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Tax havens and global environmental degradation

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The release of classified documents in the past years have offered a rare glimpse into the opaque world of tax havens and their role in the global economy. Although the political, economic and social implications related to these financial secrecy jurisdictions are known, their role in supporting economic activities with potentially detrimental environmental consequences have until now been largely ignored. Here, we combine quantitative analysis with case descriptions to elaborate and quantify the connections between tax havens and the environment, both in global fisheries and the Brazilian Amazon. We show that while only 4% of all registered fishing vessels are currently flagged in a tax haven, 70% of the known vessels implicated in illegal, unreported and unregulated fishing are, or have been, flagged under a tax haven jurisdiction. We also find that between October 2000 and August 2011, 68% of all investigated foreign capital to nine focal companies in the soy and beef sectors in the Brazilian Amazon was transferred through one, or several, known tax havens. This represents as much as 90–100% of foreign capital for some companies investigated. We highlight key research challenges for the academic community that emerge from our findings and present a set of proposed actions for policy that would put tax havens on the global sustainability agenda.

The role of 'tax havens' in the global economy has gained increasing attention in recent years. The disclosure of classified files from the law firms Appleby in 2017 (known as the 'Paradise Papers') and Mossack Fonseca in 2016 (known as the 'Panama Papers') has brought to light the intricate ways in which these financial secrecy jurisdictions lead to reduced transparency and substantial losses of tax revenue globally — currently estimated to US$200 billion per year[1]. However, limited systematic consideration has been given to the possible links between the use of such jurisdictions and economic activities that undermine the sustainability of global environmental commons. Most analyses have instead been part of investigative journalism focusing on specific cases. Examples include tax evasion through the British Virgin Islands linked to deforestation and palm oil production in Indonesia, and the extensive use of shell companies located in tax havens by diamond mining companies operating in West Africa. The absence of a more systemic examination is not surprising considering the chronic lack of data resulting from the financial opaqueness created by the use of these jurisdictions.

Here we examine the links between corporate use of tax havens and resource extraction from two key global environmental commons — the ocean and the Amazon rainforest. The ocean, and the fisheries it supports, plays a vital role as protein source and income for millions worldwide[2], and the Amazon is critical for stabilizing the Earth's climate system[3]. The two cases also illustrate what has been referred to in the economic geography literature as 'furtive' and 'fictitious' capital[4]. Our analysis of global fisheries exemplifies flows of furtive capital and how tax haven jurisdictions can be used to enable and disguise illegal fishing activities. The Amazon case, instead, exemplifies flows of fictitious capital in the form of foreign loans and advance payments via tax haven jurisdictions to companies operating in the soy and beef sectors.

The two cases are thus complementary and build on a combination of data sources, with the ambition both to quantify flows of capital and, as far as possible considering available data, assess mechanisms by which the use of tax havens can be linked to unsustainable resource extraction. We then identify critical challenges related to causality and transparency, and propose key research questions and policy dimensions worth further consideration by both the scientific and policy community.

A brief overview of tax havens

In the past decade, considerable advancement has been made in our understanding of the political, economic and social dimensions of tax havens. While these jurisdictions have been argued to, in principle, provide politically neutral and reliable arenas for institutional innovation compared with settings dominated by political turbulence and institutional legal vacuum[5], a large body of literature also highlights their negative effects. These include the socio-political price these jurisdictions themselves pay by hosting disproportionally large amounts of foreign flows of capital[6]; the destructive impacts of illicit financial flows for human development, particularly in the Global South[7,8]; their role in 'money laundering' and funding of illegal activities such as trafficking of drugs and humans, terrorist financing and war crimes[9]; and the risk of amplified global systemic financial risks created by the lack of financial transparency and oversight[1,10,11]. Contributions from economics and sociology have also mapped the suite of strategies used by companies for aggressive tax planning through these jurisdictions, thereby highlighting that the use of tax havens spans beyond wealthy individuals to also include companies, financial institutions and their subsidiaries[1,11,12]. Although contested and technically ambiguous, such aggressive tax planning strategies are usually legal[7,12] (Supplementary Information, Appendix 1).

Box 1 lists the jurisdictions often denoted as tax havens in the academic literature. Note, however, that the terms 'tax havens', 'offshore financial centres' or 'financial secrecy jurisdictions' are debated[13] (Supplementary Information, Appendix 2). Here we use the term tax havens as it is well-established and widely used among scholars, and in the public domain. Even though these jurisdictions are generally described as 'offshore', recent studies show that they are embedded in the wider operation of global financial networks or global wealth chains[5,14–16]. In addition, recent estimates show that between 10 and 30% of all foreign direct investments (FDI) is

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Box 1 | List of jurisdictions classified as 'tax havens'

The countries and jurisdictions are listed in alphabetical order. All have the following features normally associated with 'tax havens' or 'financial secrecy jurisdictions': zero or low taxes; lack of effective exchange of information; lack of transparency; and no requirement of substantial activity. Countries that also are identified as flags of convenience (FOC) states are marked with an asterisk, based on the International Transport Workers' Federation list. See Supplementary Information, Appendix 2 for further details.

Andorra
Anguilla — overseas territory of the United Kingdom
Antigua and Barbuda*
Aruba — Kingdom of the Netherlands
Bahamas*
Bahrain
Barbados*
Belize*
Bermuda — overseas territory of the United Kingdom*
British Virgin Islands — overseas territory of the United Kingdom
Cayman Islands — overseas territory of the United Kingdom*
Cook Islands — New Zealand
Costa Rica
Curaçao (from 2010)
Cyprus*
Dominica
Gibraltar — overseas territory of the United Kingdom*
Grenada
Guernsey/Sark/Alderney — dependency of the British Crown
Hong Kong
Ireland
Isle of Man — dependency of the British Crown
Jersey — dependency of the British Crown
Jordan
Lebanon*
Liberia*
Liechtenstein
Luxembourg
Macau
Maldives
Malta*
Marshall Islands*
Mauritius*
Monaco
Montserrat — overseas territory of the United Kingdom
Nauru
Netherlands Antilles — Kingdom of the Netherlands (dissolved 2010)*
Niue — New Zealand
Panama*
Samoa
San Marino
Seychelles
Singapore
Sint Maarten (from 2010)
St. Christopher and Nevis
St. Lucia
St. Vincent and the Grenadines*
Switzerland
Tonga*
Turks and Caicos — overseas territory of the United Kingdom
US Virgin Islands — external territory of the United States
Vanuatu*

channelled through tax haven jurisdictions[17,18]. These insights are important because most trade in natural resources today forms part of global production networks, which in turn are supported by an equally complex and global network of financial infrastructure and capital. Few scholars have explored in detail the operation of these global financial networks, including tax haven jurisdictions, and how they intersect with global production networks and natural resource extraction[14].

This is problematic for at least two reasons. First, the use of tax havens may lead to substantive losses in tax revenues, thereby undermining socially and environmentally beneficial public investments in accordance with the ambitions of the United Nations (UN) Sustainable Development Goals and the Paris Agreement. Second, and as we elaborate in more detail below, the use of these jurisdictions reduces financial transparency, thereby making it difficult to analyse how distant financial drivers may underpin regional and local ecological changes in land- and seascapes globally.

The role of tax havens for global fisheries

More than 30% of large commercial fisheries are currently considered overexploited[19], and between 11 and 26 million tonnes of illegal or unreported catches have been estimated to be fished worldwide[20]. Illegal, unreported and unregulated (IUU) fishing is repeatedly identified by the UN General Assembly as "one of the greatest threats to fish stocks and marine ecosystems"[21]. Besides biodiversity and economic losses, such practices threaten food security and livelihoods in many countries[2]. While IUU fishing is directly influencing marine ecosystems, such activities are also commonly associated with a range of other crimes — referred to here as 'fisheries crimes' — including bribery, fraud, trafficking, money laundering and tax evasion[22].

The fisheries industry is a global business, with owners, fishing companies, customers and other actors in the value chain spread across the world[23,24]. The global nature of fisheries value chains, complex ownership structures and limited governance capacities of many coastal nations make the sector particularly susceptible to the use of tax havens in three important ways.

First, the use of these jurisdictions has been proved to support aggressive tax planning and tax evasion[25]. Common strategies to avoid taxes include exporting and re-exporting fisheries products under incorrect article codes via subsidiaries, or selling to the tax haven subsidiary at a highly discounted value and then re-exporting to the real customers at the full value. Unreported sales and re-categorization of sales income as agency fees charged by a subsidiary located in a tax haven represent additional ways by which seafood companies have been documented to avoid taxes[25].

Second, these jurisdictions also facilitate the evasion of regulation designed to address overfishing and fisheries crime by exploiting loopholes created by the fact that many well-known tax havens also qualify as secrecy jurisdictions in other regards, such as flags of convenience (FOC) states[26–28]. FOCs are countries to which vessel owners flag vessels and from which they can expect limited or no sanctioning mechanisms if they are identified as operating in violation to international law. Recent findings indicate that some of these vessel registries are run by private entities, further reducing transparency and the ability of governments to exercise formal and informal pressure directed at FOC states[29]. By setting up company structures with subsidiaries in jurisdictions that are both FOCs and tax havens, companies can obfuscate profits and beneficiary ownership of subsidiaries and individual vessels[22,25].

This has implications for illicit activities, linking to the third point — namely, that the secrecy afforded by combined use of tax havens and FOCs also allows companies to secure the dual identity of a fishing vessel, one of which is used for legal and the other for illegal fishing activities[25]. Historical examples of IUU fishing from the Southern Ocean illustrate the destructive combination of

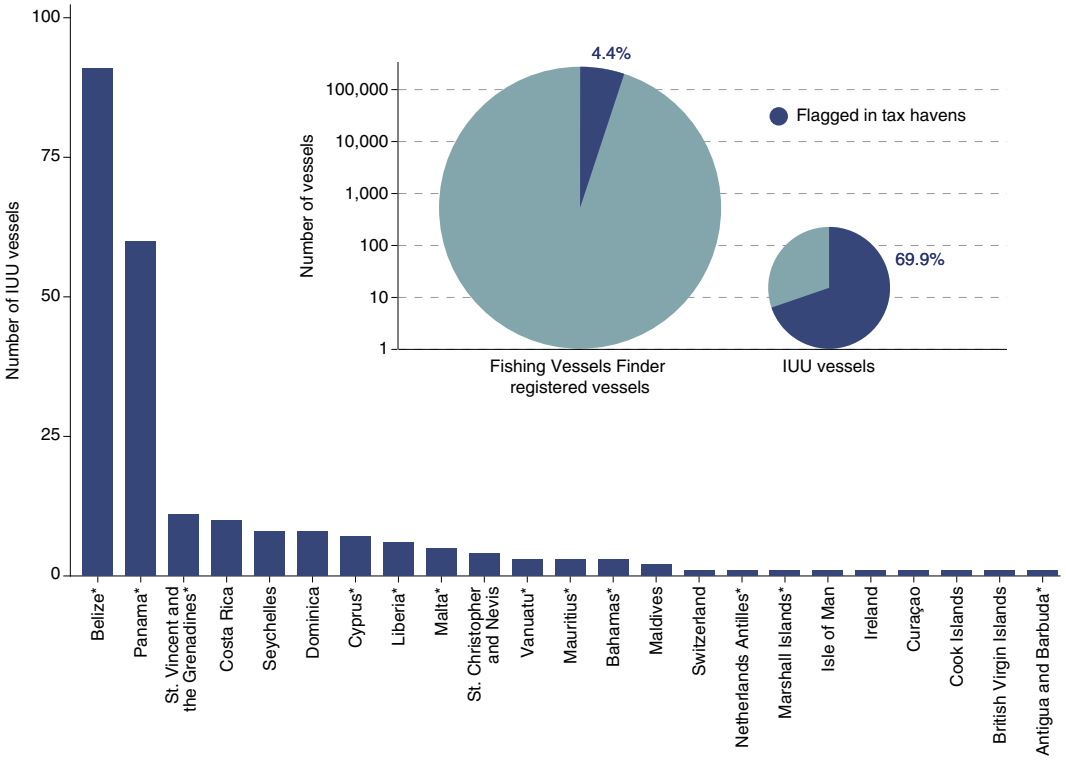

Fig. 1 | Fishing vessels and tax havens. Number of registered fishing vessels globally in the FAO Fishing Vessels Finder database ($n = 257{,}798$)[33] compared with the number of vessels that have been found to carry out or support illegal, unreported and unregulated (IUU) fishing activities ($n = 209$)[34]. Dark blue wedges show the percentage of vessels flagged in tax havens. The bar plot displays the count of IUU vessels that are, or have been, flagged in the different tax havens, where asterisks indicate overlap between tax haven jurisdictions and flags of convenience (FOC) states (Box 1 and Supplementary Information, Appendix 2).

tax evasion, hidden beneficiaries, falsely allocated catches and the resulting depletion (or, in the instance of South African stocks, collapse) of fish stocks, as well as reduction of critically threatened seabird populations[22,30–32].

Our analysis combines multiple datasets on fishing vessels and flag information to specifically highlight the link between IUU fishing and tax haven jurisdictions. While only 4% of all registered fishing vessels are currently flagged in a tax haven jurisdiction[33], data from regional fisheries management organizations and the International Criminal Police Organization (INTERPOL)[34] show that 70% of the vessels that have been found to carry out or support IUU fishing and for which flag information is available are, or have been, flagged under a tax haven jurisdiction — in particular, Belize and Panama (Fig. 1).

The use of tax havens — and its associated problems such as loss of tax revenues, reduced transparency and lack of compliance — make tracing of fisheries resource use and allocation of accountability extremely difficult and costly[25]. As such, it represents a major threat to the sustainability of global ocean resources that should be acknowledged and taken seriously. Similar uses of tax haven jurisdictions to support illicit environmentally destructive activities in other ecosystems have been reported, including illegal logging and trade with endangered species[35], but require additional analysis.

Amazonian land-use change and tax havens

The Amazon basin has suffered from extensive deforestation, despite being considered an iconic ecosystem with unique biological values, and more recently also playing a critical role in the global climate system[3,36]. As the extractive activities of companies are reliant on access to various forms of external capital (such as loans and equity capital) to start or expand their operations[37], increasing attention has been directed towards understanding the financial flows and fiscal incentives underpinning environmental changes in the Amazon region[38]. However, the extent to which this capital is channelled via tax havens has until now remained obscured.

As a means to explore the connections between global financial and production networks[14], we use a historical case, based on official figures from the Central Bank of Brazil, from October 2000 to August 2011. These are currently the only public data available, as the legal requirements for the publication of transfers of foreign capital introduced in October 2000 were suspended in August 2011 (Supplementary Information, Appendix 3a). This allows us to quantify flows of foreign capital from financial actors, based outside Brazil, to the nine largest companies operating in the soy and beef sectors of the Brazilian Amazon — two sectors representing key drivers of deforestation[38]. The studied time period overlaps partly with the most intense deforestation period in the Amazon (1995–2004), as well as the start of Brazil's Soy Moratorium in 2006[39]. The companies were selected only for their market share, without incorporating any company-specific environmental assessment (Supplementary Information, Appendix 3b). We contacted the nine companies before publication and invited responses. The contact letter and all received responses are included in Supplementary Information, Appendix 3c, and provide further details on the structure, operations, sustainability practices and policies of some of the companies.

Figure 2 shows transfers of foreign capital to these companies channelled through tax haven jurisdictions between the years 2000–2011. The types of financial transaction whose value and currency must be declared to the Central Bank of Brazil include: loans from a foreign entity; leasing/rental transactions; and two types of transaction related to trade finance: cash in advance (anticipated payment

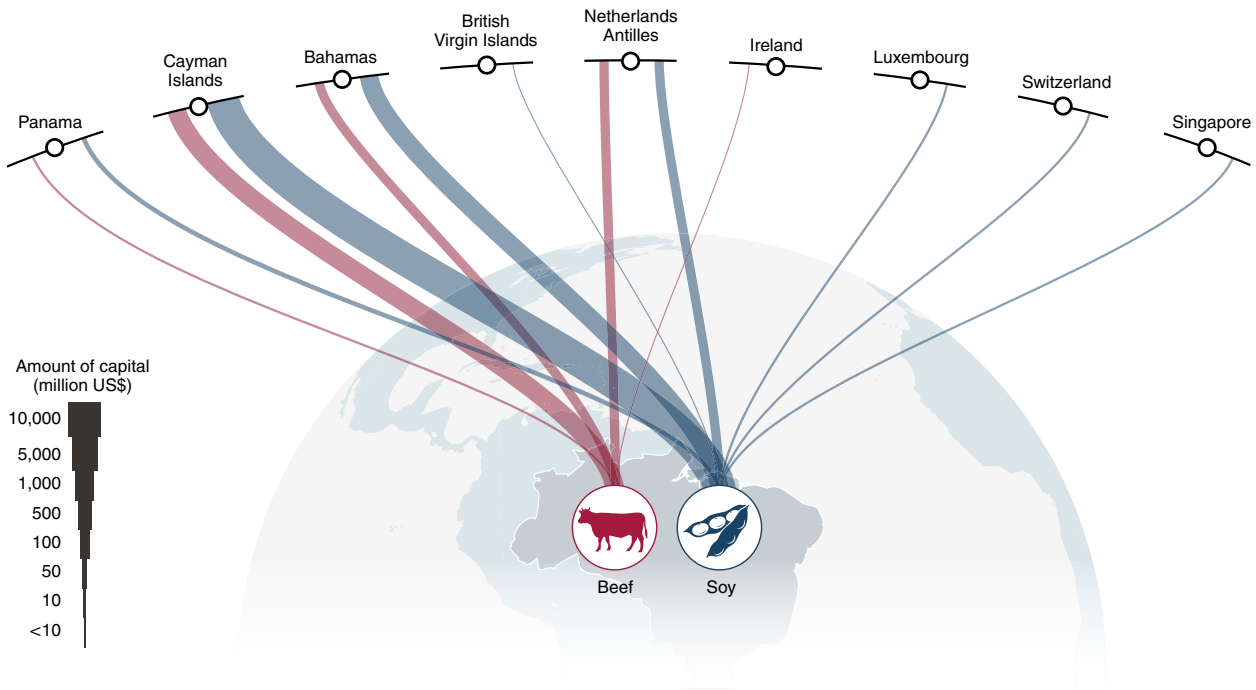

Fig. 2 | Foreign capital and tax havens in the Amazon. Foreign capital (that is, loans, cash in advance, financed import and leasing/rental) transferred from tax havens between October 2000 and August 2011 to key economic sectors associated with land-use change in the Brazilian Amazon (Supplementary Information, Appendix 3).

of exports) and import financing transactions. We add these four categories of financial transaction together to get an aggregate figure of declared foreign capital incoming to Brazil in the form of loans, financing or payments. Our analysis shows that a total of US$26.9 billion of foreign capital was transferred to the selected nine key companies between October 2000 and August 2011. Of this capital, about US$18.4 billion was transferred from tax havens (as defined in Box 1). In other words, 68% of all investigated foreign capital to these focal companies was transferred through one, or several, known tax havens. This percentage can be contrasted with the estimated 17% of all inward FDI transferred from tax havens to Brazil in 2011, or with 38% of FDI transferred from tax havens to Brazil the same year if only intercompany and intra-company loans are included[40].

Our estimate of 68% of capital transferred via tax havens is an average figure. For example, one company received US$6.9 billion from its own subsidiaries registered in the Cayman Islands as cash in advance, representing 90% of the total foreign capital received by that company between October 2000 and August 2011. Another company received virtually 100% of its foreign loans (about US$1.7 billion, representing 62.4% of the total foreign capital it received) from its own subsidiaries located in the Cayman Islands (Supplementary Information, Appendix 3d). Although the role of the Bahamas, the British Virgin Islands and the Cayman Islands for flows of FDI to and from Brazil is generally well known[41], to our knowledge this is the first exploration of their associations to companies operating in the Amazon biome.

The Cayman Islands is a central territory in the global tax haven community and a jurisdiction with strong connections to the global economy[5,41]. In our data, it is identified as the largest transfer jurisdiction for foreign capital to companies operating in the Brazilian Amazon during the investigated period (Fig. 2). Channelling capital through the Caymans provides three benefits to investors: legal efficiency, tax-minimization (mostly zero taxes and low fees) and secrecy[13,41]. Financial secrecy in this case means that the protection of the interests of clients is safeguarded. Despite increased international pressure to comply with international reporting standards, the registrar in the Cayman Islands is able to release on enquiry only the name, type of company, date of registration, address of its registered office and status of the company. Except where assistance to law enforcement agencies to combat illicit activity is mandated or authorized, the disclosure of financial information by government officials, professional agents, attorneys and accountants and their staffs is considerably limited, despite recent modifications in the country's secrecy laws[42].

The geographical reallocation of functions and funds within a company not only provides market opportunities[43], but also makes possible the favourable use of differences in national taxation policies[15]. For example, economic actors can shift profits to subsidiaries placed strategically in countries with very low, or even zero per cent corporate tax rate. Another common strategy is denoted 'debt loading', whereby companies finance their activities in high-tax jurisdictions with loans from their own subsidiaries located in a tax haven. This strategy allows companies to minimize their taxes and sometimes receive a tax deduction in the high-tax country (Supplementary Information, Appendix 1). The selected companies described here together operate 2,200 subsidiaries around the world, 143 (7%) of which are located in tax havens, most commonly in the Cayman Islands, Luxembourg and Switzerland[44] (Supplementary Information, Appendix 3).

Similar to the fisheries case, the use of tax havens in the Amazon context also plays a key role in the complex governance geography of many corporations. Company parentage is often stretched across multiple jurisdictions, which in general contributes to diminishing transparency. As an illustration, three of the focal companies in Brazil are headquartered in one jurisdiction, but incorporated in another — and tax havens feature as both headquartering and incorporation jurisdictions.

How the financial capital flowing into Brazil-located companies via tax havens is distributed across their operations is currently

impossible to assess. While national mandatory reporting requirements in both the United States and Brazil (for example, through both the United States and the Brazilian Securities and Exchange Commissions) do contribute to some degree of transparency, data about multinational companies' annual revenue per sector and country are often unattainable for research purposes, due to the non-public nature of country-by-country reporting guidelines. As such, quantifying and establishing direct causality between financial transfers via tax havens and actual land-use change is currently very difficult. Studies suggest a strong causal link between access to rural credit and deforestation rates in Brazil, but such a link has been made only to municipalities and not to companies operating in the Amazon[45].

Analyses in other sectors show that even though transfers via tax havens are associated with reputational risks, they also increase cash flow and profits, and lead to a reduced effective tax rate, which in turn sends positive signals to investors and stimulates the growth of economic activities across all jurisdictions of a company[46–49].

Financial secrecy, data availability and causality

The examples above show that the use of tax havens is not only a socio-political and economic challenge, but also very probably an environmental one. Direct proof of causality remains elusive as financial secrecy also hampers the ability of scholars and investors to analyse how financial flows affect economic activities on the ground, and their environmental impacts. Yet, in a globalized world where distant drivers can induce regional and local ecological changes through so-called 'telecoupling' mechanisms[50,51], and where our understanding of the close interplay between 'onshore' and 'offshore' finance in the global economy is limited[14], such analyses are becoming increasingly important to policymakers, investors and enforcement agencies.

A number of methodological advancements and improved access to ecological and economic data (for example, through increased supply chain transparency[52]) have paved the way for important insights[53]. However, a key element for tracing causality to distant financial drivers is long-term (decadal) data about how capital is distributed across a company's complex web of subsidiaries where extractive and financial operations take place. The use of tax haven jurisdictions poses major challenges to transparency and makes it currently difficult, if not impossible, for scholars and policymakers to track international flows of capital, and associated social and ecological impacts (Supplementary Information, Appendix 3e).

Putting tax havens on the global sustainability agenda

The lack of clearly established causal links between capital flows via tax havens and environmental change should not deter from further investigations. Instead, we hope that our analysis triggers important questions for those interested in the implications of tax havens for global environmental sustainability. For scholars, the questions centre on causality and the importance of legal and illegal capital flows. That is:

- To what extent does the use of capital channelled through tax haven jurisdictions allow companies to expand their extractive operations in ways that they would not do otherwise? In particular, to what extent does the use of tax havens allow companies to circumvent environmental regulation and accountability?
- Does the use of tax havens by multinational corporations lead to underreporting of inward FDI into extractive activities affecting important global environmental commons?
- Are these jurisdictions used to a different extent in different extractive sectors, and if so, why?
- If losses of tax revenues are substantial over time, do these undermine national and regional monitoring and enforcement capacities that would help safeguard important global environmental commons?

Our study also raises important issues for policymakers. First, in a similar way as is discussed for global fossil fuels subsidies[54], loss of tax revenue through the use of tax haven jurisdictions by companies modifying the biosphere could be conceptualized as indirect subsidies[55] to economic activities with possibly detrimental global environmental consequences. While estimating the size of such subsidies will be challenging, systematic analyses of whether aggressive tax planning in extractive industries could be viewed as supporting environmental degradation should be a priority in current international policy discussions about the realization of the 2030 Agenda for Sustainable Development.

Second, leading international fora and organizations such as the Group of Twenty, UN Environment, the UN Food and Agriculture Organization and the UN Office of Drugs and Crime should initiate joint independent assessments of the natural capital costs, such as loss of biodiversity and carbon sequestration, of these until now unquantified subsidies. This assessment should help reduce uncertainties around causality between capital flows and environmental change, and include a more comprehensive set of biomes, economic sectors, and companies and their subsidiaries than presented here.

Third, the international community should intensify its attempts to stimulate corporate transparency and collaborate to uncover and fight tax evasion, viewing such actions as important not only from a socio-political perspective, but also for environmental reasons. This includes recognizing the importance of FOC states in the structure of the global offshore system, as well as expanding current reform proposals. For example, the European Commission's proposal for a common consolidated corporate tax base, and the US-initiated Foreign Account Tax Compliance Act[1], as well as the proposal to increase transparency by means of a country-by-country reporting advanced by the European Commission and the Organisation for Economic Co-operation and Development[56], should progress, be made accessible for research and be complemented with targeted assessments of the potentially large environmental benefits of these proposals in sectors such as fisheries, forestry, and extractive industries including oil and gas. The legislation introduced by the government of the United Kingdom in May 2018 with the ambition to force British overseas territories (which include large tax havens such as Bermuda, the Cayman Islands and the British Virgin Islands) to make public the names of the owners of thousands of companies registered in these jurisdictions by the end of 2020 should also be welcomed. Whether this measure will result in increased financial transparency remains to be seen, but it has the potential to allow for further assessments of the links between tax havens and environmental degradation.

Bringing to light, quantifying and minimizing these hidden indirect subsidies should be viewed as a key issue in our efforts to protect global environmental commons, and a priority at a time when nations are coming together to endorse and finance the ambitions expressed in the UN Sustainable Development Goals.

Data availability

All data supporting this article are openly available in the figshare repository https://doi.org/10.6084/m9.figshare.5857716 (Supplementary Information, Appendix 3f).

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Author contributions

V.G., B.C., A.D., J.-B.J. and H.Ö. designed research. V.G., B.C. and A.D. collected and analysed Amazon data. J.-B.J. and H.Ö. collected and analysed global fisheries data and cases. V.G., B.C., A.D., J.-B.J. and H.Ö. wrote the paper with contributions from J.F.

Competing interests

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Additional information

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