GREENING THE TRANSPORT SECTOR BY MAINSTREAMING BIODIVERSITY

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ABSTRACT

In late 2022, the UN CBD (Convention on Biological Diversity) will meet to adopt a post-2020 global biodiversity framework which will detail how the private sector should mainstream biodiversity into its business strategies, investments, and production systems. The mainstreaming of biodiversity has lagged behind the carbon agenda, as evidenced in the Green Transport Strategy for South Africa. However, both voluntary and legislated corporate disclosures on biodiversity impact are increasing. The National Biodiversity and Business Network (NBBN) of South Africa assists corporates in understanding their dependencies and impacts on nature.

We discuss the main impacts of transport on African biodiversity and present the results of the third, annual corporate biodiversity performance assessment of the Biodiversity Disclosure Project. For 2020, 327 JSE-listed companies and 27 State-Owned Enterprises (SOEs) were involved. The results showed that the private sector, including transport, is ill-equipped to achieve science-based targets and invest in biodiversity. We briefly outline emerging measurement standards for the transport sector to become greener, not only in energy, but biodiversity. This includes setting targets which are based on footprint accounting, thereby contributing to the Sustainable Development Goals.

1. INTRODUCTION

Transport has both direct and indirect effects on biodiversity and with the rapidly growing infrastructure in South Africa which is coupled with our heritage of high biodiversity, already under threat. Coupled with this need to collect baseline data of transport effects on African biodiversity, there is a growing need for the private sector to mainstream biodiversity, with increased mandatory reporting of biodiversity impacts and dependencies. As a conservation NGO, the Endangered Wildlife Trust, we have been addressing these issues within the transport and other sectors, and in this paper we outline: 1) why the transport industry needs to consider biodiversity; 2) the main impacts of transport on African biodiversity; 3) the performance of South African transport companies in mainstreaming biodiversity in comparison to other sectors; 4) the way forward in biodiversity foot-printing.

2. WHY THE TRANSPORT INDUSTRY NEEDS TO CONSIDER BIODIVERSITY

The World Economic Forum recently reaffirmed biodiversity loss as one of the top 3 risks to businesses globally (Global Risks Report, 2022). They define biodiversity loss as

'Irreversible consequences for the environment, humankind, and economic activity, and a permanent destruction of natural capital, as a result of species extinction and/or reduction' (Global Risks Report, 2022). Accelerating and widespread climate change will result in irreversible consequences for the planet (IPCC, 2021), and while decarbonization efforts have received much attention, the coupled role of ecosystem collapse has lagged.

In 2022, the UN CBD will adopt a post-2020 global biodiversity framework (www.cbd.int/conferences/post2020) and has repeatedly called upon the private sector to mainstream biodiversity into its business strategies, investments, and production systems (See the business consultation on the CBD Post-2020 global biodiversity framework - : https://4post2020bd.net/business-consultation-on-the-cbd-post-2020-global-biodiversity-framework/.

Additionally, both voluntary and legislated reporting initiatives for nature such as the Global Reporting Initiative (GRI) and the Sustainable Development Goals (SDG) are encouraging companies to recognize their relationship with biodiversity. SDG Target 9 (UN, 2015) related to industry, innovation and infrastructure, describes several targets to develop and upgrade infrastructures which are sustainable, resilient, and inclusive. South African companies are already subject to onerous mandatory and voluntary disclosure requirements (e.g., KING IV), including reporting on the impacts of business on our natural world (e.g., GRI Standards, CDP questionnaires). Yet, there is a need for reporting organisations to consider biodiversity specifically, as opposed to simply assuming it is covered under the broader sustainability agenda. While the Green Transport Strategy for South Africa (2018-2050) included the objective of "Minimising the adverse effects of transport activities on the environment." (Department of Transport, 2018), there is little guidance as to what this means.

African economies are currently among the world's fastest growing (Edo et al., 2020), and across Africa much of the major transport infrastructure, is being built as part of over 30 'development corridors', potentially affecting areas with high conservation value (Laurance et al., 2015; Sloan et al., 2016). Out of 33 proposed and current development corridors in sub-Saharan Africa, roads and rails would bisect a total of 408 protected areas (Laurence et al., 2015). South Africa is the third most biologically diverse country (Bartels and Kotze, 2006) and is the 25th largest country in the world (CIA, 2021). As of 2021, road networks in the country are the tenth longest in the world (Department of Transport, 2021) and the rail network is ranked 9th longest in the world by the International Union of Railways (UIC, 2021, www.uic.org).

3. THE DIRECT IMPACTS OF TRANSPORT ON WILDLIFE

South Africa's extensive transport infrastructure network is having severe impacts on the country's native fauna, with species from all taxonomic groups (i.e. amphibians, reptiles, birds, and mammals) impacted (e.g., Collinson et al., 2019a; Collinson et al., 2019b; Williams et al., 2019; Linden et al., 2020; Hlatshwayo, 2021). Roads and railways pose severe threats to wildlife by reducing available resources (such as food and water), increasing mortality rates (reducing abundance), and fragmenting remaining habitat into smaller patches (e.g., Fahrig and Rytwinski, 2009; van der Ree and Grilo, 2015; Collinson et al., 2019; Grilo et al., 2021). The two most direct and visible ecological impacts of road and rail infrastructure are mortalities arising from wildlife-train/vehicle collisions, and the barrier created in the landscape, which fragments habitats and can isolate populations. So far, most research investigating transport infrastructure induced wildlife mortalities focused on roads (e.g., Drews, 1995; Cunneyworth and Duke, 2020), whereas there is still a big

knowledge gap on railway-related-impacts (Borda-de-Água et al., 2017; Popp and Boyle, 2017). Although mortality reduction is a central concept in the field of transport ecology, the extent of what we are losing in terms of local and global wildlife is still not well enough understood and documented, (Hetman et al., 2019).

Wildlife mortality because of collisions with trains or vehicles (or 'railkill/ roadkill') is the most visible impact from rail and road infrastructure (Forman, 1998; Fahrig and Rytwinski, 2009). Collisions are not easily avoided, given the travelling speeds that can be reached, and the inability to stop quickly or navigate around animals in their path. Barrier effects are regarded as one of the greatest ecological impacts of transport infrastructure. Aside from the habitat destroyed to build roads and railways, the infrastructure creates both physical and behavioural barriers to wildlife movement, resulting in habitat fragmentation, isolated populations, increasing edge effects, and disturbance to populations living nearby (Forman 1998; Fahrig and Rytwinski, 2009; van der Ree and Grilo, 2015). This division of the landscape is especially disadvantageous for large mammals, where it can hinder migration and prevent gene flow between different groups. In fact, transport infrastructure is one of the largest drivers of habitat loss and fragmentation, and therefore biodiversity loss, worldwide (Laurance et al., 2015).

From the Endangered Wildlife Trust's (EWT; non-governmental, not-for-profit South African conservation organisation) National Database (EWT, 2021) for vertebrate roadkill in South Africa, mammals are the most reported class (50%), followed by birds (18%), reptiles (6%) and amphibians (1%), with 24% being unknown. Amongst mammalian orders, large mammals such as carnivores (45%), followed by ungulates (6%) are involved in most collisions and are most likely to cause damage or delays to trains and vehicles given their size. For rail, the EWT National Database is somewhat limited with most reports being for reptiles, and the African elephant (*Loxodonta africana*).

Wildlife crossing structures (WCS) are recognised as an effective mitigation measure to reduce both collisions with animals and barrier effects, through facilitating the safe passage of animals over-or-under rail or road infrastructure (van der Ree and Grilo, 2015; Rytwinski at al., 2016). Whilst specifically designed wildlife passages are most effective for reducing barrier effects, they are also the most expensive, costing up to millions of Rand. Underpass structures that are built for drainage or engineering purposes (e.g., culverts or viaducts) can easily be modified to improve their use by wildlife; this approach is regarded as the most economical and feasible form of mitigation of both wildlife mortality and barrier effects (Rytwinski at al., 2016). Understanding the factors affecting use of these non-wildlife underpasses is therefore critical, especially in developing countries where biodiversity conservation typically competes with socioeconomic needs in budget allocations (van der Ree and Grilo, 2015; Rytwinski at al., 2016).

Collisions with large mammals can be expensive, and evidence shows that mitigation measures such as WCS make sound economic sense: the benefits (i.e., cost-saving) from underpasses with wildlife fencing easily outweigh the implementation costs at road/rail sections which had even a small number of collisions (van der Ree and Grilo, 2015; Rytwinski at al., 2016).

Despite the potential of WCS in mitigating road and rail impacts, there is little knowledge of their use by wildlife or effectiveness along rail infrastructure, with extremely few published studies that primarily focused on Europe, China, and Australia (Borda-de-Água et al., 2017; Popp and Boyle, 2017). Furthermore, although a range of studies on road WCS have been conducted, around 85% of existing knowledge is from Europe and North

America (Smith et al., 2015; Rytwinski et al., 2016). WCS research has scarcely been conducted in areas with high diversity of large mammal species, such as Africa, which is home to the world's largest intact congregation of large mammals and a quarter of global biodiversity (Collinson et al., 2019).

4. HOW WELL ARE TRANSPORT COMPANIES MAINSTREAMING BIODIVERSITY IN SOUTH AFRICA?

To assess whether South African companies are making efforts to incorporate biodiversity into their policies and practices, the National Biodiversity & Business Network (NBBN) of South Africa, managed by the EWT, established the Biodiversity Disclosure Project (BDP) in 2018. The NBBN as a network works with corporates to mainstream biodiversity and measure and manage biodiversity impact on the ground. On an annual basis. the BDP conducts a rigorous assessment of corporate biodiversity performance and publicly publishes the results The 2020-2021 assessment (conducted by one of the authors (Teren): NBBN, 2021) was conducted on all 327 Johannesburg Stock Exchange (JSE) listed companies, and 27 State-Owned Enterprises (SOEs).

The assessment used publicly available information, including company websites and 2020 annual reports (e.g., annual integrated reports or sustainability reports). Each company was contacted electronically to offer them the opportunity to review their individual results and share any additional information if warranted. The NBBN assessed the biodiversity mainstreaming performance of the target organisations according to eight key questions, which reflect the key steps that a company needs to follow to effectively mainstream biodiversity into its activities (Appendix 1).

There were five possible answers with corresponding scores (0 to 4) for each question (see Appendix 1 for details). Key principles underlying the set of possible answers include the impact mitigation hierarchy, embedded into national legislations.

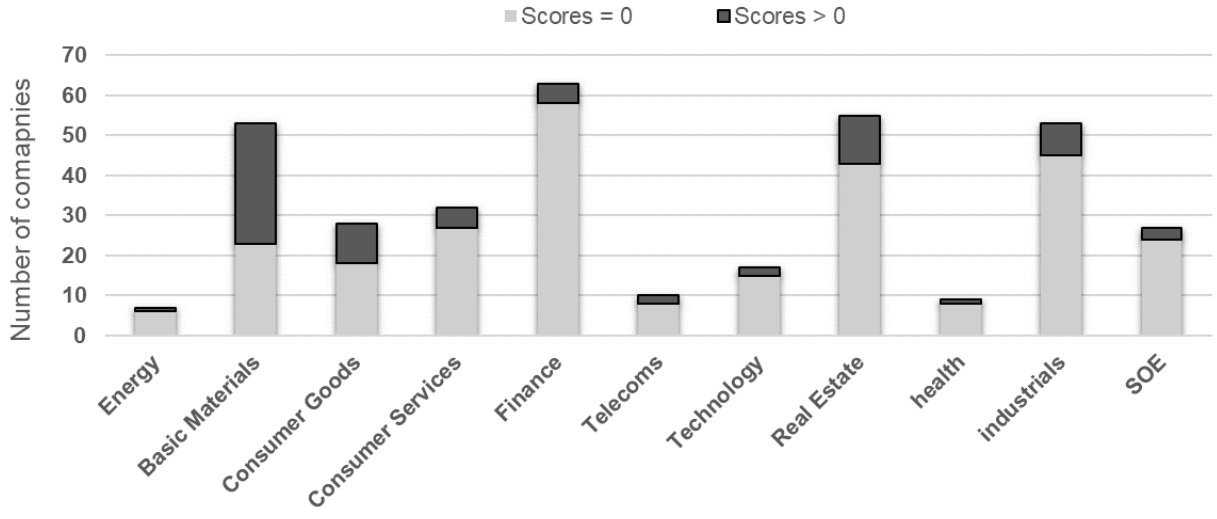

Figure 1: The difference between sectors of the number of companies (N = 354) that had any evidence of biodiversity mainstreaming in 2020

The Basic Materials Sector was the only sector with more than 50% of companies having any evidence of biodiversity mainstreaming (i.e., any total score above 0) based on the analysis (Fig. 1).

The transport sector was mainly represented as SOEs which had mixed ratings. Only Transnet Ltd. and the South African National Roads Agency (SANRAL) had evidence of mainstreaming biodiversity out of five transportation SOEs (Table 2). SANRAL's total score increased from 2.5 to 4 points from 2019 to 2020, while Transnet's total score showed a large improvement from 1.5 in 2019 to 8.5 in 2020. Transnet scored relatively well in the annual ratings (Table 2), in comparison to its peers, but still scored 0.5 for question 4 "does the company measure its biodiversity impacts and dependencies" and 0 for question 5: "Does the company have a biodiversity strategy, biodiversity targets and associated key performance indictors (KPIs)?"

A key finding from the report was that companies across all sectors, including transport, need reliable, consolidated biodiversity impact data so that they can 1) understand the size of their biodiversity footprints and the associated negative and positive impacts, 2) manage their biodiversity impact inventory,3) set-up evidence-based targets and 4) develop action plans articulated around the mitigation hierarchy. These findings are echoed in a recent UN-backed study showing that only 18% of investments over the past year "could be considered green and sustainable" (UNEP, 2021).

Table 2: The Biodiversity Mainstreaming Scores of Transport-related State-Owned Enterprises of South Africa from 2019 and 2020. Scores out of a maximum of 4 (BDP Ratings, National Biodiversity and Business Network, 2021)

Transport State Owned-Enterprises	What is the biodiversity policy of the company?		What are the biodiversity dependencies and impacts of the company?		Does the company measure its biodiversity dependencies and impacts?		Does the company value its biodiversity dependencies and impacts? What are the most material ones?		Does the company have a biodiversity strategy, biodiversity targets and associated key performance indictors (KPIs)?		Does the company have a biodiversity action plan?		Does the company disclose its biodiversity risks and performance?		Does the company have a biodiversity monitoring system in place for continuous improvement?	
	2019	2020	2019	2020	2019	2020	2019	2020	2019	2020	2019	2020	2019	2020	2019	2020
AIRPORTS COMPANY SOUTH AFRICA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
NATIONAL PORTS AUTHORITY	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PASSENGER RAIL AGENCY OF SOUTH AFRICA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SOUTH AFRICAN NATIONAL ROAD AGENCY	0	0	0.5	0.5	0.5	0.5	0	0	0	0	1	1	0.5	1	0	1
TRANSNET (LTD)	0.5	2	0	1.5	0	0.5	0	0.5	0	0	1	2	0	1	0	1

5. HOW COMPANIES CAN MEASURE, MANAGE AND REPORT ON BIODIVERSITY IMPACTS

A biodiversity impact can be defined as the change in the state of ecosystems (e.g., extent and condition/integrity) and species (e.g., habit or population size (CDSB, 2021). These changes can either be positive (biodiversity gain) or negative (biodiversity loss). A biodiversity footprint (BF) refers to the total biodiversity impacts generated by an organisation, a project or product.

Companies need reliable, consolidated biodiversity impact data so that they can: 1) understand the size of their biodiversity footprints and the associated negative and positive impacts, 2) manage their biodiversity impact inventory; 3) set-up evidence-based targets and 4) develop action plans articulated around the mitigation hierarchy.

There are many methods and tools for biodiversity planning and monitoring relevant to business, and several indicators and tools have been developed (see for example Stephenson and Carbone, 2021). The recently published Application Guidance for Biodiversity-related Disclosures of the Climate Disclosure Standards Board (CDSB, 2021) offers a framework for reporting environmental and social information with the same rigour as financial information. The Science Based Targets Network (SBTN) has also issued initial guidance for nature prior to publishing integrated targets for all aspects of nature, including biodiversity (expected in 2022) (SBTN, 2020).

The consolidation of biodiversity footprint measurement does not have to be onerous, with an increasing body of case studies available (e.g. the biodiversity footprints we eveloped for two of Eskom's sites using the BD Protocol is available online at: https://www.nbbnbdp.org/bd-protocol.html).

6. CONCLUSION

African economies are currently among the world's fastest growing (Edo et al., 2020), with transportation within development corridors strongly related to socioeconomic drivers (Seto, 2011). Although Agenda 2063 (African Union Commission, 2015) recognises that there will be environmental challenges associated with economic growth, there is little current evidence to suggest sufficient rigorous planning and management is (or will be) in place to mitigate the negative impacts of these developments (Politzer, 2008; Laurance and Arrea, 2017). Transport infrastructure in particular plays a pivotal role in economic and social development through the improved access to resources and therefore livelihood it provides (Edo et al., 2020). However, with its 65-million-kilometre footprint it dominates landscapes worldwide. There is an urgent need to address biodiversity in greening the transport sector, which up till now has focused on decarbonisation efforts. Amidst the calls for a post-pandemic 'green' recovery, our findings confirm that the South African private sector is ill-prepared to mainstream biodiversity into strategic investments and production models.

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APPENDIX

Table 1: The Survey methodology used in the BDP Ratings (NBBN, 2021)

Question		Evidence	Score
Question 1	**What is the biodiversity policy of the company?**	No information	**0**
		Clear statement that explains the company's interactions with biodiversity.	**1**
		Clear statement that explains the company's interactions with biodiversity and focuses on impact avoidance and / or minimisation.	**2**
		Clear statement that explains the company's interactions with biodiversity and focuses on no-net-loss.	**3**
		Clear statement that explains the company's interactions with biodiversity and focuses on net positive impacts.	**4**
Question 2	**What are the biodiversity dependencies and impacts of the company?**	No information	**0**
		Clear statement that explains the company's direct, material biodiversity impacts.	**1**
		Clear statement that explains the company's direct, material biodiversity dependencies and impacts.	**2**
		Clear statement that explains the company's material direct and indirect (suppliers, clients) biodiversity dependencies and impacts, including throughout its supply chains.	**3**
		Clear statement that explains the company's material direct and indirect biodiversity dependencies and impacts, over the whole life cycle of products or services.	**4**
Question 3	**Does the company measure its biodiversity dependencies and impacts?**	No information	**0**
		Quantified information on the company's direct, material biodiversity impacts.	**1**
		Quantified information on the company's direct, material biodiversity dependencies and impacts.	**2**
		Quantified information on the company's material direct and indirect biodiversity dependencies and impacts, including throughout its supply chains.	**3**
		Quantified information on the company's material direct and indirect biodiversity dependencies and impacts, over the whole life cycle of products or services.	**4**
Question 4	**Does the company value its biodiversity dependencies and impacts? What are the most material ones?**	No information	**0**
		Qualitative, quantitative and / or monetary values of direct, material biodiversity impacts.	**1**
		Qualitative, quantitative and / or monetary values of direct, material biodiversity dependencies and impacts.	**2**
		Qualitative, quantitative and / or monetary values of the company's material direct and indirect biodiversity dependencies and impacts, including throughout its supply chains.	**3**
		Qualitative, quantitative and / or monetary values of the company's material direct and indirect biodiversity dependencies and impacts, over the whole life cycle of products or services.	**4**
Question 5	**Does the company have a biodiversity strategy, biodiversity targets and associated KPIs?**	No information	**0**
		Targets and KPIs for at least one step of the impact mitigation hierarchy.	**1**
		Targets and KPIs for all steps of the impact mitigation hierarchy.	**2**
		No-net-loss targets and KPIs.	**3**
		Net positive impact targets and KPIs.	**4**
Question 6	**Does the company have a biodiversity action plan?**	No information	**0**
		Action plan covers at least one step of the impact mitigation hierarchy for direct, material biodiversity impacts.	**1**
		Action plan covers all steps of the impact mitigation hierarchy for direct, material biodiversity dependencies and impacts.	**2**
		Action plan covers all steps of the impact mitigation hierarchy for material direct and indirect biodiversity dependencies and impacts, including throughout its supply chains.	**3**
		Action plan covers all steps of the impact mitigation hierarchy for material direct and indirect biodiversity dependencies and impacts, over the whole life cycle of products or services.	**4**
Question 7	**Does the company disclose its biodiversity risks and performance?**	No information	**0**
		Disclosure of the company risks and performance related to direct, material biodiversity impacts.	**1**
		Disclosure of the company risks and performance related to direct, material biodiversity dependencies and impacts.	**2**
		Disclosure of the company risks and performance related to material direct and indirect biodiversity dependencies and impacts, including throughout its supply chains.	**3**
		Disclosure of the company risks and performance related to material direct and indirect biodiversity dependencies and impacts, over the whole life cycle of products or services.	**4**
Question 8	**Does the company have a biodiversity monitoring system in place for continuous improvement?**	No information	**0**
		Biodiversity performance monitoring system in place for direct, material biodiversity impacts.	**1**
		Biodiversity performance monitoring system in place for direct, material biodiversity dependencies and impacts.	**2**
		Biodiversity performance monitoring system in place for material direct and indirect biodiversity dependencies and impacts, including throughout its supply chains.	**3**
		Biodiversity performance monitoring system in place for material direct and indirect biodiversity dependencies and impacts, over the whole life cycle of products or services.	**4**