

Article

Assessing Biodiversity and Threatened Species Disclosure among Top Saudi Companies

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Abstract: This paper aims to investigate how much information is disclosed by leading Saudi companies regarding their practices related to biodiversity and conservation of species, as well as identify the individual reporting items that demonstrate the highest and lowest levels of disclosure across Saudi companies. The study's sample comprised the 14 leading companies, which together represented 88% of the Saudi stock market's overall value. The annual reports and sustainability reports for 2021, 2022, and 2023, as well as the company websites, were the content analyzed to identify any mentions or discussions related to biodiversity and the conservation of endangered species. The study found that while a small percentage (7.1%) of Saudi companies exhibited high levels of biodiversity disclosure, over half (57.2%) fell into the low disclosure category. Though a sizable portion (21.4%) showed moderate disclosure efforts, a concerning 14.3% exhibited no disclosure at all. Regarding the individual items, the items of biodiversity that were not disclosed were 52.8%, demonstrating the absence of accounting disclosure for most areas of biodiversity. While 23.5% is a poor disclosure, 19.6% is a medium disclosure, and 4.1% is a strong disclosure.

Keywords: biodiversity reporting; threatened species; content analysis; Saudi Arabia



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1. Introduction

The significant loss of biodiversity in nature is now widely acknowledged, as the consensus among geologists indicates that we are in a period of mass extinction caused by human actions [1]. The current geological era is experiencing an unprecedented rate of species extinctions, with estimates suggesting that the observed rate vastly exceeds the natural background rate, measuring 1000 to 10,000 times higher attributed to environmental changes [2]. Regrettably, numerous locations with abundant biodiversity are currently witnessing significant levels of species disappearance [3]. A recent publication highlighted the danger of continued planetary deterioration and emphasized that the loss of biodiversity is a major issue for our era [4]. The loss of biodiversity has significant environmental and ecological effects that must be addressed. Although the direct economic consequences of biodiversity loss are complex, taking immediate action to preserve natural ecosystems is an important step toward sustainability and protecting vulnerable communities that depend on natural resources.

The decrease in global biodiversity levels has stimulated governments, businesses, and communities worldwide to take action. The 1992 Rio Earth Summit marked a significant turning point for governments to seriously address the biodiversity and climate issues in a serious manner. Prior to this, various international forums and agreements had already been established, such as the Convention on Biological Diversity (CBD), The United Nations Sustainable Development Goals (SDGs), The International Union for Conservation for Nature (IUCN), Global Reporting Initiative, the UN Framework Convention on Climate Change (UNFCCC), The World Wildlife Fund for Nature (WWF), to address this emerging challenge of our times. The integration of biodiversity conservation into existing policy

frameworks and the development of new tools and indicators [5] highlight the growing recognition of the importance of biodiversity for ensuring sustainable economic growth and wellbeing. This trend is expected to continue, with biodiversity recovery plans set to become a central component of future policies [6] and a key consideration in business decision-making for long-term economic prosperity [4].

Until recently, companies' environmental departments did not prioritize the importance of biodiversity in their strategic decision-making processes, despite the increasing urgency of the issue and the various environmental initiatives established under the umbrella of business sustainability or Corporate Social Responsibility (CSR) [7]. Despite contrasting views, a report by PWC [8] highlights the potential severity of biodiversity loss for businesses. KPMG [9] also emphasizes the issue, categorizing it as one of the top ten sustainability concerns that will impact companies in the near future. According to Smith et al. [10], biodiversity loss poses significant risks to businesses, threatening the availability of natural resources, supply chains, and ecosystem services.

Companies may encounter heightened pressure from stakeholders to be more transparent about their environmental initiatives as a growing number of consumers and stakeholders become aware of the impact that businesses have on nature [11]. As this awareness increases, there will likely be a greater demand for organizations to be held accountable for their actions [11,12]. Consequently, businesses must adapt and change their practices to better protect biodiversity, as staying silent on this issue will be seen as irresponsible and may result in future pressures and disinvestment from shareholders [13]. Therefore, businesses must take responsibility for their effects on the natural world and the loss of species, or they risk damaging their reputation and suffering financial consequences.

Despite concerted efforts by organizations to address the biodiversity crisis, corporations have been slower to prioritize biodiversity conservation. Addison et al. [14] analyzed the top 100 companies on the Fortune 500 Global list and discovered that only 49 companies mentioned biodiversity in their reports. Furthermore, while a few pioneering studies on biodiversity reporting have emerged since 2013, the field remains understudied. According to Jones et al. [15], research in biodiversity accounting is still in its infancy, though there is a pressing need to facilitate interdisciplinary research that documents, assesses, and disseminates information about biodiversity.

Previous research on biodiversity reporting has primarily concentrated on developed countries, with a focus on regions such as Europe and the UK [16–21]. In contrast, developing countries have received relatively little attention in the academic literature, with a lack of accessible information on species extinctions and biodiversity degradation in countries within the region. As highlighted by Roberts et al. [22], it is important to investigate how organizations in developing countries approach biodiversity conservation. Saudi Arabia, as a developing country, offers a valuable case study for examining biodiversity reporting, particularly among the largest companies listed on the Saudi Stock Market.

In this paper, large companies were considered, focusing on the Saudi Stock Market. Large companies, which have the required resources that bear greater responsibility for substantial effects on biodiversity [23], are typically entrusted with spearheading and supporting institutional initiatives. The paper has two main objectives: to investigate the extent of information disclosed by leading Saudi companies regarding their practices related to biodiversity and species conservation, and to identify the individual reporting items that show the highest and lowest levels of disclosure across the Saudi companies. A focused examination of their reporting and accountability practices is necessary to evaluate the significance of biodiversity for their operations, their efforts to protect it, and the effectiveness of various international policies developed over time.

In light of contributions to the literature, this paper addresses the need to further explore the research area of biodiversity accounting, as highlighted by Jones et al. [15]. This paper seeks to further explore the important and evolving research area of biodiversity accounting. By investigating how much information is disclosed by leading Saudi companies regarding their practices related to biodiversity and conservation of species and

identifying the individual reporting items that demonstrate the highest and lowest levels of disclosure across the Saudi companies, the study aims to generate insights related to developing countries.

2. Literature Review

The primary focus of environmental accounting is not to benefit the natural world but rather to scrutinize humanity's impact on it. As Gray [24] pointed out, nature does not require our accounting efforts. Instead, this type of accounting serves as a means for humans to assess the harm we inflict on the environment and the unsustainable rate at which we exploit its resources. Organizations have a responsibility to protect and preserve natural resources, and as such, they must be transparent and accountable to their stakeholders and the broader community [25].

Accounting has the potential to play a significant part in establishing accountabilities to safeguard biodiversity by improving current governance systems. The studies most pertinent to this research are those that examine the reporting of biodiversity [12,16,17,26]. However, the researchers of such studies observe that companies are providing limited information on their efforts to mitigate the loss of biodiversity and prevent species extinction [27,28]. Jones et al. [15] highlighted the importance of preserving biodiversity from extinction, emphasizing the crucial role of biodiversity accounting in achieving this goal.

In recent years, the primary focus of research in accounting for biodiversity has been the examination of how companies in developed nations disclose information about biodiversity. A study by Rimmel et al. [16] analyzed the top 30 firms listed on the Stockholm Stock Exchange in Sweden, while Van Liempd and Busch's [17] research focused on the biodiversity reporting practices of Denmark's 27 largest companies. Both studies conducted a longitudinal review of annual and sustainability reports to identify instances of biodiversity disclosure. The results from both Scandinavian countries were disappointing, with companies providing very limited information on the topic. However, Rimmel et al. [16] findings did offer a glimmer of hope, revealing a significant increase in disclosure over the five-year period from 2006 to 2010, with a nearly twofold rise. Research conducted by [17] between 2009 and 2011 revealed a gradual but significant uptick in transparency over time. Similarly, a study by Adler et al. [18] examined mining and metal companies in Australia, analyzing data from 2010, 2012, and 2013. The longitudinal study showed a notable improvement in the quantity and quality of information shared. Nevertheless, the overall level of transparency remained underwhelming and lacking in depth. Grabsch et al. [19] investigated the level of biodiversity reporting by British and German companies in their study. The researchers observed that most companies in their study failed to disclose substantial details about their biodiversity impact, and furthermore, there was a scarcity of quantitative financial metrics specifically tied to biodiversity performance. Bhattacharyya and Yang [20] examined the biodiversity disclosure practices of 41 Australian listed firms. They found that biodiversity disclosures increased between 2012 and 2015, and better disclosure practices were linked to adopting Global Reporting Initiatives (GRI) Standards, higher media visibility, membership in the metals and mining industry, and smaller board sizes. Marco-Fondevila and Álvarez-Etxeberria [21] evaluated how companies in the EU engaged with the EU biodiversity strategy and what influenced the quality and importance of their disclosure indicators. They studied 170 listed companies from the EU's five largest economies, analyzing their biodiversity reporting in 2018 and 2021. The researchers identified a growing but varied level of engagement with biodiversity among EU-listed companies.

There are only a limited number of studies that are focused on a sample of companies located in developing nations. One such study analyzed the biodiversity disclosure practices of South African food producers and miners [27]. Despite operating in environmentally sensitive sectors, the sampled companies were found to provide limited biodiversity information in their annual reports. A subsequent study evaluated the level of biodiversity reporting in seven South African firms, revealing that while the overall disclosure quan-

tity was low, some firms were making progress by providing more detailed biodiversity information [29]. Maroun et al. [30] studied the disclosure practices related to biodiversity of 19 South African companies. Building on the idea of “organized hypocrisy” put forth by Maroun et al. and Cho et al. [30,31], the researchers classified biodiversity-related disclosures into two distinct categories: those that merely paid lip service to the issue and those that demonstrated tangible, concrete actions. Their findings show that while some companies neglected biodiversity rhetoric, they emphasized biodiversity action. Most companies had limited biodiversity information in 2013, but biodiversity disclosure practices showed growth between 2013 and 2015. Smith et al. [11] examined biodiversity disclosures in forestry and salmon farming companies in Chile, noting that these businesses frequently employed disclosures to conceal negatives and emphasize positives. They emphasize the importance of incorporating stakeholders’ perspectives and local context in biodiversity reporting to ensure meaningful action. Sibanda and Mulama [32] suggested that Kenya could benefit from implementing extinction accounting to protect its wildlife heritage. Zhao and Atkins [33] tested an extinction accounting framework for giant pandas in China, finding a lack of panda conservation in reports from Chinese-listed companies. Sun and Lange [34] studied biodiversity reporting by China’s largest dairy company, observing gradual improvement in the Yili Group’s reporting over time but noting a continued need for substantial enhancements rather than symbolic disclosures.

In summary, although 17 countries with high biodiversity have been identified by The World Conservation Monitoring Centre, the majority of them are developing nations, and there is limited research being conducted in these regions. Therefore, this study is being conducted in Saudi Arabia in order to address the need for more research in these areas, as highlighted in the existing literature [22].

3. Data and Method

This study primarily used reports from the large companies listed on the Saudi stock market as a key source, given that the market is among the largest worldwide and a top player in emerging markets. Earlier studies on corporate biodiversity reporting revealed that publicly traded companies tend to provide comprehensive and higher-quality information on the subject compared to non-listed companies [28]. Research has also shown that the size of a company can greatly influence its level of social and environmental disclosure [35].

The research sample primarily targeted publicly traded companies, assuming they provide comprehensive information on biodiversity. To ensure a representative sample of Saudi listed companies, the study selected fourteen companies with the highest market value in February 2024, collectively representing 88% of the market’s total value (Table 1).

The primary data for this study were derived from publicly available reports and metrics issued by companies between 2021 and 2023. The chosen timeframe was deliberate, aiming to evaluate the recent progression of biodiversity disclosure while minimizing the potential impact of the COVID-19 pandemic on corporate performance and transparency, which was more pronounced in 2019 and 2020.

Due to the complex and fragmented nature of biodiversity data, which is dispersed and varied [28], this study adopted an approach inspired by Adler et al. [28] to evaluate the extent of corporate involvement in disclosing biodiversity information.

In order to collect data, we carefully reviewed annual reports, sustainability reports, and websites. We obtained a combined total of 84 annual and sustainability reports from the companies under review. Subsequently, all these reports were scrutinized to gather information on biodiversity and threatened species. Furthermore, the examination of company websites was conducted to identify potential biodiversity information dispersed throughout different parts of their corporate communications, which is usually disclosed voluntarily [16]. Research by Adler et al. [28] revealed that numerous companies share details about their biodiversity initiatives on their websites. To guarantee a comprehensive dataset for future examination, the researchers relied on a dual approach: they drew on

the standardized metrics provided by the GRI indicators, as well as relevant keywords identified in previous research studies [18,26,28].

Table 1. Market value of top Saudi-listed companies.

No.	Company	Market Value %	Location
1	Aramco	67.75%	Dhahran
2	Al Rajhi	3.09%	Riyadh
3	Acwa Power	3.07%	Riyadh
4	The Saudi National Bank	2.35%	Jeddah
5	Sabir	2.32%	Riyadh
6	Saudi Telecom Company	1.84%	Riyadh
7	Maaden	1.77%	Riyadh
8	Dr. Sulaiman Al Habib Medical Services Group Company	0.98%	Riyadh
9	Riyad Bank	0.93%	Riyadh
10	Alinma Bank	0.86%	Riyadh
11	Saudi Awwal Bank	0.78%	Riyadh
12	Saudi Electricity	0.76%	Riyadh
13	Elm Company	0.68%	Riyadh
14	Almarai	0.57%	Riyadh

To assess the extent of biodiversity and endangered species reporting, this research employed a biodiversity disclosure index created by Adler et al. and Adler et al. [18,28], comprising 28 elements (refer to Appendix A). Additionally, the researchers used the content analysis method created by [28] for coding. Each of the 28 key items in the research needs to be rated on a scale from 0 to 3.

- A score of “0” was given if the specific item was not referenced at all.
- A score of “1” was assigned if the information provided for a specific index item was scarce, unclear, or overly general.
- A score of “2” was granted for a specific index item when the disclosures included factual, demonstrable, and up-to-date data.
- A score of “3” was given when disclosures for a particular index item encompassed all the elements of a “2” score, along with additional details about the facility, impacted species, specific actions taken, financial expenditures, and a clear connection of the data to company strategies, objectives, performance metrics, or goals.

4. Results

Information about biodiversity was dispersed throughout various corporate documents, including sustainability reports, annual reports, and company websites. In the study, two companies failed to provide any information on biodiversity and endangered species, earning a score of zero. Sulaiman Al Habib Medical Services scored between 1 and 10. The remaining companies’ scores varied, with four scoring between 11 and 20, three between 21 and 30, one between 31 and 40, one between 41 and 50, and one exceeding 60 (See Table 2). Notably, more than 88% of the companies fell short of the midpoint of the 0–84 index, indicating a significant gap in biodiversity disclosure.

Table 2. Biodiversity and threatened species disclosure index scores of Saudi-listed companies.

Company \ Item	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	Total
Aramco	2	3	3	1	3	2	2	2	2	2	3	3	2	3	3	2	3	2	3	2	2	2	2	1	2	1	2	2	62
Alrajhi	2	0	0	1	0	2	2	2	1	0	2	2	2	1	0	0	0	0	0	0	1	0	0	0	0	0	0	1	19
Acwa Power	0	0	1	0	0	2	2	2	0	1	0	1	1	0	0	0	0	0	1	1	1	0	1	0	1	0	0	0	13
The Saudi National Bank	3	0	0	0	0	2	3	3	2	0	2	0	0	0	3	0	0	0	0	2	2	2	2	2	0	0	0	1	29
Sabir	2	2	2	2	2	2	2	2	0	0	1	2	0	0	2	2	1	0	2	2	2	0	2	0	1	1	1	2	37
Saudi Telecom Company	2	0	0	0	1	0	1	1	0	0	0	1	0	0	1	0	0	0	0	2	0	0	0	0	1	0	0	1	10
Maaden	1	1	2	1	3	2	3	3	2	2	2	1	1	2	1	0	3	1	1	1	1	2	1	2	3	1	3	1	46
Sulaiman Al Habib Medical Services	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	4
Riyad Bank	2	1	0	1	1	1	1	1	0	0	2	0	2	0	1	0	1	1	0	1	1	0	0	0	0	0	0	2	19
Alinma Bank	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Saudi Awwal Bank	2	0	0	0	2	1	2	2	1	1	1	2	2	0	1	0	1	0	1	1	1	1	1	0	1	0	0	1	24
Saudi Electricity	2	0	1	0	1	1	2	2	2	0	1	1	2	0	2	0	1	1	0	1	0	0	1	1	0	0	0	1	22
Elm Company	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Almarai	2	0	1	0	1	2	0	0	0	0	2	1	0	0	1	0	1	1	0	0	0	0	0	1	0	0	0	0	13

The results of this study indicate that Saudi companies can be assessed and evaluated based on their levels of biodiversity-related disclosure, as outlined below:

- Poor disclosure: Companies achieving this rating are deemed to have fulfilled the standards for public disclosure. Those not scoring 28 are classified as having inadequate disclosure.
- Medium disclosure: Clear and provable disclosure, earning a score of 29–56.
- Strong disclosure: Reserved for companies demonstrating advanced levels of transparent disclosure, with scores ranging from 57 to 84, and the extent of complete disclosure varies depending on each company's focus on a particular biodiversity category.

The research sample companies can be categorized as follows:

- Companies with strong disclosure: Aramco alone represents 7.1% of the study sample.
- Companies with medium disclosure: Madden, SABIC, and Saudi National Bank collectively make up 21.4% of the study sample.
- Companies with poor disclosure: Eight companies represent 57.2% of the study sample.

Additionally, it is worth noting that two companies, accounting for 14.3%, have not disclosed any information. (See Table 2).

We assessed how much Saudi companies disclosed information about biodiversity across twenty-eight different categories. We found the following:

- A total of 207 statements, accounting for 52.8%, were not revealed (scored zero), indicating a lack of disclosure in accounting for the majority of biodiversity items.
- The poor disclosure score of 1 is ninety-two, accounting for 23.5% of the total. For medium disclosure with a score of 2, the total is seventy-seven, representing 19.6%. Strong disclosure with a score of 3 amounts to sixteen, which is 4.1%. These findings indicate that the majority of disclosures by Saudi companies are lacking quality or of poor quality.
- Upon examining the strong disclosure, we noticed that it encompassed 13 biodiversity-related themes, accounting for 46.4%. However, the number of companies demonstrating strong transparency varied between one and two. Two companies stood out by providing detailed information on their environmental protection initiatives, including research and development expenditures, conservation and damage of land, and efforts to safeguard water resources (P14, P22, P24). In contrast, only one company went above and beyond by sharing its interests, policies, plans, and participation in environmental protection efforts and international agreements. This company also delved into the impact of its operations on wildlife, protected areas, damaged ecosystems, biodiversity loss, and biodiversity restoration.
- As for the medium disclosure, it included most areas of biodiversity, as eight companies disclosed international agreements to preserve biological diversity (P28). Seven companies disclosed marine biodiversity (P23). Six companies reported damaged and protected lands. Five companies reported on the awards and recognition they received, and management plans to do so (P16, P18). Four companies disclosed the plant wealth, affected habitats, and affected ecosystems (P9, P20, P21).
- As for the weak disclosure, it included all areas of biodiversity, but it ranged between 1–6 companies. The highest interest was in reporting its participation in afforestation activities and the company's efforts to create awareness of biodiversity among employees and the community (P1, P12). Five companies disclosed the presence of plant wealth in their area of work, land management and rehabilitation activities, company policy, and the amount spent on research and development (P8, P9, P17).
- There is a clear absence of disclosure about biodiversity (score of zero), representing a rate of 52.8%, and it included all topics. The range was between 3 and 12 companies, which indicates the weak role of companies in many biodiversity issues. Among the topics that most of the study companies did not disclose were their participation in biodiversity associations, the biodiversity assessment of their activities, their partici-

pation in preserving environmental corridors, and the biodiversity projects that have been implemented (P13, P2, P3, P7, P19) (See Table 3).

Table 3. Distribution of biodiversity reporting item scores (refer to Appendix A for the meanings of these items).

Item	Score 0	Score 1	Score 2	Score 3	Total
P1	5	6	3	-	14
P2	11	1	1	1	14
P3	11	3	-	-	14
P4	8	4	1	1	14
P5	9	3	2	-	14
P6	7	4	3	-	14
P7	10	1	3	-	14
P8	6	5	3	-	14
P9	5	5	4	-	14
P10	9	3	1	1	14
P11	9	4	1	-	14
P12	6	6	2	-	14
P13	12	2	-	-	14
P14	5	5	2	2	14
P15	11	1	1	1	14
P16	7	2	5	-	14
P17	5	5	3	1	14
P18	5	3	5	1	14
P19	10	2	2	-	14
P20	8	2	4	-	14
P21	5	4	4	1	14
P22	4	2	6	2	14
P23	4	3	7	-	14
P24	6	4	2	2	14
P25	9	4	1	-	14
P26	8	3	2	1	14
P27	9	3	1	1	14
P28	3	2	8	1	14
Total	207	92	77	16	392

Through the descriptive statistics of the biodiversity data of the study companies, the following evidence can be obtained from the mean:

- Saudi companies have placed top priority on disclosing information about their efforts to uphold global pacts aimed at conserving biodiversity, as outlined in the report (P28). This is closely followed by transparency on the preservation and degradation of wetland ecosystems, as reported in (P22), as well as the effects of their operations on marine biodiversity, detailed in (P23).
- Corporate reports disclose information about management plans (P18), biodiversity policy/strategy (P17), ecosystems affected/protected (P21), cost of research and development (P17), and damaged rivers or waterways (P24).

- Companies are interested in creating awareness of biodiversity (P12), and also announce plant wealth in their area of operation (P9), and participating in afforestation activities (P1). Inform biodiversity partners to help conserve biodiversity (P6), work on land management and rehabilitation activities (P8), damage habitats (P20), biodiversity loss due to their operations (P27), and compensation paid (P4).
- On the other hand, the least disclosure made in the areas of biodiversity in Saudi companies is the biodiversity assessment of its activities (P3), the company's participation in biodiversity associations (P13), its involvement in protecting environmental corridors (P2), making donations or charitable activities (P11), the company's environment (P15), and the species included in the union's list International for Nature Conservation (P25). (See Table 4).

Table 4. Index items and descriptive statistics.

Item	N	Minimum	Maximum	Mean	SD
P1	14	0.00	2.00	0.8571	0.77033
P2	14	0.00	3.00	0.4286	0.93761
P3	14	0.00	1.00	0.2143	0.42582
P4	14	0.00	3.00	0.6429	0.92878
P5	14	0.00	2.00	0.5000	0.75955
P6	14	0.00	2.00	0.7143	0.82542
P7	14	0.00	2.00	0.5000	0.85485
P8	14	0.00	2.00	0.7857	0.80178
P9	14	0.00	2.00	0.9286	0.82874
P10	14	0.00	3.00	0.5714	0.93761
P11	14	0.00	2.00	0.4286	0.64621
P12	14	0.00	3.00	0.8571	1.02711
P13	14	0.00	2.00	0.2857	0.72627
P14	14	0.00	3.00	1.0714	1.07161
P15	14	0.00	3.00	0.4286	0.93761
P16	14	0.00	2.00	0.8571	0.94926
P17	14	0.00	3.00	1.0000	0.96077
P18	14	0.00	3.00	1.1429	1.02711
P19	14	0.00	2.00	0.4286	0.75593
P20	14	0.00	2.00	0.7143	0.91387
P21	14	0.00	3.00	1.0714	0.99725
P22	14	0.00	3.00	1.4286	1.08941
P23	14	0.00	2.00	1.2143	0.89258
P24	14	0.00	3.00	1.0000	1.10940
P25	14	0.00	2.00	0.4286	0.64621
P26	14	0.00	3.00	0.7143	0.99449
P27	14	0.00	3.00	0.5714	0.93761
P28	14	0.00	3.00	1.5000	0.94054

5. Discussion and Conclusions

This study's findings offer a fascinating overview of the current state of biodiversity disclosure among listed companies in Saudi Arabia. The results of the analysis cover

the period from 2021 to 2023, providing a comprehensive picture of the performance. While biodiversity reporting is not a top priority for most companies, it is evident that the majority of firms studied have acknowledged its importance and chosen to disclose relevant information over the past three years.

Biodiversity reporting's significance is limited to smaller actions, but there is a noticeable effort towards increased importance, particularly within Aramco. The behavior exhibited in these reports indicates that companies are starting to find biodiversity intriguing, as noted by [36]. However, it remains a minor aspect in the broader sustainability field, aligning with the findings of [28] for companies in the United States.

Contrary to [37]'s assertion that indicators are necessary for conveying meaningful information, our findings reveal that companies reported positive materiality does not translate to the effective use of indicators. Notably, our observation suggests that certain companies, such as Aramco, known for their high-quality reporting, have already developed their own indicators.

Aramco accounts for 7% of the sample, but it dominates the overall valuation, comprising 67.75% of the total. Its operations in industries that extract natural resources pose a significant risk to biodiversity. This context sheds new light on the implications of the company's seemingly impressive reporting practices.

The primary focus of this research is to examine how Saudi Arabia's leading publicly traded companies disclose their commitment to biodiversity. By analyzing 88% of the market value of Saudi-listed companies, the study aims to achieve two main goals: first, to investigate how much information the top Saudi companies reveal regarding their biodiversity and species conservation efforts, and second, to pinpoint specific reporting items that show the highest and lowest levels of disclosure among these companies. This study is one of the earliest to delve into biodiversity reporting in Saudi Arabia and expands upon previous research on biodiversity reporting in developing countries.

The research reveals that a small percentage of 7.1% of the entities showcased a high level of disclosure, serving as a commendable example for others to follow. Conversely, a significant 57.2% of the entities fell into the category of low disclosure, indicating a concerning gap in biodiversity conservation among Saudi companies. On a positive note, 21.4% demonstrated a moderate level of disclosure, showing that many are actively working towards improving transparency. However, it is alarming that 14.3% of the entities showed no disclosure at all, which is unacceptable and requires immediate attention. Despite a noted interest in the subject, the engagement of Saudi-listed companies appears to be lacking, suggesting that global efforts have not yet influenced their policies and dedication to biodiversity. Furthermore, in our study, we examined 28 key items across 14 different companies. For each item, we measured the scores on a level of strong, medium, and poor disclosure. A significant proportion of biodiversity items, totaling 52.8%, were not reported, indicating a lack of transparency in most biodiversity-related areas. Furthermore, the disclosure of biodiversity information was found to be inadequate, with 23.5% of cases classified as poor, 19.6% as medium, and only 4.1% as strong. The results have practical implications, especially for Saudi companies looking to release biodiversity reports or improve their biodiversity disclosure efforts.

Despite this, the study has yielded fascinating insights into the varied responses of companies following the impact of their activities. We have uncovered the reasons behind some companies' more extensive reporting on biodiversity compared to others. Our findings highlight disparities in the private biodiversity conservation systems of companies that exhibit high levels of transparency. This implies that companies that have developed their own bespoke approach to biodiversity disclosure tend to have more influence than those that rely on specific indicators and strategies.

Our study on Saudi-listed companies parallels some of the findings by Addison et al. [14] on Fortune Global companies, pointing towards a trend where large corporations are not prioritizing biodiversity in their sustainability reports.

The results of this study hold significance for the overall environmental accounting and reporting efforts, particularly in the realm of biodiversity accounting and reporting. By highlighting the companies with the best biodiversity disclosure practices, this research serves as a strong motivator for other firms to enhance their biodiversity reporting standards. Hassan et al. [37] stress the need for increased awareness and responsibility regarding biodiversity and extinction. Since the focus of this paper is on Saudi-listed companies, it sets a foundation for urging more companies in Saudi Arabia to heighten their awareness and responsibility towards biodiversity and adopt biodiversity reporting practices.

There are a few limitations to consider in this study. To start with, the results are derived solely from companies that are publicly listed on one market, which could restrict the broad applicability of these findings. Additionally, the sample size only represents a small part of the larger population it aims to reflect.

According to this, further research is needed in this area to assist practitioners and academics in comprehending the requirements for involving companies in biodiversity conservation and in pinpointing the underlying reasons for these minimal disclosures. Future research should also study how this differential exposure to biodiversity threats affects the reporting practices and disclosure of the companies. This could involve categorizing the companies based on their industry and associated biodiversity risks and then examining whether companies with higher biodiversity impacts provide more extensive biodiversity-related disclosures. Additionally, it would be worth discussing whether we anticipate detailed reports from companies with lower biodiversity impacts, such as banks, or is it sufficient for them to simply prompt borrowing firms with high exposure?

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Appendix A. Index of Biodiversity and Threatened Species

-
- (1) The company discloses its contributions to environmentally responsible forestation efforts, including seedling transplantation, forest plantation, sustainable forestry practices, and other reforestation initiatives.

 - (2) The organization discloses its commitment to preserving and restoring environmentally sensitive areas, known as ecological corridors, situated near its manufacturing facilities, mines, transportation networks, and other operational sites.

 - (3) The company discloses a “biodiversity assessment” detailing the impact of its operations on the environment in the vicinity of its manufacturing plants, mines, transportation infrastructure, and other sites.

 - (4) The company discloses the adoption of a “biodiversity offset” strategy to minimize their impact on biodiversity.

 - (5) The company discloses plans or targets for biodiversity conservation in the upcoming years.

 - (6) The company discloses that it is working with local and international organizations to support its efforts in conserving biodiversity.

-
- (7) The company discloses information about its projects and initiatives aimed at enhancing biodiversity conservation within its manufacturing facilities, mining operations, transportation infrastructure, and other areas of its business.
-
- (8) The organization is involved in initiatives focused on managing and restoring land areas.
-
- (9) The company has disclosed that it has identified a wealth of floral resources in and around its operating area, which includes production, functional, and transportation facilities.
-
- (10) The organization reports the rich biodiversity present within or near its operational zones, including production, functional, and transportation areas.
-
- (11) The organization made donations or engaged in philanthropic initiatives that supported the conservation, protection, and promotion of biodiversity.
-
- (12) The company discloses its initiatives to promote environmental education and raise awareness about the importance of preserving biodiversity among its workforce and in the surrounding community.
-
- (13) The company engages with biodiversity organizations such as external agencies and NGOs to enhance biodiversity initiatives within the community.
-
- (14) The organization discloses the expenses allocated to research and development, technologies, and innovations used for preserving or restoring biodiversity.
-
- (15) The company's environmental policy prioritizes biodiversity.
-
- (16) The company discloses about being recognized or awarded for its efforts in conserving and restoring biodiversity.
-
- (17) The company discloses its policies and strategies regarding biodiversity.
-
- (18) The company disclosed incorporated biodiversity considerations into its high-level management strategy and planning.
-
- (19) The company discloses information on the impacted/preserved/safeguarded/renewed indigenous species.
-
- (20) The company discloses information on habitats impacted, preserved, safeguarded, or rejuvenated.
-
- (21) The company discloses information on ecosystems that have been impacted, preserved, safeguarded, or enhanced.
-
- (22) The company discloses information on wetlands that have been impacted, preserved, safeguarded, or enhanced.
-
- (23) The company discloses information on marine biodiversity that has been impacted, preserved, safeguarded, or enhanced.
-
- (24) The company discloses information on the bodies of water that have been impacted, preserved, safeguarded, or revitalized, including rivers, creeks, lakes, reservoirs, and waterways.
-
- (25) The company discloses information on species that are categorized as extinct, threatened, or vulnerable by the International Union for Conservation of Nature (IUCN) or by the country
-
- (26) The company's operations result in a loss of biodiversity and species, as disclosed by the company.
-
- (27) The company discloses the locations of its operational sites that fall within IUCN-recognized protected areas of Categories I to IV.
-
- (28) The company discloses information about the global biodiversity treaties and initiatives it is involved with or has aligned its practices to.
-

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