7	Senior Conservationist	Landscape ecology, forest management, and conservation finance	Trust, advocacy, national coordination	67 minutes
8	CEO and Founder	Carbon offsetting, urban forestry (business degree)	Investment management	67 minutes
9	Professor, Policymaker	Conservation protection, recovery of freshwater fish, biodiversity	Academia	70 minutes
10	Director, Conservation Finance & New Conservation Strategies	Resource management, conservation finance (undergraduate degree in forestry, MBA later)	Large international conservation organization	118 minutes
11	Corporate Strategy Specialist	Conservation impact bonds (business degree)	Advocacy, regional coordination	76 minutes
12	Executive Director	Ecosystem recovery, wildlife research and land stewardship, at-risk species	Advocacy, regional coordination	76 minutes
13	Executive Director	Funding of conservation projects	Large foundation	57 minutes
14	Director of Ecosystem Recovery	Protection and recovery of ecosystems, sustainable land uses and lifestyles, deep reverence for the natural world	Advocacy, regional coordination	81 minutes
15	Investment Director	Project financing against desertification (engineering degree followed by a business degree)	Large transnational initiative	60 minutes
16	Director of Conservation Planning	Connections between science and Indigenous knowledge, innovative policy solutions, endangered species	Public land	81 minutes

	External Interviewee	Specialty	Organization Type	Duration
17	Farmer, Executive Director	Ecosystem farming, alternative land use services (B.Com.)	Large foundation, advocacy, support for farmers	84 minutes
18	Forestry Manager, Trustee, Municipal Councilor	Planted forest management	Large cooperative	82 minutes
19	Manager, Wildlife Office (Indigenous Conservationist)	Holistic management of ecosystems	Reserve	86 minutes
20	Professor, Zoo Specialist	Zoos, structure of evolutionary biology and its implications for the study of cultural evolution	Academia	65 minutes
21	Wilderness Officer	Stewarding, protecting wilderness areas	Zoological society	69 minutes
22	Head of Climate and Carbon Finance	Project financing, impact bonds (engineering degree followed by an economics degree)	Large transnational funding organization	42 minutes
23	Conservation Specialist	Conservation of wilderness, endangered species (MBA later)	Public land, advocacy, coordination efforts	53 minutes
24	Natural Heritage Coordinator (Indigenous Conservationist)	Holistic management of ecosystems	Reserve	105 minutes
25	CEO	Conservation and management of endangered species	Zoological society	39 minutes
26	Chair	Political aspect of conservation (i.e., negotiation with governments, policymaking)	Conservation organization (advocacy, regional coordination)	72 minutes
27	Conservation Science Specialist	Conservation science, protection of endangered species	Large international conservation organization	60 minutes
28	Conservation Finance Specialist	Carbon offsetting, blockchain for climate (MBA later)	Non-profit	95 minutes
29	Conservation Finance Specialist	Species-impact bond designer (undergraduate business degree)	Zoological society	120 minutes
				37.5 hours

Note: Given the article's focus on financialization, we have indicated whether interviewees studied business or economics during their careers. Only six interviewees had studied business, five of whom had worked exclusively in conservation finance. The other individuals had degrees in zoology, forestry, ecology, biology, conservation, veterinary medicine, and anthropology, among other fields.

Appendix C: Figure shared with the external conservationists interviewed during the 2nd stage of research

Layer	Financialization Step	Visuals	Quotes	Locus of Decision
LAYER 1: Science	Pacifying		The monitoring tool reflects the "journey of species survival... showing how long the progress is of a species program." (I3)	**Scientists**
LAYER 2: Societal	Engaging		"The 'population size' one with the concentric circles and the polar bear on the outside and the skink…illustrates that the kinds of animals we work with are incredibly endangered." (I17)	**Society**
LAYER 3: Management	Objectifying		"We are a conservation results business – and we have to prove it." (Internal presentation of the index, 2014)	**Governability of species**
LAYER 4: Finance	Calculating		The index was advertised internally as a way "to verify the impact of our work so that key stakeholder groups understand the 'return on their investment.'" (Internal presentation)	**Return on investment**

Caring for Life

↓

Avoiding Losses

Online Appendix – The IUCN Red list

Source: https://www.iucnredlist.org/about/background-history, accessed April 27, 2022
Source: https://www.iucnredlist.org/resources/classification-schemes, accessed April 27, 2022

Below is how the IUCN describes the IUCN Red list:

"Established in 1964, the International Union for Conservation of Nature's (IUCN) Red List of Threatened Species has evolved to become the world's most comprehensive information source on the global extinction risk status of animal, fungus and plant species.

The IUCN Red List is a critical indicator of the health of the world's biodiversity. Far more than a list of species and their status, it is a powerful tool to inform and catalyse action for biodiversity conservation and policy change, critical to protecting the natural resources we need to survive. It provides information about range, population size, habitat and ecology, use and/or trade, threats, and conservation actions that will help inform necessary conservation decisions. […]

To date, many species groups including mammals, amphibians, birds, reef building corals and conifers have been comprehensively assessed. As well as assessing newly recognized species, the IUCN Red List also re-assesses the status of some existing species, sometimes with positive stories to tell. For example, good news such as the downlisting (i.e., improvement) of a number of species on the IUCN Red List categories scale, due to conservation efforts. The bad news, however, is that **biodiversity is declining**. Currently, there are more than 142,500 species on The IUCN Red List, with more than 40,000 species **threatened with extinction**, including 41% of amphibians, 37% of sharks and rays, 34% of conifers, 33% of reef building corals, 26% of mammals and 13% of birds.

Despite the high proportions of threatened species, we [IUCN] are working to reverse, or at least halt, the decline in biodiversity. Increased assessments will help to build The IUCN Red List into a more complete 'Barometer of Life'. To do this, we [IUCN] need to increase the number of species assessed to at least 160,000. This will improve the global taxonomic coverage and thus provide a stronger base to enable better conservation and policy decisions. The IUCN Red List is crucial not only for helping to identify those species in need of targeted recovery efforts, but also for focusing the conservation agenda by identifying the key sites and habitats that need to be protected. Ultimately, The IUCN Red List helps to guide and inform future conservation and funding priorities.

The Classification Schemes used in IUCN Red List assessments include:

- **Threats** – to record past, ongoing and future threats to a taxon. For definitions, examples and guidance on the Threats Classification Scheme ver. 3.2, click here.
- **Stresses** – to record how each threat impacts a taxon. For definitions, examples and guidance on the Stresses Classification Scheme ver. 1.1, click here.
- **Habitats** – to record which habitats a taxon occurs in. For definitions, examples and guidance on the Habitats Classification Scheme ver. 3.1, click here.
- **Conservation Actions In Place** – to record what conservation actions are already in place for a taxon. For definitions, examples and guidance on the Conservation Actions in Place Classification Scheme ver 2.0, see here.

- **Conservation Actions Needed** – to record what conservation actions are needed for a taxon. For definitions, examples and guidance on the Conservation Actions Needed Classification Scheme ver. 2.0, click here.
- **Research Needed** – to record what further research is needed on a taxon. For definitions, examples and guidance on the Research Needed Classification Scheme ver. 1.0, click here.
- **General Use and Trade** – to record how a taxon is utilised and what level of trade occurs for the taxon. For the General Use and Trade Classification Scheme (including the Non-Consumptive Use scheme) ver. 1.0, click here.
- **Livelihoods** – to record the importance of a taxon to human livelihoods. For the Livelihoods Classification Scheme ver. 2.0, click here).
- **Plant and Fungal Growth Forms** – to record growth or life form to enable searches on the Red List web site for particular functional groups of plants (trees, shrubs, succulents, ferns, etc.) and fungi. For definitions and guidance on the Plant and Fungal Growth Forms Classification Scheme ver. 1.1, click here."