

The Sustainable Development Goals in Light of Global Mining Activities

A Radical Shift?

Anna Meyer

Montanuniversität Leoben

ORCID: <https://orcid.org/0009-0000-6536-1067>

Email: anna.meyer@unileoben.ac.at

Keywords

Critical Discourse Analysis

Corpus linguistics

Sustainability reporting

Mining sector

Sustainable Development Goals

Abstract

The Sustainable Development Goals (SDGs) constitute a milestone in sustainable development governance. The seventeen goals shape how humanity sees and measures sustainable development. All-encompassing as the SDGs are, they have influenced mining company reporting practices. Mining is a major industrial sector with substantial direct emissions (Scope 1 and 2), which increase with decreasing ore grades and increasing production (Norgate and Haque 2010).

The present paper investigates how mining companies have adapted their sustainability reports in response to the SDGs. The paper examines the framing of sustainability discourse through keyness (log likelihood) and dispersion analysis (DP_{norm}), relative frequency, and statistical strength of collocates (MI3). For this purpose, a 774,016 token corpus was assembled. Subsequently, the adopted corpus linguistic approach is complemented with Critical Discourse Analysis: the mining company sustainability reports over a period of eight years are investigated with reference to the timeframe before and after the ratification of the SDGs as a diachronic evolution of sustainability discourse in corporate texts.

Results do not suggest a shift in the overall volume of sustainability discourse but in its framing, notably through institutionalization and SDG alignment. Environmental concerns remain frequently subordinated to economic priorities, rendering the former physically and linguistically erased.

1. Introduction

1.1 Sustainable development

Human activities have left a definite mark on our planet and led to the transgression of several ecosystems and the disruption of ecosystem services (Matson, et al. 2016, 33). Climate change and biodiversity loss, deemed core planetary boundaries in 2015 (Steffen, et al. 2015, 1), are now among transgressing limits already at or in the high-risk zone (Richardson, et al. 2023, 1).

In 2015, the Sustainable Development Goals (SDGs) were adopted by all 193 United Nations Member States to foster sustainable progress until 2030. But how is sustainable development

in this framework defined?

Sustainable development is how we must live today if we want a better tomorrow, by meeting present needs without compromising the chances of future generations to meet their needs. The survival of our societies and our shared planet depends on a more sustainable world. (UN 2015)

The SDGs are a guiding framework that significantly shaped how sustainability is communicated. In light of present radical changes to the ecosystem, the SDGs may provide a plan towards a sustainable Anthropocene. In a never-before-seen acceleration, human actions have led to social (increase of population and GDP), ecological (increase in surface temperature and loss of biodiversity), and technological (increase in mineral extraction and telecommunication) changes (Steffen, et al. 2015). These substantial alterations demand radical transformations. A radical change demands a holistic, joint and global effort (McPhearson, et al. 2021). What would such a radical shift be considering current mining practices that still aim for a maximization of profit while ecosystem deterioration is an accepted symptom? The belief in constant economic growth seems to justify the need for weak sustainability, i.e. the exchange of one sustainability pillar for the other. Thus, subordinating nature and social needs is a practice in need of radical shifting. I hereby define ‘radical shift’ as a new orientation in underlying economic beliefs, otherwise named ‘transformation.’ Thus, an expansion of the sustainability debate to large discussions of the economic system cannot be disregarded, as such discussions are fundamental for sustainable development (Schneidewind 2019, 67) and stem directly from the origins of the “Great Transformation” (Polanyi 1944), in which Polanyi analysed the interaction of political and economic dynamics. A radical shift is therefore a conceptual reorientation of the role corporations play. Along with Stibbe, I argue that “profound changes are needed to hold back or reverse the tide of ecological destruction” (2015, 3). This paper proclaims that such changes will not suffice to alter unsustainable practices instantly. However, they are intrinsic and radical, changing development at the core, echoing Göpel (2016, 155), who calls for “radical, incremental change” by which she means multiple steps eventually evolving the current economy into a future-oriented system. Does sustainable development disguise sustained economic growth, or does it represent a genuine transition from the overproduction needed to maintain the current economy (Pineault 2023) toward a more responsible use of resources in pursuit of inclusive human well-being (Matson, et al. 2016)? By doing so, Matson et al. focus strongly on the anthropocentric view of nature being an asset to “humanity’s ‘life support system’” (2016, 52). In this paper, an ecosophy of more-than-humans is postulated, and thus the definition of sustainability is one of inclusive well-being for all species. In Pineault’s (2023) understanding, the economic production needs cannot be countered

by calls to change consumption behaviour, but rather through radical changes of production and corporate structures.

Reviewing the global impact human actions have on the Earth, resource use and mining initially stand out. Mining poses threats to the environment by consuming vast amounts of energy and resources, generating GHG emissions such as CH₄, NO_x and CO₂, and sourcing large amounts of water. Additionally, post-mining waste can be harmful to both people and the planet. Socio-economically, increasing well-being due to a rise of employment possibilities can result in trade-offs due to environmental harm and loss of overall well-being connected to industrial activities (Lo, et al. 2024). Mining operations connect to sustainability in two ways: first, they supply the needed material for the facilitation of the energy transition and second, they contribute through their own efforts to operate sustainably.

The seventeen ambitious SDGs (UN 2015), with 169 targets, have attracted praise and criticism. Spaiser et al. (2016) have assessed the incompatibility of socio-economic progress and environmental sustainability. The authors state that within a business-as-usual scenario, the 2030 Agenda risks failure, revealing that while economic growth fulfils socio-economic goals, it can also hinder environmental goals (2016, 14). Gladkova (2017) sees a vast playing field for the private sector in SDGs-as-governance since finance and indicators offer room for private pressure to focus on company interests and promote neoliberal realities dressed up as sustainable development. Additionally, and especially in the case of the linguistic focus of the present study, the evolution that the term *development* has undergone should be noted. Schultz (2001) notes how apparently neutral words can be used to connote a non-exploitation stance, whereas in reality they are employed very differently as a way to legitimise the commercial use of the environment. This is the case for *development*, which connotes something positive by erasing negative side effects. Adding *sustainable*, a collocation that has become mundane since its use in the Brundtland Report, renders *development* even more acceptable. Nevertheless, as will be shown, companies clearly interpret the phrase as “sustained development” (Schultz 2001, 110).

However critical one might be, the SDGs have contributed to the metalevel discourse on sustainability rhetoric (Munro 2023). As such, they provide a perspective on sustainability, categorising targets and dividing the broad term sustainability into seventeen goals. Since their launch, the use of the SDGs has widened in corporate sustainability reporting. It remains to be seen if the contribution to the SDGs is transformational and radical for the sector’s sustainability discourse.

1.2 A short history of sustainability reporting

The business sector has addressed environmental concerns of the public sphere by increasing transparency via sustainability reporting, which is used as a means to secure a social licence to operate (SLO). SLO refers to a societal consent towards a business' operations. This dynamic of seeking legitimacy and consent has been investigated under the term "social contract theory" (Demuijnck and Fasterling 2016, 675). Early reports on ecological topics were written by multinational corporations in the 1980s. In the 1990s, sustainability reporting increased driven by rising public interest in environmental as well as social matters. Meanwhile, in 1997 Elkington coined the term "Triple Bottom Line" (1997, 2), which proposes the three bottom lines of people, planet, and profit as performance indicators for companies.

In 2000, the United Nations Global Compact was founded to create collective business impact by supporting the Ten Principles on human rights, environment, labour and anti-corruption, and the SDGs¹. In 2000, the GRI published the first global, albeit voluntary, framework for sustainability reporting. Therefore, not legal obligations but public pressure made reporting a necessity for companies. In 2001, the European Commission defined CSR as "a concept whereby companies integrate social and environmental concerns in their business operations and in their interaction with their stakeholders on a voluntary basis" (2006), framing the European way forward. Subsequently, CSR was formalised into ISO 26000. Unlike other ISO standards, it is not certifiable; instead, it serves as guidance for organisations and businesses to define and implement CSR². In the European Union, the Non-Financial Reporting Directive (NFRD) marked a turning point from voluntary to required reporting in 2014. In 2016, the GRI transitioned from guidelines to standards, which, though voluntary, are continuously updated. This background provides a context for the present paper, which approaches CSR as a specialized discourse genre that has significantly developed to an institutionalized practice (Contrafatto 2014).

1.3 A brief outline of sustainability reporting in the mining sector

The 1990s saw a rise in environmental awareness, placing pressure on the mining sector to improve its ecological and social performance and to act with greater transparency. To demonstrate their responsibility, some companies complied to voluntary resource management standards, effectively earning a SLO (MMSD 2002, xiv).

In the 1990s, the Global Mining Initiative (GMI) conducted a project called "Mining, Minerals

¹ UN Global Compact. "The Ten Principles of the UN Global Compact." <https://unglobalcompact.org/what-is-gc/mission>. Last visited 20/05/2026.

² "ISO 26000 Social Responsibility." International Organization for Standardization (ISO). <https://www.iso.org/iso-26000-social-responsibility.html>. Last visited 20/05/2026.

and Sustainable Development” (MMSD³), to be carried out by the International Institute for Environment and Development (IIED) with the aim of formulating the sector’s sustainability definition. As a result, the Toronto Declaration was adopted, and the International Council on Mining and Metals (ICMM) was formed to continue the MMSD’s work and implement its findings, with the goal to “enhance the contribution of mining & metals to sustainable development” (ICMM n.d.). A phase of analysis and consultations resulted in the publication of *Breaking New Ground* (2002) presenting MMSD’s analysis and policy recommendations. Today, the ICMM’s Mining Principles share core convictions with the SDGs:

Each SDG connects with or can be directly influenced by ICMM’s Mining Principles. Unlike many other sectors, there is no primary point of connection between mining and a single SDG. Instead, operations have the extraordinary potential to contribute to several goals at once. (ICMM⁴)

This claim is grounded in the high importance of metals and minerals in today’s society and the impact that mining operations have on communities, ecosystems, and the economy. Whether negative or positive, the influence of mining on the SDGs is undeniable (ICMM n.d.).

In response to the ratification of the SDGs, the United Nations Development Programme (UNDP), in cooperation with the ICMM, published a white paper entitled *Mapping Mining to the Sustainable Development Goals: An Atlas* (2016). Its aim was to inspire and share best practices on how mining companies can include the SDGs in their actions and business. The Atlas asserts that mining operations are related to all SDGs, and “the mining industry has the opportunity and potential to positively contribute to all the 17 SDGs” (United Nations Development Programme 2016, 3). The Atlas provides examples of all SDGs on two tiers: firstly, on the incorporation of the goals into the core business, and secondly, on the promotion and support for achieving the SDGs through collaboration and partnerships. The Atlas is an influential work for the perception of mining companies’ sustainable contribution.

2. State of the art

This section briefly outlines the theoretical and methodological approaches relevant to this paper and its contribution. Baker et al. (2008) analysed the discursive presentation of asylum seekers and refugees using Corpus Linguistics (CL) to provide a statistically evident selection of examples for Critical Discourse Analysis (CDA). Following the corpus-driven paradigm of CL

³ “Mining, Minerals and Sustainable Development (MMSD).” International Institute for Environment and Development. <https://www.iied.org/mining-minerals-sustainable-development-mmsd>. Last visited 20/05/2026.

⁴ “ICMM – Supporting Sustainable Development through Mining and Metals.” ICMM. www.icmm.com/en-gb/our-work/sustainable-development-goals. Last visited 20/05/2026.

(Tognini-Bonelli 2001), the study follows statistical patterns and relative frequencies of thematic words. A similar angle is adopted in the present study, using keyness and collocations. Baker et al. (2008) argue for a combination of CL and CDA along the lines of mutual benefit. Partington favours the term “statistical methodological philosophy” (2013, 8), which informs corpus analysis in the search for linguistic patterns.

Corpus-assisted discourse studies (CADS) is defined by the aim of “uncovering non-obvious meaning” (Partington 2013, 11) and the ad hoc compilation of specialized corpora due to the lack of available data collections, which is true in the present case. CDA, however, is concerned with the study of underlying power structures of language use, which are determined by the language users rather than language itself, viewing language use as social practice. As such CDA bridges the gap between social analysis and text analysis by examining text materials, seeking to discuss the socially constructed and performative aspects of language use (Fairclough 2004). The approach draws from different theories and concepts to analyse text and language as a social process with the aim to uncover existing power structures in different domains (Wodak 2013; Baker, et al. 2008). Wodak defines CDA as “demystifying ideologies and power” (2013, xxi).

At the centre of ecolinguistics approaches, one can place this quote by Steffensen and Fill: “Do linguistic patterns, literally, affect the survival and well-being of the human species as well as the other species on Earth?” (2014, 9). This paper applies ecolinguistic discourse analysis (Stibbe 2015) to investigate how language frames sustainability in the context of ecological relations. The analysis focuses on salience and erasure in the interplay of economic activity and nature. To this end, the analysis aims to uncover salient, erased and potentially destructive stories being told by mining company sustainability reports.

This paper investigates a corpus of corporate sustainability reports through critical and ecological lenses. By applying quantitative methods from CADS and CL, the study identifies emerging linguistic patterns and explores how mining corporations construct and frame sustainability in their reports. In this way, the study integrates the approaches discussed above by combining quantitative corpus analysis with critical discourse perspectives. Ecolinguistics extends this analytical view by examining how discourse shapes human interactions with the more-than-human world.

Focusing on corporate texts, Jaworska’s (2020) work is influential with respect to studying the social implications and power dynamics of corporations’ contribution to sustainability discourse. She sees discourse as the key tool for executing corporate goals.

A growing body of linguistic research on sustainability discourse in corporate reporting indicates increasing academic interest in this field. As environmental concerns become more prominent in both academia and public debate, understanding the ways in which corporate

narratives influence sustainability discourse is of relevance not only to researchers, but also to the wider public. The beginning of this thought can be traced back to Howard Bowen in 1953, who coined the term “corporate social responsibility” as the concept of businesses’ social responsibility recognising the powerful impact on society. Therefore, he called for a change in their decision-making, which should include considerations of their impact (Latapí Agudelo, et al. 2019).

Focusing on the extractive sector, Livesey (2002) concludes that Shell employs the concept of sustainability in the reconciliation of sustainable development, aligning it with economic growth. Buhr and Reiter’s (2006) account of the Noranda mines uses a discourse analysis along three dimensions: moral responsibility, empirical objectivity and aesthetic judgement. Milne et al. (2009) provide a relevant contribution to the field through their analysis of the early triple bottom line reports. They state that businesses use sustainability in a pragmatic way that perpetuates dominant business discourse rather than altering it. The authors conclude that financial worth and growth remain imperative factors of discourse (Milne, et al. 2009). Onn and Woodley (2014) conducted a discourse analysis of ICMM members’ sustainability reports and the journal *Resources Policy*. Their findings suggest that sustainability in the business context is constructed as compatible with traditional profitability (2014). The authors of the paper admit that sustainability is no longer seen as mining incessantly or profitability. Nevertheless, there still seems to be no discussion on the contribution of mining companies to the sustainability agenda (Onn and Woodley 2014, 125). Poole’s work (2016) is notable as the analysis uses EDA to cluster grammatical and semantic fields in the discourse of corporate and activist side to reflect beliefs and perceptions of the environment. The current paper follows a similar line of thought, regarding sustainability reports in a critical light and analysing collocations of the semantic field of sustainability.

Additionally, Tost et al. (2018) investigated how the mining sector frames environmental sustainability and compared the results across sectors via keyword analysis. They argue that the SDGs themselves are a hybrid of weak and strong (overall weak but strong, especially in climate change and biodiversity). The authors further conclude that the mining companies examined, including those analysed in the present study, express support for the SDGs in line with current societal expectations; however, the concrete measures through which these goals are to be achieved remain unclear. They suggest a stronger commitment to climate action and the use of natural resources by considering the consequences of strong sustainability in business models (Tost, et al. 2018). The distinction between weak and strong sustainability is relevant for the following study. Weak sustainability postulates that natural capital can be substituted by other forms of capital such as economic or social capital. In contrast, strong sustainability rejects this notion and considers natural capital to be irreplaceable (Neumayer, 2013). This

distinction is especially useful in the context of assessing the framing of nature in the sustainability reports of mining companies. Finally, Niceforo (2025) has contributed to the field by her analysis of sustainability language in different genres including corporate texts. However, there is a lack of studies investigating diachronically how the SDGs have reshaped sustainability discourse in the mining sector using corpus-assisted ecolinguistic discourse analysis.

3. Presenting Rio Tinto, Glencore and Vale

The sustainability reports of the companies Rio Tinto, Glencore and Vale were chosen to form a corpus (RGV corpus) because they represent the largest global mining companies based on revenue in the defined cut-off year 2021. Economic success was chosen as a selection criterion because it is achieved through the Earth's exploitation and it may perpetuate narratives of destruction for the cause of wealth creation. Against this feedback loop of resource sourcing and narrative spinning, corporations have generated an immense capital surpassing financial resource of states: Already in 2018, a revenue-based list showed that 157 of the top 200 economic entities are not countries but corporations (Global Justice Now 2018). In the context of current climate challenges, with many states pursuing climate neutrality, such imbalanced power relations pose an additional threat.

All three companies have been reporting on sustainability matters in the chosen years. All companies have incorporated the SDGs into their reporting. However, the SDGs are neither legally binding nor devised for companies. As a result, the wide use of the global goals in companies is noteworthy and leads to the present research question of their framing. These companies can be seen as representatives of the mining industry, which is aligning its operations to responsible sourcing: All are members of the ICMM and commit to its principles of sustainable performance. The companies do not exclusively mine coal and have plans to divest from coal assets (Kinch 2021; MarketLine 2021).

4. Data selection for the RGV corpus

In the years analysed, all companies adhered to GRI and produced sustainability-themed reports. Rio Tinto changed its reporting policy in 2019 and ceased publishing an exclusive sustainability report, but issues an annual, strategic, and specific climate report. To achieve comparability in the corpus for all companies, Rio Tinto data for 2019 and 2020 was obtained from the strategic report, covering similar topics as sustainability reports. It was considered that strategic and sustainability reports may differ in genre and audience, but both feature sustainability issues. Data was collected by downloading the reports from the company websites

and subsequently preparing them by deleting pictures and graphics to limit noise and ease the text analysis in LancsBox v. 6.x (Brezina, et al. 2021).

This paper further focuses on a comparison of sustainability language differences between two sub-corpora representing pre-2015 and post-2015 discourses. Therefore, the RGV corpus was split in the subcorpora RGVb (2013, 2014, 2015) and RGVa (2016, 2019, 2020), each comprising three reporting years. The SDGs were ratified only in September 2015 at the United Nations 70th General Assembly (Fukuda-Parr and McNeill 2019, 9). In this context, the SDGs cannot have influenced the reporting year 2015 as it was already under way as the UN Framework became official on 1 January 2016 (UN.org 2026). The 2015 reports on the year 2015 could not include adaptation to the SDGs yet. The years 2017 and 2018 were deliberately excluded to create two contrasting corpora of equal size and to achieve a long-term perspective, leaving time for the companies to adapt to the SDGs. The resulting corpus RGV consists of 740,711 tokens. The two subcorpora, RGVb (before) and RGVa (after) the launch of the SDGs, are comparable in size: RGVb: 346,528 tokens and RGVa: 394,183 tokens.

5. Methodology

This study adopts a CADS approach and aims to critically assess the development and framing of sustainability discourse by quantitatively examining a sustainability corpus and qualitatively analysing concordance lines identified through corpus linguistic methods. CL methods include keyness and dispersion analysis, relative frequency, and statistical strength of collocates, which were used to identify recurring linguistic patterns and discursive frames. CADS combine CL and CDA in order to identify recurring linguistic patterns and critically analyse their ideological significance. The analysis further draws on ecolinguistics as a means of making sense of ‘the stories we live by’ from a critical environmental perspective. Concepts such as salience and erasure (Stibbe 2015) were applied to identify foregrounded, backgrounded or omitted sustainability aspects. The use of an ecolinguistic lens points to the more-than-human world and investigates where destructive stories perpetuate ecological damage. Adopting this methodology, the paper hopes to contribute to the understanding of sustainability discourse, highlighting how “communication (verbal and non-verbal) gives shape, texture, potential and relevance to events, participants, features and relations; and it can also background, obfuscate or erase situations, actors, connections and causality relations” (Bortoluzzi and Zurru 2024, 2).

The analysis focused on institutional framing of sustainability, responsibility and the dynamic between economic and environmental sustainability. Following Stibbe’s comment on the relevant link between ecolinguistics and critical discourse analysis, this paper is concerned with “discourses which have an impact on how humans treat each other, other organisms and

the physical environment” (2014, 4) as it observes the sustainability reporting of large multinational corporations. These global economic actors possess extensive financial capital, which grants them power not only economically, but also through their discursive influence and hegemonic construction of meaning.

The SDGs were used as a focal lens to investigate how sustainability is framed in the discourse because the SDG icons provide companies with public representability (Barta, et al. 2023). The fact that public pressure is a driver in sustainability accounting, especially so for mining companies, gave rise to these research questions:

- How did the publication and ratification of the UN’s SDGs influence the language of sustainability reporting in the corpus?
- What lexemes are used to convey sustainability terms and the SDGs in the RGV?
- How do these differ between the two sub-corpora representing pre-2015 and post-2015 discourses?

5.1 Frequency, keyness and dispersion

Firstly, to address the use of sustainability-related terms before and after the SDGs, the RGV corpus, as well as its subcorpora were compared to samples of the Corpus of Contemporary American English (here named COCAS) and each other, to generate keywords. COCAS is compiled from the Corpus of Contemporary American English (COCA). COCAS was used because it enabled a comparison between general English and the specific business language of the sustainability reports. In the comparison, resulting keywords are specific to the corpus of mining companies and to COCAS and can provide essential topics. Lastly, the RGVb and RGVa were compared to identify differences between the time frames. To investigate the framing of sustainability pre- and post-SDG corpora, the relative frequencies of sustainability-related terms were measured. As even normalised frequencies are skewed when comparing distinctly sized corpora, keyness and dispersion were added to augment the analysis and subcorpora comparison.

5.2 Collocation analysis

The corpus was searched for *sustainability* and *sustainable* to find noun, verb, and adjective collocations pre- and post-SDG corpora. Collocation analysis pointed to changes in semantic associations. For these analyses, the MI3-score was chosen to assess the strength of association, because it is less sensitive to low-frequency bias than MI, which highlights rare words. In addition, a T-test was performed to assess the stability of the association and reduce the influence of low-frequency collocations. In the literature, a T-score of two or more is often used as a heuristic indication of significance and serves as a guideline in the present paper. The

combined use of measures allowed a balanced comparison and identification of statistically robust and linguistically meaningful collocations in the subcorpora RGVb and RGVa. Both measures are not strictly inferential, and as such, no fixed significance threshold was applied. Values were instead interpreted comparatively.

6. Results

6.1 Keyword analysis

The keyword analysis showcased the aboutness of the corpora, assessing the most relevant words. The following lists of keywords reveal the core topics of the corpus RGV compared to COCAS (see Tab. 1).

Number	RGV corpus keywords	COCAS keywords
1	.	@
2	<i>vale</i>	<i>you</i>
3	<i>management</i>	<i>he</i>
4	<i>operations</i>	<i>she</i>
5	<i>mining</i>	<i>my</i>
6	<i>emissions</i>	<i>his</i>
7	<i>rio</i>	#
8	<i>communities</i>	<i>her</i>
9	<i>sustainability</i>	<i>it's</i>
10	<i>2019</i>	<i>me</i>

Tab. 1: Keyword analysis of the RGV corpus compared to COCAS

It can be observed that RGV reflects ESG and business topics, whereas COCAS shows general English. The keywords of RGV describe themes on management of organisations (*management*, *operations*, *communities*), environmental assessment (*emissions*), and *sustainability*, which all refer to the genre of sustainability reports. The words *vale* and *rio* are part of company names. The next table (Tab. 2) illustrates a comparison between the sustainability reports of the years before (RGVb) and after (RGVa) the launch of the SDGs with COCAS, respectively.

Number	RGVb keywords	COCAS keywords	RGVa keywords	COCAS keywords
1	.	@	.	@
2	operations	he	vale	you
3	Vale	your	2019	he
4	Rio	my	2020	she
5	mining	she	management	her
6	management	i	operations	his
7	emissions	#	emissions	#
8	communities	his	mining	my
9	2014	he	sustainability	it's
10	Tinto	it's	safety	me

Tab. 2: RGV corpus was split in RGVb (before) and RGVa (after) and each part was in turn compared to COCAS

The word *emissions* is featured in both lists, as well as *mining* and *operations*. *Sustainability* appears in RGVa's keywords, as well as *safety*. A last keyword analysis (Tab. 3) compared the two subcorpora, RGVb and RGVa, to each other.

Number	RGVb keywords	RGVa keywords
1	2013	2019
2	2014	2020
3	r	2018
4	xstrata	covid-19
5	2015	2021
6	2012	sdg
7	cent	underlying
8	t	brumadinho
9	railway	esg
10	waste	2016

Tab. 3: Comparison of the two subcorpora RGVb (before) and RGVa (after) to each other

Naturally, the years appear in the respective corpora of the year of report publication. The keywords identified include the expected keywords *SDG* and *ESG*, but also *underlying*, *covid-19*, *brumadinho*. The latter two refer to detrimental events: the COVID-19 pandemic and the Brumadinho dam break at the company Vale, which resulted in more than a hundred deaths and devastating environmental hazards in Brazil (Silva Rotta, et al. 2020, 11).

6.2 Frequency of terms and themes

Relative normalised frequencies (per 10.000 words) of the search terms *sustain**, *sustainability*, *sustainable*, *sustainable development*, *SDG*, *sustain* + SDG* were investigated to detect possible changes in pre- and post-SDG corpora.

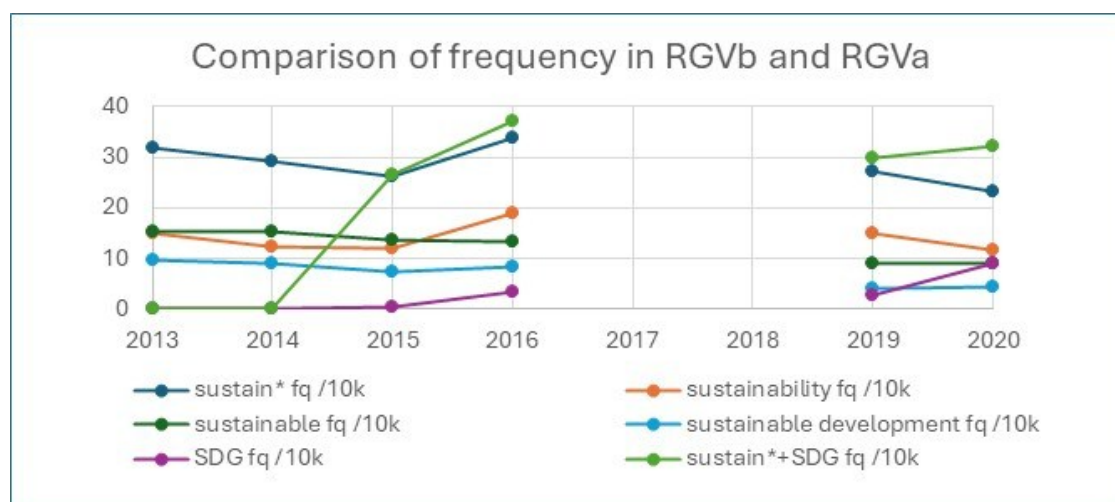


Fig. 1: Graph showing the normalised frequency of the words/lemma *sustain**, *sustainability*, *sustainable*, *sustainable development* and the aggregated abstract analytical category *sustain*+SDG*. The years 2017 and 2018 were deliberately not included to allow the SDG framework to have an impact

Fig. 1 shows the relative normalised frequencies for all search words decline slightly until 2015, followed by a minor increase in 2016. Subsequently, most terms gradually decline, but not strongly, as a relatively stable use in 2019 and 2020 suggests. This pattern does not indicate a disappearing sustainability discourse but rather fluctuations of emphasis over time. The green line shows the combined relative frequency of *sustain** + *SDG* and was used as inclusive indicator of sustainability discourse in order to detect a general trend. Here the values after 2016 vary from the slightly declining terms (*sustain**, *sustainability*, *sustainable*, *sustainable development*) but do not provide strong evidence for a continued increase or decline in sustainability discourse. Note that differences in text length can influence frequency counts, even if normalised. To address this shortcoming, the analysis was complemented by a keyness analysis (based on log-likelihood) and dispersion measure (using DP_{norm}) to compare pre- and post-SDG corpora⁵. Tab. 4 shows *sustainability* has moderate keyness (LL=5,28, $p<0,05$), suggesting a stable use of the term. Keyness for the terms *sustainable*, *sustainable development*, and *SDG* is high, indicating a strong prominence of sustainability discourse linked to the framework terms in RGVa (post-SDG). The united category *sustain** was used to gather the wider sustainability discourse, which reported no significant keyness (LL=1,06, $p>0,05$), showing no meaningful difference in pre- and post-SDG corpora. However, the combination of *sustain**+*SDG* showed a significant increase in the post SDG corpus (LL=8,39, $p<0,01$) indicating that while the overall use of sustainably language is stable, the explicit combination with the SDG framework-related language shows statistically significant elevation.

Search terms	Keyness (LL)	Dispersion RGVb (DP_{norm})	Dispersion RGVa (DP_{norm})
<i>sustain*</i>	1,06	0,0003	0,0004
<i>Sustainability</i>	5,28	0,2676	0,1399
<i>Sustainable</i>	29,73	0,2016	0,1502
<i>sustainable development</i>	24,82	0,2757	0,2316
<i>SDG</i>	228,10	0,9799	0,3759
<i>sustain*</i> + <i>SDG</i>	8,39	/	/

Tab. 4: Keyness and dispersion for selected search terms

⁵ Apart from *sustain** and *sustain**+*SDG* keyness was computed automatically using LancsBox comparing RGVa as target and RGVb as reference corpus. The lexical bundle *sustainable development* was automatically analysed using the N-grams function. Since LL is not additive, expected frequencies and LL calculation for *sustain** and *sustain**+*SDG* were done manually after aggregating frequencies. The latter case, *sustain**+*SDG*, marks an abstraction as distinct lexical items are aggregated to identify a discourse trend. Dispersion for *sustain** was calculated manually, the other search terms values were generated in LancsBox. The aggregated category *sustain**+*SDG* was not computed but rather interpreted via the dispersion values of its components.

Furthermore, Table 4. includes DP_{norm} values for the chosen search terms. *Sustainable*, *sustainable development* and *sustainability* are evenly distributed in the whole corpus (DP_{norm} is low for all terms $\sim 0,15-0,29$). *Sustain** has even lower values and is also evenly distributed. Sustainability discourse is approximately evenly spread across all reports. Contrastingly, *SDG* is unevenly distributed in RGVb ($DP_{norm}=0,9799$) but is much more distributed as dispersion increases over time in RGVa. This indicates a spread of *SDG* usage.

6.3 Collocations

The following results were generated to answer the research question of how sustainability reports frame sustainability terms and the SDGs. Therefore, in RGVb and RGVa noun, verb, and adjective collocations (± 5 -word range) of the search terms *sustainability* and *sustainable* were identified. The ten most frequent collocations, sorted by frequency, were analysed, and comparisons between RGVb and RGVa were made via a lemma-based search. For this reason, the corpus was PoS-tagged.

6.3.1 Collocations of sustainability

The most frequent collocation in the subcorpora is *report*, with equal statistical significance in both subcorpora, indicating the nature of corporate sustainability reports. The target word *sustainability* is more frequent in RGVa. The collocation of the target word with itself (*sustainability* MI3: 17,432 vs. 14,523, T-test: 7,227 vs. 4,779) suggests a dense discourse. Overall, higher MI3 and T-test values of collocations suggest that associations become stronger. *Approach*, *committee*, and *strategy* are stronger collocates in RGVa and with the addition of *policy*, *operational*, and *lead* as emerging collocates, a semantic field of governance can be defined, revealing institutionalisation of sustainability discourse. Furthermore, an extensive list of new adjective collocations (*operational*, *global*, *annual*, *lead*, *selected*, *social*, and *economic*) points towards a diversification of the semantic field framing sustainability. A second semantic field focuses on action with stable verb collocations in terms of frequency and MI3 values for *include*, *promote*, and new collocations post-SDG, such as *oversee*, *provide*, and *contain*. This hints at a linguistic change towards implementing sustainability. Lastly, a category of responsibility and future-orientedness can be detected in the collocates of *sustainability* (*long-term*, *responsible*) in RGVa.

Collocations with *approach* can be traced back to the phrase “our approach to sustainability” in reports of Rio Tinto and Glencore, which frequently refers to another published document by the companies. A notable quote however, mentions:

- (1) Transition to a low-carbon future: Climate change constitutes an important part of our sustainability approach. Climate change risks have formed part of our strategic thinking and investment decisions for over two decades. The transition to a low-carbon future presents both challenges and opportunities for our portfolio over the short to long term. Key areas of uncertainty include future climate change regulation and policies, the development of low-carbon technology solutions and the pace of transition across our value chains, in particular the decarbonisation pathways across the steel sector. (Rio Tinto 2021)

Apparent is the focus on climate change. In terms of salience, climate change adaptation measures are highlighted which all refer to business, investment and the continuation of operations. The risks of climate change to humans and more-than-humans are not mentioned. However, an interesting collocation is *long-term*:

- (2) The Board of Directors is confident in Vale's economic and financial capacity, and in the long-term sustainability of Vale, based on its already demonstrated competitiveness and resilience to the price cycle of its products. (Vale 2020)

The salience of profit and competitiveness is sharply enhanced by the erasure of the natural world. In this understanding, sustainability is based on economic success for years to come. The economic framing of resilience, the capacity of a natural system to recover after disturbances, becomes visible when the concept is applied to business stability. Through the use of seemingly neutral terminology such as *resilience*, the commercial exploitation of the environment is discursively legitimised and potentially harmful practices are framed positively (Schultz 2001). The example frames sustainability primarily economically, while environmental and social dimensions remain backgrounded.

6.3.2 Collocations of *sustainable*

The most frequent noun in both subcorpora is *development* (RGVb MI3: 24,677, T-test: 18,413 vs. RGVa MI3: 23,846, T-test: 15,527), suggesting a stable collocation not affected by the SDG launch. Similarly to section 6.3.1., *sustainable* shows semantic fields such as action (*achieve*, *build*, with new collocations *include* and *align*) and SDG alignment (new collocates are *SDG*, *SDGs*, *align*). A look at concordance lines indicates that reports in RGVa are aligned to the Sustainable Development Goals in some cases, such as in the concordance line "The initiative [Mulheres do Maranhão (Maranhão Women Network)] is aligned with the UN Sustainable

Development Goals (SDGs)” (Vale 2016), but referred to other sustainable actions without SDG alignment.

The category of future responsibility could also be found in collocations of *sustainable* (*safety, safe, responsible, future*). It is interesting that *safe* ranks low in RGVb, but it is the most frequent word in RGVa. An explanation could be the aforementioned Brumadinho disaster, which seems to have shifted the discourse towards safety. This argument is also supported by the keyword search comparing RGVa to COCAS: *sustainability* and *safety* appear in RGVa’s keywords. Words that no longer collocate in RGVa are *economic, long-term, global, local, and competitive*. The words *council, business, growth, and world* become much less frequent. Taken together, these changes might suggest a move away from focusing on purely economic gains towards a responsibility for the future. To conclude, the comparison of RGVb and RGVa in terms of collocations for *sustainability* and *sustainable* shows a shift towards an institutionalised as well as responsibility-oriented sustainability discourse. However, by contrasting this with the findings of concordance lines, it becomes apparent that responsibility is predominantly framed in two ways: responsible water use and responsible operations justified by supplying minerals and metals to the low-carbon transition.

- (3) In late 2020, we launched a long-term promotional campaign that provides information about our business, addresses potential concerns about the way we operate, and raises awareness of the importance of our products to enable the transition to a low-carbon economy in a sustainable and responsible way. (Glencore 2020)

This quotation refers to the salience of mined products, which are enablers of a low-carbon economy. The example shows strategic scope ambiguity as it leaves open whether *sustainable* and *responsible* apply to the low-carbon transition, the products or mining operations, or both. Again, the natural environment is absent from the extract. In the next example, the environment is assessed:

- (4) Our assets undertake detailed assessments of their local environmental conditions during the operational changes in their life cycle, to develop water management strategies that maximize the efficient and sustainable use of this important natural resource. (Glencore 2020)

Here, salience is finally given to water, a part of nature. Note that it is framed as a resource, which is important and valuable in its function for the company, not for other reasons. To summarize this section, changes in discursive patterns, such as those seen in the emerging

identified discursive frames, show how mining companies construct sustainability post-SDG in three ways:

FRAME	EXAMPLE	INTERPRETATION
Governance	<i>policy, operational, lead</i>	Sustainability is institutionalised and receives attention and is supported via committees, and strategic positioning.
SDG alignment/Action	<i>achieve, build, include, align, promote, oversee, provide, contain</i>	Action to be in line with the global and esteemed SDG framework creates trust and good reputation.
Responsibility/Risk/Safety	<i>safety, long-term, responsible</i>	The prevention of risk is foregrounded, which is viewed as part of sustainability as is responsible water use. The focus of this frame on human risks is erasing the impact on the ecosystem.

Tab. 5: Summary of the most salient changes in discursive frames: Governance, SDG alignment/Action and Responsibility/Risk/Safety

7. Conclusion

This paper investigated the impact of the Sustainable Development Goals on sustainability reporting in the mining sector, which has a considerable impact on the planet's ecosystems through its operations and ideology. By favouring stories of sustainability that align with production and economic growth in their sustainability report, the companies exercise hegemonic power. These stories become stories we live by. This paper set out to point to discursive patterns which limit an ecologically holistic sustainability that respects the more-than-human world.

The need for sustainable actions is apparent, and the mining industry has reflected this fact in its contribution to sustainability in notable publications such as *Breaking New Ground* (MMSD 2002) and *Mapping Mining to the Sustainable Development Goals: An Atlas* (UNDP 2016). An attempt to align operations to the need for sustainable development has been made. It needs to be noted that the corpus does not extend past the year 2020 and thus represents short-term effects.

Normalised frequency data suggest a fluctuation of sustainability discourse over time. Keyword analysis aimed to uncover sustainability-related topics in the corpus. Its results characterise RGV as a business corpus focused on environmental impact management in mining. The diachronic analysis of the subcorpora pre- and post-SDG shows that an environmental perspective is present in both corpora. Supporting the former argument, keyness analysis of the search terms revealed a moderate keyness of sustainability, indicating a robust use over time. Dispersion aligns with this result, as generic sustainability discourse is approximately evenly spread in all reports. Results suggest that the overall use of sustainable language is steady and the explicit combination with the SDG framework-related language indicates a statistically significant rise post-SDG. This means that sustainability discourse is

increasingly expressed in relation to the SDGs. Collocation analysis fine-grained these results. Collocations of *sustainability* and *sustainable* in the subcorpora pre- and post-SDGs indicate a shift towards an institutionalised and responsibility-oriented sustainability discourse that aligns with the SDG framework in some cases. However, the detected ambiguity might lead to greenwashing as to what is meant by *sustainable* and *responsible*. Additionally, the analysis aligns with Niceforo that the specialised meaning of *resilient* is “diluted” (2025, 56) in its use in different contexts. Along with Niceforo (2025), it can be argued that language is not used neutrally, but shapes when moving from expert or academic settings to a corporate context, and as such, it can support or undermine ecological thinking.

Lastly, the impact of the SDGs is visible in the corpus. However, this discursive shift does not imply that company interests have shifted from a business-as-usual scenario, reaffirming Onn and Woodley’s statement of sustainability to “co-exist with traditional profitability” (2014, 125). An expected move away from focusing on purely economic gains towards responsibility for the future could not be found. On the contrary, the analysis of salience and erasure showed that nature is consistently absent in the concordance examples.

A future investigation should aim at a comparison between the development of sustainable actions and the results of this paper. The diachronic development of corporate emissions could demonstrate if company commitment is executed.

Mapping Mining to the Sustainable Development Goals: An Atlas (Columbia Center on Sustainable Investment, 2016) claimed that the mining sector can substantially contribute to all goals. This positive and promising statement seems, considering the results gathered, to describe a development that is not yet achieved. Thus, the change experienced is not radical. The SDGs open sustainability discourse to seventeen goals in which the environment is prominently featured. A similar salience of nature in the reports is absent. Therefore, the results suggest that the analysed mining corporations adopt weak sustainability, substituting the environment with economic development. Finally, the SDGs have been successful in reframing the language of sustainability, but companies have not reframed their sustainability contributions to tell a nature-encompassing story we can live by.

Bionote

Anna Meyer is a researcher and project manager at the Resources Innovation Center Leoben at Montanuniversität Leoben and a PhD candidate at Graz University. Her research focuses on critical discourse analysis, corpus linguistics, ecolinguistics, climate communication and sustainability reporting. Furthermore, she is the sustainability manager at Montanuniversität

Leoben and her work includes CO₂ accounting, reporting and actions for sustainable development at the university.

Works cited

- Baker, Paul, et al. "A Useful Methodological Synergy? Combining Critical Discourse Analysis and Corpus Linguistics to Examine Discourses of Refugees and Asylum Seekers in the UK Press." *Discourse and Society* 19.3 (2008): 273-306.
- Barta, Sergio, et al. "How Implementing the UN Sustainable Development Goals Affects Customers' Perceptions and Loyalty." *Journal of Environmental Management* 331 (2023): 1-5.
- Bortoluzzi, Maria and Elisabetta Zurru. "Introduction: Ecological Communication for Raising Awareness and Ecoliteracy for Taking Action." *Ecological Communication and Ecoliteracy*. London: Bloomsbury Academic, 2024. 1-21.
- Brezina, Vaclav, Pierre Weill-Tessier and Tony McEnery. #LancsBox v. 6.x. *Software*. 2021.
- Buhr, Nola and Reiter Sara. "Ideology, the Environment and One World View: A Discourse Analysis of Noranda's Environmental and Sustainable Development Reports." *Advances in Environmental Accounting and Management* 3 (2006): 1-48.
- Columbia Center on Sustainable Investment, Sustainable Development Solutions Network, United Nations Development Programme & World Economic Forum, *Mapping Mining to the Sustainable Development Goals: An Atlas*. 2016.
https://scholarship.law.columbia.edu/sustainable_investment_staffpubs/87. Last visited 17/08/2026.
- Contrafatto, Massimo. "The Institutionalization of Social and Environmental Reporting: An Italian Narrative." *Accounting, Organizations and Society* 39.6 (2014): 414-432.
- Davies, Mark. *The Corpus of Contemporary American English (COCA sample)*. 2008.
<https://www.corpusdata.org/formats.asp>. Last visited 17/08/2026.
- Demuijnck, Geert and Björn Fasterling. "The Social License to Operate." *Journal of Business Ethics* 136.4 (2016): 675-685.
- Elkington, John. *Cannibals with Forks: The Triple Bottom Line of 21st Century Business*. Capstone: Oxford, 1997.
- European Commission Communication. "Implementing the Partnership for Growth and Jobs: Making Europe a Pole of Excellence on Corporate Social Responsibility." *Commission of European Communities* 22 March 2006. <https://eur-lex.europa.eu/legal-content/EN/TXT/HTML/?uri=CELEX%3A52006DC0136>. Last visited 20/05/2026.

- Fairclough, Norman. *Analysing Discourse Textual Analysis for Social Research*. London: Routledge, 2004.
- Fukuda-Parr, Sakiko and Desmond McNeill. "Knowledge and Politics in Setting and Measuring the SDGs: Introduction to Special Issue." *Global Policy* 10.51 (2019): 5-15.
- Gladkova, Katerina. "Two Years into the SDGs – Neoliberalised Development?" *Medium* 25 September 2017. <https://medium.com/@TNInstitute/two-years-into-the-sdgs-neoliberalised-development-bb35c2b5df1b>. Last visited 20/05/2026.
- Glencore. *Sustainability Report*. 2020. <https://www.glencore.com/media-and-insights/insights/2020-sustainability-report>. Last visited 17/08/2026.
- Global Justice Now. "69 of the Richest 100 Entities on the Planet are Corporations, not Governments, Figures Show." *Global Justice Now* 17 October 2018. <https://www.globaljustice.org.uk/news/69-richest-100-entities-planet-are-corporations-not-governments-figures-show/>. Last visited 20/05/2026.
- Göpel, Maja. *The Great Mindshift: How a New Economic Paradigm and Sustainability Transformations Go Hand in Hand*. Berlin: Springer, 2016.
- Jaworska, Sylvia. "Corporate Discourse." *The Cambridge Handbook of Discourse Studies*. Edited by Anna De Fina and Alexandra Georgakopoulou. Cambridge: Cambridge University Press. 2020. 666-686.
- Kinch, Diana. "Vale to Exit Coal Business, Buys Mitsui's Moatize Stake in Restructuring" *S&P Global Commodity Insights* 21 January 2021. www.spglobal.com/commodityinsights/en/market-insights/latest-news/coal/012121-vale-to-exit-coal-business-buys-mitsuis-moatize-stake-in-restructuring. Last visited 20/05/2026.
- Latapí Agudelo, et al. "A Literature Review of the History and Evolution of Corporate Social Responsibility." *International Journal of Corporate Social Responsibility* 4.1 (2019): 1-23.
- Livesey, Sharon M. "The Discourse of the Middle Ground: Citizen Shell Commits to Sustainable Development." *Management Communication Quarterly* 15.2 (2002): 313-349.
- Lo Michaela, Courtney Morgans and Santika Truly. "Nickel Mining Reduced Forest Cover in Indonesia but Had Mixed Outcomes for Well-being." *One Earth* 7 (2024): 2019-2033.
- Matson Pamela, William C. Clark and Krister Andersson. *Pursuing Sustainability: A Guide to the Science and Practice*. Princeton: University Press 2016.
- McPhearson Timon, et al. "Radical Changes are Needed for Transformations to a Good Anthropocene." *npj Urban Sustain* 1.5 (2021): 1-13.
- MarketLine. "Glencore Makes the most of Coal Mining's Final Days as Competitors Retreat." *Mining Technology* 30 June 2021. <https://www.mining-technology.com/marketdata/glencore-coal-mining/>. Last visited 20/05/2026.

- Milne, Markus, Helen Tregidga and Sara Walton. "Words not Actions! The Ideological Role of Sustainable Development Reporting." *Accounting, Auditing & Accountability Journal* 22.8 (2009): 1211-1257.
- MMSD. "Breaking New Ground. Mining, Minerals and Sustainable Development (MMSD) Final Report." *International Institute for Environment and Development*. London: Earthscan. 2002.
- Munro, Lauchlan T. "Are the SDGs a Hegemonic Global Policy Agenda?" *Revue internationale des études du développement* 253 (2023): 33-61.
- Neumayer, Eric. *Weak Versus Strong Sustainability: Exploring the Limits of Two Opposing Paradigms*. Cheltenham: Edward Elgar Publishing Limited, 2013.
- Niceforo, Marina. *The Language(s) of Sustainability: A Corpus-Assisted Critical Discourse Study between ESP and Popularisation*. Napoli: Paolo Loffredo Editore, 2025.
- Norgate, Terry and Nawshad Haque. "Energy and Greenhouse Gas Impacts of Mining and Mineral Processing Operations." *Journal of Cleaner Production* 18.3 (2010): 266-274.
- Onn, A. Han and Alan Woodley. "A Discourse Analysis on How the Sustainability Agenda is Defined within the Mining Industry." *Journal of Cleaner Production* 84.1 (2014): 116-127.
- "Our Vision and Mission." *Global Reporting Initiative*. www.globalreporting.org/about-gri/who-we-are/. Last visited 20/05/2026.
- Partington, Alan, Alison Duguid and Charlotte Taylor. *Patterns and Meanings in Discourse: Theory and Practice in Corpus-Assisted Discourse Studies (CADS)*. Amsterdam: John Benjamins, 2013.
- Pineault, Éric. *A Social Ecology of Capital*. London: Pluto Press, 2023.
- Polanyi, Karl. *The Great Transformation*. Boston: Beacon Press, 1944.
- Poole, Robert. "A Corpus-aided Ecological Discourse Analysis of the Rosemont Copper Mine Debate of Arizona, USA." *Discourse and Communication* 10.6 (2016): 576-595.
- "Principle 09: Social Performance." *ICMM*. www.icmm.com/en-gb/our-principles/mining-principles/principle-9. Last visited 20/05/2026.
- Richardson, Katherine, et al. "Earth Beyond Six of Nine Planetary Boundaries." *Science Advances* 9.27 (2023): 1-16.
- Rio Tinto. *Strategic Report 2020*. Park Communications, 2021. <https://www.riotinto.com/-/media/content/documents/invest/reports/annual-reports/2020/rt-annual-report-strategic-2020.pdf?rev=9dfde6be489c4d0ebd523c16e4b6cd5b>. Last visited 17/08/2026.
- Schneidewind, Uwe. *Die Große Transformation. Eine Einführung in die Kunst gesellschaftlichen Wandels*. Frankfurt am Main: Fischer, 2019.
- Schultz, Beth. "Language and the Natural Environment." *The Ecolinguistics Reader* (2001): 109-142.

- Silva Rotta, Luiz Henrique, et al. "The 2019 Brumadinho Tailings Dam Collapse: Possible Cause and Impacts of the Worst Human and Environmental Disaster in Brazil." *International Journal of Applied Earth Observation and Geoinformation* 90 (2020): 1-12.
- Spaiser, Viktoria, et al. "The Sustainable Development Oxymoron: Quantifying and Modelling the Incompatibility of Sustainable Development Goals." *International Journal of Sustainable Development & World Ecology* 24.6 (2016): 1-14.
- Steffen, Will, et al. "Planetary Boundaries: Guiding Human Development on a Changing Planet." *Science* 347.6223 (2015): 1-10.
- Steffensen, Sune Vork and Alwin Fill. "Ecolinguistics: the State of the Art and Future Horizons." *Language Sciences* 41.6 (2014): 6-25.
- Stibbe, Arran. "An Ecolinguistic Approach to Critical Discourse Studies." *Critical Discourse Studies* 11.1 (2014): 117-128.
- . *Ecolinguistics: Language, Ecology and the Stories We Live By*. London: Routledge, 2015.
- Tognini-Bonelli, Elena. *Corpus Linguistics at Work*. Amsterdam: Benjamins, 2001.
- Tost, Michael, et al. "The State of Environmental Sustainability Considerations in Mining." *Journal of Cleaner Production* 182 (2018): 969-977.
- UN General Assembly, "Transforming Our World: the 2030 Agenda for Sustainable Development." *A/RES/70/1* (2015): 1-35.
- United Nations, "The 17 Goals." 2015. <https://sdgs.un.org/goals>. Last visited 17/08/2026.
- UN Sustainable Development Goals. "Fast Facts – What is Sustainable Development?" <https://www.un.org/sustainabledevelopment/blog/2023/08/what-is-sustainable-development/>. Last visited 20/05/2026.
- UN. "The Sustainable Development Agenda." <https://www.un.org/sustainabledevelopment/development-agenda-retired/>. Last visited 20/05/2026.
- Vale. *Sustainability Report 2016*. https://www.responsibilityreports.com/HostedData/ResponsibilityReportArchive/v/NYSE_VALE_2016.pdf. Last visited 10/09/2026.
- Vale. *Integrated Report*. 2020. https://vale.com/documents/d/guest/vale_integrated_report_2020. Last visited 17/08/2026.
- Wodak, Ruth. "Editor's Introduction: Critical Discourse Analysis – Challenges and Perspectives." *Critical Discourse Analysis* 1 (2013): xix-xliii.