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OVERLINE

Hold big business to task on ecosystem restoration

Corporate reporting must embrace holistic principles from restoration science

By Timothy A. C. Lamont^{1,*}, Jos Barlow¹, Jan Bebbington², Thomas Cuckston³, Rili Djohani⁴, Rachael Garrett^{5,6}, Holly P. Jones^{7,8}, Tries B. Razak⁹, Nicholas A. J. Graham¹

Large transnational corporations (TNCs) could use their considerable finances, labor, manufacturing infrastructure, and logistics expertise to play key roles in upscaling ecosystem restoration efforts, which are vital for achieving global biodiversity, climate, and development targets (1,2). Indeed, many TNCs are positioning themselves as environmental leaders, carrying out restoration that goes far beyond legal obligations to offset their own environmental impacts. This promise of corporate-led progress is alluring, and has delivered benefits in some cases, but is also fraught with risks. Well-intentioned efforts can do more harm than good (3), and some corporations oversell their efforts for reputational enhancement (i.e. greenwashing). Our evaluation of sustainability reports of 100 of the world's largest businesses reveals the extent to which TNCs are claiming to contribute to – but failing to report on – ecosystem restoration. Increased rigor, consistency, transparency, and accountability are needed to ensure that corporate-led restoration delivers quantifiable, beneficial, and equitable outcomes.

Restoration by TNCs: current state of play

In recent decades, large corporations have increasingly articulated and reported on their environmental responsibilities (4). Much of this progress stems from legal mandates for corporations to mitigate or offset their direct operational impacts. For example, the 2022 Kunming-Montreal Global Biodiversity Framework outlines that governments must implement requirements for large corporations to “regularly monitor, assess, and transparently disclose their risks, dependencies and impacts on biodiversity”. This reflects existing country-based requirements for businesses to conduct

Environmental Impact Assessments (EIAs) to quantify and reduce their environmental damage. Ecosystem restoration that offsets damage is often reported under such frameworks.

Additionally, beyond these efforts and reporting required by law, businesses collectively have voluntarily pledged to, for example, plant billions of trees (e.g. the Trillion Trees Corporate Alliance), hundreds of thousands of corals (e.g. the Hope Grows program) and tens of thousands of mangroves (e.g. the Million Mangroves program). Private sector reporting initiatives are emerging to encourage companies to voluntarily measure and disclose their biodiversity impacts more broadly, beyond legal requisites. These reporting initiatives include: the Global Reporting Initiative (GRI); the Taskforce on Nature-related Financial Disclosures (TNFD); the Science-Based Targets Network (SBTN); the International Sustainability Standards Board; and the Align project. These standards – although voluntary in theory – are often effective tools for regulating TNCs because they generate normative ideas about ‘good behavior’ amongst large companies (5). Such guidelines have helped increase the rigor of reporting across a range of sustainability metrics, in an era where many businesses are attempting to shift their public identities towards environmental stewardship. Amidst this general pattern of heightened reporting, however, specific and important details on emerging attempts by TNCs to enter the wider ecosystem restoration agenda lag worryingly behind.

Our analysis of sustainability reports from 100 of the world's largest corporations (see supplementary materials for details) reveals that two thirds of these companies state that they carry out various forms of restoration. These efforts encompass tree planting, repairing recent specific environmental damage, and assisting long-term recovery of extensively degraded ecosystems. Particularly active participation is observed in the energy and materials sectors, where 9 of the top 10 companies describe restoration efforts. Concerningly, however, across all sectors there is a marked lack of rigor in defining restoration, outlining methods, and quantifying outcomes (see the figure). Most reports do not differentiate between projects that simply mitigate operational impacts of firms (as legally required) or those going beyond this to contribute towards wider global restoration goals. A third of reports fail to mention the size

of any of their restoration projects; nearly 80% provide no information about financial costs; and more than 90% fail to report a single ecological outcome. None of the 100 reports quantify social or economic impacts on local stakeholders or traditional owners. This near-total lack of transparency in both ecological and socio-economic reporting means that there is no way to quantify the amount of restoration being done or to confirm that its outcomes are indeed beneficial. Put simply, the evidence base supporting large corporations' claims about ecosystem restoration is wholly insufficient.

Key principles for restoration success

Substantial improvements in accountability and evaluation of progress could be achieved if corporate reporting was structured around key principles from restoration science. Existing sustainability guidelines may help to drive and improve this process, but they must be implemented in ways that recognize the need for holistic evaluation of multiple environmental and socioeconomic metrics. For example, the Global Reporting Initiative (GRI) Standards are used by more than two-thirds of the world's large corporations (6), defining the information that should be provided in business-relevant sustainability reporting. Restoration currently falls within the ambit of GRI Standard 304 for biodiversity (7), which is under revision following a period of public consultation. In the proposed standard, restoration-specific disclosure requirements are focused on mitigating business operational impacts and limited to documenting the spatial area of projects (GRI 304–5, a, iii). This guidance lacks the stringency and detail required to appropriately report on the increasingly ambitious restoration activities carried out by many corporations. While some existing reporting requirements are relevant to certain aspects of restoration (e.g. GRI 304-6 on reversing biodiversity loss; GRI 305-5 on offsetting carbon emissions; and GRI 413-1 on engaging local communities), the current enthusiasm and ambition surrounding large-scale corporate restoration demands more explicit, restoration-specific guidance.

Considerable work in the last five years has identified a set of complementary principles that lead to positive restoration outcomes (3, 8–10). These principles each pertain to different stages of the restoration process (see the table). If companies' reporting gave details about each

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of these principles, it would allow better assessment of the scale and impacts of restoration. Improved reporting of these principles would also likely drive improvements across the different phases of restoration; companies with holistic reporting will be further incentivized to improve the design, implementation, and measurement of their projects. Importantly, each of the seven principles was reported appropriately by at least three corporations (see the table), demonstrating that it is possible to provide compliant evidence within a standard reporting framework. However, these examples were rare; most principles were reported on by only a handful of corporations, and no single corporation reported appropriately on all seven principles. Further, most examples of compliant reporting were given for just one case study within a corporation's portfolio of restoration projects, rather than comprehensive reporting that covers all restoration activity.

Implementing principle-based transparency

It is clear that existing corporate reporting fails to adequately communicate the outcomes of different restoration activities. International guidelines and national laws are currently designed to support biodiversity impact reporting, and generally consider restoration as a tool to compensate for direct operational impacts. However, this does not account for efforts of corporations that go beyond this 'bare minimum' and attempt to drive net-positive global change.

International guidelines (e.g. GRI, SBTN, TNFD) must provide a new framework for restoration activities that are additional voluntary contributions. As the specific details of this new reporting framework emerge, trade-offs are likely to develop between the depth of reporting and the cost involved in providing information. As such, a key challenge for policy makers will be to define 'minimum standards' associated with each restoration principle, that ensure the provision of necessary data without excessive cost. For example, minimum standards on proportionality might require information about the spatial extent and number of organisms planted in each individual restoration project; and minimum standards on permanence might require a statement of the number of years committed to maintenance, monitoring, and reporting. Standards must also be flexible enough to accommodate diverse targets; for example, projects aiming to preserve specific endemic species will report different outcomes to those focused on restoring ecosystem services. As such, guidelines should encourage corporations to engage with local stakeholders, traditional owners, and subject-specific experts to apply these principle-based standards in the

individual context of each specific project (12).

National or jurisdictional permitting authorities can align with these guidelines by requiring corporations to report specifically about whether individual restoration projects are legally required offsets or additional voluntary efforts. Summative reporting should be required in both cases, but with different approaches and goals. Legally required offsets should already be covered by EIA frameworks and submitted to appropriate regulatory bodies for audit. However, additional voluntary projects should outline a separate set of publicly accessible aims, plans and reports. Plans should be evaluated by experts as a pre-requisite to activities commencing, to ensure that they avoid social harms, are ecologically viable, and have clear reporting structures in place (13). Reporting on non-mandatory activities would be of interest to an array of corporate report users. This includes company owners (especially those with ethical screening in place), funders (usually banks), information providers to capital markets (e.g. corporate rating agencies), peer-group companies (especially those in the same industry or geographic region), and other stakeholders who wish to understand the outcomes of corporate restoration (e.g. NGOs and scientists). These cases all provide incentives for regulatory bodies to ensure that this information is in the public domain. Importantly, the reporting and evaluation of such projects must acknowledge that restoration is difficult and even well-planned projects sometimes fail or require changes in strategy. The aim of this exercise should therefore not be to penalize or publicly shame projects that fall short of original targets, but to summarize current progress, promote learning from mistakes, and encourage improvements in practice.

Restoration at a crossroads

Consistent reporting is required to accurately assess the impact of big business' contributions to the UN Decade on Ecosystem Restoration, now in its third year. This increased transparency should also be in the interests of large corporations themselves, who stand to gain much from demonstrating to their shareholders, employees, consumers, and regulators that they make meaningful contributions to global sustainability. Businesses already have strong incentives to demonstrate the value of their restoration initiatives; now strengthened reporting frameworks can help to deliver this accountability more effectively.

If managed carefully with transparent reporting, the world's largest corporations could considerably upscale ecosystem restoration, provide an evidence base from which others may learn, and garner public recognition for

their efforts. Conversely, inadequate reporting by these organizations undermines accountability in ways that could threaten the credibility of the global restoration movement, exacerbate environmental damage and create social injustice. Corporate involvement will certainly transform the future of ecosystem restoration; now policy interventions must determine whether that change is for better or worse.

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Figure 1: Reporting of ecosystem restoration by 100 of the world's largest businesses. Each block represents one business, chosen as the biggest ten corporations (by revenue) in each of the ten most represented industrial sectors in the Fortune Global 500 list. In the lower two rows, dark green blocks represent businesses whose reports adhere with good restoration practice; light green blocks represent businesses with no reported adherence; and grey blocks represent businesses that do not claim to carry out restoration.

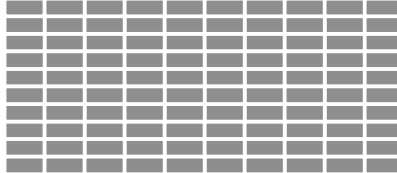
Table 1: Compliance of corporate-led restoration reporting with principles of restoration best practice. Principles are grouped by the phase of restoration activity to which they are most relevant. Examples of compliance are quoted from sustainability reports. See Supplementary Table 1 for further details.

100 of the world's largest businesses

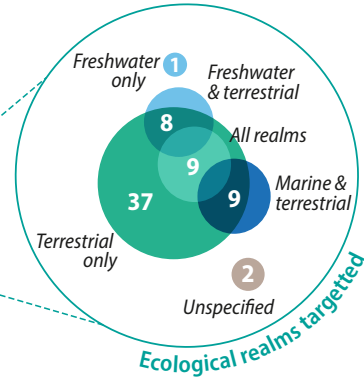
SECTOR



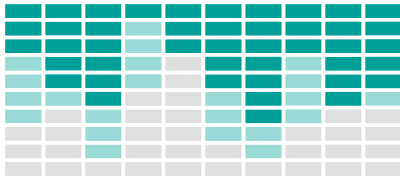
100 report environmental impact



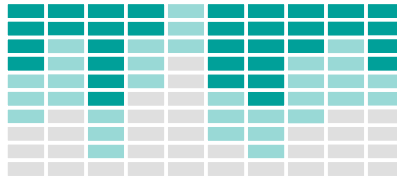
66 carry out ecosystem restoration



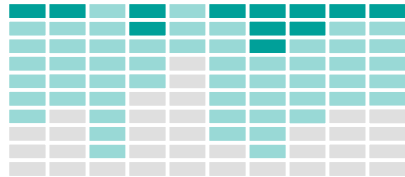
44 report area covered or number of trees planted



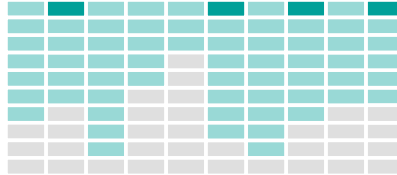
34 mention ecological monitoring activities



12 report budget invested or restoration costs



4 report ecological monitoring outcomes



1 **Table 1: Compliance of corporate-led restoration reporting with seven established principles of restoration best practice.** Principles are grouped by the phase of
 2 restoration activity to which they are most relevant. Examples of compliance are quoted from sustainability reports. See Supplementary Table 1 for further details.

Restoration principle	Explanation and possible reporting metrics	Example of compliance	Percentage of corporations compliant (n = 66)
Most relevant to project design			
Mitigation hierarchy	Restoring degraded habitat is generally less effective than conserving intact ecosystems. Corporations should work within the 'mitigation hierarchy' (11) by reporting their efforts to conserve existing habitat as a precursor to planning restoration.	<i>"When executing projects and operations...we follow the Mitigation Hierarchy...to identify and assess ways to first avoid, then minimise or offset, impacts to biodiversity."</i>	39% (26)
Inclusive governance	Corporations should work with local stakeholders and decision makers during planning and implementation of restoration projects. Reports should describe these partnerships, with a focus on empowering local communities and traditional owners.	<i>"From the project's start [we] chose to engage intensely with stakeholders, giving them a strong voice, as part of a consultative and conciliatory based approach. Four years and the consultation of nearly 10,000 people..."</i>	21% (14)
Most relevant to project implementation			
Permanence	Projects should plan for lasting impact. Reports should state the number of years committed to maintenance and monitoring, and/or survival rates and durations of previous projects.	<i>"Species diversity was more than ten times higher [than control plots]...we will monitor the progress of this measure for at least five years."</i>	11% (7)
Proportionality	Restoration should be proportional to environmental damage. Reports should disclose the area restored and/or budget invested in restoration, to demonstrate the extent of corporations' work.	<i>"To date, approximately 100 hectares at [site x] and 328 hectares at [site y] have been planted and are being maintained"</i>	70% (46)
Most relevant to measurement and reporting of outcomes			
Monitoring and transparency	Corporations claiming to restore ecosystems should prove that their initiatives are having desired ecological impact. Projects should define specific goals of restoration and regularly monitor their progress against these goals using quantitative ecological data. They should publish results in open access reports.	<i>"[We] collect water, sediment and fish data...to evaluate the impact of the clean-up."</i>	6% (4)
External benefits	Projects should target and report benefits beyond ecosystem recovery. For example, restoration can support local livelihoods, community engagement, education, research and/or training and capacity building.	<i>"Creation of the artificial reefs...provided recreational diving opportunities, benefited local fishers and communities and enabled scientists to further study artificial reef science"</i>	21% (14)
Reference ecosystems	In many cases, historic baselines are no longer feasible due to changing environmental conditions. Projects should monitor local 'reference ecosystems' to guide their efforts in restoring locally appropriate species compositions that are resilient to current and emerging threats.	<i>"This project comprises research on the natural vegetation inherent to a certain area...careful selection of suitable trees...to create a forest that harmonises with the local scene and is based on an ecological approach. Wild birds and animals inherent to the land return to the forests."</i>	5% (3)