Exploring the Synergetic Relationship between ESG and Planetary Health Using Systems Dynamics

By Byomkesh Talukder, Assistant Professor, Global Health, FIU. Email: btalukde@fiu.edu

Abstract: Integrating Environmental, Social, and Governance (ESG) criteria has become essential for advancing sustainability, managing risk, and fostering innovation in business and investment sectors. Adopting ESG principles allows companies and investors to generate long-term value while contributing to a more sustainable and equitable global environment. ESG considerations are crucial for addressing complex global issues such as climate change, biodiversity loss, pollution, habitat destruction, and human health. The planetary health crisis, exacerbated by unsustainable practices like industrialization, urbanization, and excessive consumption, is directly linked to these global challenges.

This study aims to explore the relationship between ESG principles and planetary health, focusing on how integrating ESG can address the planetary health crisis. Despite the recognized importance of ESG in promoting sustainability, there remains a gap in understanding its direct impact on planetary health outcomes. This research will examine ESG practices and planetary health literature, utilizing case studies, empirical data, and theoretical frameworks to analyze their interconnectedness. By modeling the relationship between ESG and planetary health through Systems Dynamics, the study seeks to illustrate how ESG integration can reduce environmental degradation and enhance human health.

This research provides valuable insights for policymakers, businesses, investors, and other stakeholders by bridging the gap between ESG principles and planetary health. Understanding the role of ESG in mitigating planetary health challenges can lead to more informed decision-making, transformative policy shifts, and improved practices. Ultimately, the study advocates for holistic approaches to planetary health management by leveraging ESG principles to contribute to a more sustainable and resilient future.

Keywords: ESG, Sustainability, Planetary health, Climate change, Environmental Degradation, Health

1.0 Background

In recent decades, industries have increasingly faced pressure to enhance their global sustainability efforts. Shareholders and stakeholders have advocated for integrating corporate social responsibility (CSR) into business operations, recognizing the need for companies to go beyond mere compliance and actively contribute to societal well-being (Tsang et al., 2023). CSR began gaining momentum in the 1970s as businesses started acknowledging their broader social responsibilities and linking their operations with societal needs (Writer, 2019). By the 1990s, CSR had evolved into a framework for addressing sustainability, ethical practices, and global impact. Companies began integrating CSR into their core operations, reflecting a shift towards more responsible business practices aligned with changing societal expectations (Latapí et al., 2019).

Despite its growth, CSR has faced several significant challenges. Many companies struggle to define clear CSR goals, leading to often vague or inconsistent initiatives. Limited resources—such as time, money, and expertise—can hinder effective implementation, while internal resistance to change can slow progress (Rangan et al., 2025; ESCE International Business School. (n.d.). Additionally, measuring the true impact of CSR programs is complex, and the emphasis on short-term results frequently overshadows the need for long-term systemic change (Fehre et al., 2016). Concerns about greenwashing, where companies falsely portray their products or practices as environmentally friendly, and the lack of standardization in CSR reporting undermine credibility (Aggarwal & Kadyan, 2014). Furthermore, some CSR efforts are disconnected from core business operations, limiting their effectiveness and innovation potential (Jenkins, 2009).

In the 2000s, ESG (Environmental, Social, and Governance) criteria emerged as a more comprehensive and measurable evolution of CSR (Wang & Phillips-Fein, 2023). Driven by evolving societal expectations, investor demands, and regulatory developments, ESG goes beyond the traditional focus of CSR on social responsibility (Matos, 2020; Daugaard & Ding, 2022). ESG integrates environmental, social, and governance issues with a strong emphasis on financial materiality, linking sustainability directly to business risk and performance (Hoang, 2018; Jebe, 2019). This approach provides quantifiable metrics for standardized evaluations and has become essential for businesses aiming to address sustainability, governance, and ethical challenges in today's market (Escrig-Olmedo et al., 2029). Regulatory pressures and the growing demand for transparency have further accelerated the adoption of ESG practices (Singhania & Saini, 2023). ESG considerations are crucial for managing risks and fostering innovation, particularly in addressing complex global issues such as climate change, biodiversity loss, pollution, and human health (Ayyoob & Sajeev, 2024).

Planetary health is an emerging field that underscores the deep interconnections between human health and Earth's natural systems (Ebi et al., 2020; Talukder et al., 2024). Its importance has grown due to the global climate crisis and its impacts on well-being (Myers, 2017). Planetary health examines how environmental factors—including climate change, pollution, and biodiversity loss—affect health outcomes, such as new disease patterns, mental health issues, and safety risks (Whitmee et al., 2025). These impacts are particularly severe for vulnerable and marginalized populations, notably in lower-income communities and the Global South (Bayram et al., 2023). Addressing the planetary health crisis requires an interdisciplinary approach combining environmental sciences, public health, and policy advocacy to develop effective strategies for improving human and planetary health (Ebi et al., 2020; Iyer et al., 2021).

By addressing the intertwined issues of environmental degradation and human health, ESG practices support resilience and sustainable development, contributing significantly to planetary health (Chopra et al., 2024). Therefore, this study aims to explore the relationship between ESG criteria and planetary health, bridging the gap between these fields and providing valuable insights for more integrated and practical solutions.

2.0 Methodology

The research is organized into three phases: a literature review, exploring the theoretical underpinnings of the relationship between ESG metrics and planetary health issues, and systems dynamics modeling.

Phase 1: Literature Review

A narrative literature review (Lau & Kuziemsky, 2016) was conducted by systematic review principles (Morgan & Florez, 2022), including developing query protocols, systematically screening and selecting studies, and synthesizing the evidence to understand the theoretical foundation of ESG practices, planetary health, and their interconnection. This review analyzed articles, reports, policy documents, and websites using PubMed, Scopus, and Google Scholar databases. Additionally, a general Google search was performed to identify relevant websites. Key search terms included "ESG," "planetary health," "sustainability," "climate change," "environmental degradation," "ESG and planetary health," "ESG impact on planetary health," "environmental sustainability and health," and "ESG and climate change effects." The search queries were organized as follows:

- **(i)** Query 1: “ESG criteria” AND “planetary health”
- **(ii)** Query 2: “Environmental, Social, Governance” AND (“impact on health” OR “planetary health”)
- **(iii)** Query 3: “ESG practices” AND “climate change” AND “health outcomes”
- **(iv)** Query 4: “ESG” AND “planetary health” AND “sustainability”
- **(v)** Query 5: “Environmental degradation” AND “human health” AND “ESG strategies”

Phase 2: Exploration of the theoretical underpinnings of the relationship between ESG metrics and planetary health issues

Building on the insights from Phase 1, which identified key ESG frameworks, metrics, and planetary health issues, this phase aims to clarify the relationship between ESG metrics and planetary health objectives. The primary goal is to define the mechanism of how different ESG metrics align with and influence planetary health issues. To evaluate the impact of ESG metrics on addressing planetary health challenges, we conducted a comprehensive mapping and connection analysis between ESG performance metrics and critical planetary health issues such as climate change, pollution, and biodiversity loss.

Phase 3: Systems Dynamics Modeling

Phase 3 of the research involves employing systems dynamics modeling. This phase builds upon the findings from Phase 2 analysis, using them to construct and refine causal loop diagrams that illustrate the complex relationships among environmental, social, and governance (ESG) components and their impacts on planetary health.

Cause and Effect Diagrams serve as a foundational element in systems dynamics modeling (Sauer et al., 2017), representing how different variables within the ESG framework influence planetary health outcomes. The diagrams focus on three primary areas:

(i) Environmental Dynamics: It explores how environmental aspects of ESG (such as carbon emissions, resource management, and pollution control) are interconnected with planetary health issues like climate change, biodiversity loss, and ecosystem degradation through causal loop feedback mechanisms.
(ii) Social Dynamics: It examines the social dimensions of ESG (such as social equity, community engagement, and labor practices) and their impact on planetary health, highlighting how social determinants affect health outcomes and environmental sustainability through causal loop feedback mechanisms.
(iii) Governance Dynamics: This dynamic explores the governance aspects of ESG (e.g., corporate policies, regulatory compliance, ethical standards) and their role in shaping planetary health issues. Through causal loop feedback mechanisms, it assesses how governance structures and practices impact environmental and health outcomes.

Integration of Causal Loops Diagrams:

After developing the initial cause and effect diagrams, the next step is integrating these causal loops into a comprehensive causal loop diagram (Sahin et al., 2020). This holistic diagram combines the causal loops from the environmental, social, and governance components to provide a complete picture of the interactions between ESG practices and planetary health (Ryan et al., 2021). The integration process involves:

(iv) Linking Variables: Connect the variables identified in the cause-and-effect diagrams to show how they interact and influence each other across ESG components and planetary health issues (Scavarda et al., 2006).
(v) Feedback Loops: Identifying and incorporating feedback loops that demonstrate how changes in one component of ESG can affect other components and, in turn, impact planetary health. These feedback loops help illustrate the dynamic nature of the relationships and the potential for cascading effects (Groundstroem & Juhola, 2021).

4.0 Results

Overview of ESG Reporting Frameworks

There are several types of ESG reporting frameworks that companies can use to disclose their environmental, social, and governance performance. The main types include (i) Comprehensive Frameworks, (ii) Topic-Specific Frameworks, (iii) Industry-Specific Standards, (iv) Investor-Focused Frameworks, (vi) Integrated Reporting Frameworks, and (vi) Emerging Consolidated Standards. A brief description of these types is given below.

Comprehensive frameworks provide broad guidance on ESG reporting across multiple topics and are categorized into (i) Comprehensive Frameworks and (ii) the UN Global Compact. The Global Reporting Initiative (GRI) is among the most widely used, which covers a broad spectrum of environmental, social, and economic issues [Conservice. (n.d.), Quantive. (n.d.).]. The UN Global Compact offers principles for aligning business operations with sustainable and socially responsible practices [Quantive. (n.d.). Topic-specific frameworks target particular ESG areas; for instance, the Task Force on Climate-related Financial Disclosures (TCFD) focuses on climate-

related financial risks and opportunities [Conservice. (n.d.), Sustainability News, 2024)], while CDP (formerly the Carbon Disclosure Project) centers on environmental reporting, including climate change, water security, and deforestation [Conservice. (n.d.), Quantive. (n.d.).]. Industry-specific standards, such as those from the Sustainability Accounting Standards Board (SASB), provide tailored guidance for different sectors [Conservice. (n.d.), Quantive. (n.d.)]. Investor-focused frameworks include the Principles for Responsible Investment (PRI), which assist investors in incorporating ESG issues into their investment practices [LinkedIn, 2024]. Integrated reporting frameworks, like those from the International Integrated Reporting Council (IIRC), aim to integrate financial and non-financial reporting [Quantive. (n.d.).]. Emerging consolidated standards, such as those developed by the International Sustainability Standards Board (ISSB), strive to establish a comprehensive global baseline for sustainability disclosures in capital markets [Quantive. (n.d.)' Azeus Convene. (n.d.).]. When choosing a framework, companies should consider their industry, stakeholder needs, regulatory requirements, and specific ESG goals, often employing multiple frameworks to produce a comprehensive ESG report suited to diverse audiences and purposes.

ESG Metrics

ESG metrics are essential for evaluating a company's environmental, social, and governance performance (Rajesh & Rajendran, 2020). ESG metrics are typically divided into three main categories, as shown in Table 1. They serve several critical purposes: providing concrete data to support sustainability efforts, ensuring accountability and transparency with stakeholders, enabling companies to track progress and identify areas for improvement, helping to identify and mitigate potential environmental, social, and governance risks, attracting investment, as investors increasingly consider ESG performance in their decisions; ensuring regulatory compliance as ESG reporting regulations evolve; and enhancing brand reputation by demonstrating strong ESG performance (Kocmanova et al., 2012; Boerner, 2015; Kotsantonis & Serafeim, 2019; Zumente & Bistrova, 2021; Keeley et al., 2022; Dathe et al., 2024;). It is important to note that the relevance and importance of specific ESG indicators can vary depending on the industry, company size, and geographic location (Garcia et al., 2017; Duque-Grisales et al., 2021). Companies often prioritize the most material ESG factors for their specific business and stakeholders when developing their ESG reporting strategy (Matakanye et al., 2021; Arvidsson et al., 2022).

Table 1. List of ESG Metrics

Category	Common ESG Metrics	References
 Environmental	Carbon emissions (CO2e)	Treepongkaruna et al., 2024
	Energy consumption and efficiency	Işık et al., 2024
	Water usage and management	Weber & Saunders-Hogberg, 2018
	Waste generation and recycling rates	Gholian-Jouybari et al., 2024
	Renewable energy usage	Mneimneh et al., 2023
	Climate change risks and opportunities (e.g., TCFD disclosures)	Oliver Yébenes, 2024
	Air and water pollution	Sadriwala et al., 204
	Biodiversity impact and conservation efforts	Kopnina et al., 2024
	Environmental policy compliance	Atkins et al., 2023
	Product lifecycle sustainability	Bellandi, 2022)
	Employee diversity and inclusion statistics	Giampetro-Meyer, 2022
	Labor practices (e.g., fair wages, working conditions)	Torres et al., 2023
	Health and safety incidents (e.g., accident rates)	Kotsantonis & Serafeim, 2019

 Social	Community engagement and impact	Keeley et al., 2022
	Human rights policies and performance	Atkins et al., 203
	Training and development hours per employee	Schleich, 2022
	Employee turnover and retention rates	Chang et al., 2022
	Customer satisfaction and data protection	Aksoy et al., 2022
	Supply chain labor standards and compliance	Bartley, 2022
 Governance	Board diversity and independence	Romano et al., 2020
	Executive compensation tied to ESG performance	Cohen et al., 2023
	Anti-corruption policies and whistleblower programs	Cardoni & Kiseleva, 2023
	Shareholder rights and voting mechanisms	Cohen et al.,2023
	Tax transparency	Dalby et al., 2021
	Regulatory compliance (e.g., legal fines, litigation)	Dell'Erba & Gomtsyan, 2024
	Business ethics and corporate behavior	Fiaschi et al., 2020
	Governance structure (e.g., board committees, ESG oversight)	Elmghaamez et al., 2024
	Risk management frameworks	Dathe et al., 2024

Environmental, Social, and Governance (ESG) indicators assess various dimensions of a company's operations and impact. Environmental indicators focus on how a company affects natural resources and climate, addressing carbon emissions, energy consumption, and water management to promote sustainability and reduce environmental footprints (Jinga, 2021; Mneimneh et al., 2023). Social indicators evaluate the company's impact on its employees, communities, and society, covering areas such as diversity, labor practices, human rights, and product safety, thus reflecting its commitment to social responsibility and ethical behavior (Rahdari & Rostamy, 2015; Veenstra & Ellemers, 2020; Kandpal et al., 2024). Governance indicators scrutinize the quality of leadership and ethical standards within the company, including board composition, executive compensation, and anti-corruption policies, ensuring that management practices are responsible, transparent, and aligned with the interests of shareholders and other stakeholders (Gutterman, 2018; Câmara, 2022; Dathe et al., 2024).

Critical Planetary Health Issues

Planetary health issues encompass the impacts of climate change on human health, including increased extreme weather events, disease pattern changes, heat-related illnesses, and mental health problems (Demaio & Rockström, 2015; Whitmee et al., 2015; Myers, 2017). Environmental degradation, such as air and water pollution, deforestation, soil erosion, and biodiversity loss, further exacerbates these challenges (McKinney, 2019; Ebi et al., 2020; Talukder et al., 2021). Unsustainable agricultural practices, declining crop yields, overfishing, and resource depletion worsen food system vulnerabilities (Marinova & Bogueva, 2022; Wijeskara, 2023). Additionally, pollution from plastics and chemicals, urbanization's effects, and loss of ecosystem services threaten vital health resources like clean air, water, and food, disproportionately affecting vulnerable populations (Ebi et al., 2020; Tong et al., 2022). The capture of the various planetary health issues The Lancet Countdown on Health and Climate Change broadly monitors the issues through 41 indicators in five domains: climate impacts, health adaptation, mitigation strategies, economics, and public engagement (Watts et al., 2021).

Mechanism of the Relationship Between ESG Indicators and Planetary Health Issues

As shown in Tables 2, 3, and 4, the environmental, social, and governance metrics of ESG address planetary health issues in various pathways.

Table 2. Mechnizam of how Environmental ESG practices contribute to planetary health issues

Environmental ESG Practice	Mechanism Addressing Planetary Health Issues	Reference
Carbon Emissions (CO2e)	Reducing carbon emissions mitigates climate change, decreasing extreme weather events and preventing shifts in disease patterns.	Ye & Xu, 2023
Energy Consumption and Efficiency; Renewable Energy Usage	Enhancing energy efficiency and using renewable energy lowers carbon footprints, reducing heat-related illnesses, air pollution, deforestation, and soil erosion.	Shah et al., 2024; Ofremu et al., 2024
Water Usage and Management	Sustainable water management addresses water scarcity, impacts food systems, and reduces water pollution while supporting ecosystems.	Gordon et al., 2010; Cosgrove, & Loucks, 2015
Waste Generation and Recycling Rates	Effective waste management and recycling reduce pollution from plastics and chemicals, prevent improper disposal, and mitigate soil and water pollution.	Rajmohan et al., 2019
Climate Change Risks and Opportunities (e.g., TCFD Disclosures)	Transparent reporting on climate risks and opportunities helps organizations adapt to climate impacts and improves resilience to extreme weather events.	Field et al., 2012
Air and Water Pollution	Addressing air and water pollution targets major environmental health issues, including heat-related illnesses and mental health problems.	Crowley et al., 2016; Sorensen & Hess, 2022; Aghamohammadi et al., 2022
Biodiversity Impact and Conservation Efforts	Conservation efforts prevent biodiversity loss, support ecosystem health, and reduce environmental impacts on food systems and natural resources.	Sandifer et al., 2015; Wunderlich et al., 2018
Environmental Policy Compliance	Compliance with environmental regulations helps mitigate various issues, including pollution and degradation, supporting overall planetary health.	Percival et al., 2021; Laffoley et al., 2020
Product Lifecycle Sustainability	Sustainable product lifecycles reduce resource depletion and environmental impacts throughout a product's life, addressing resource depletion and pollution.	Chang et al., 2014

Table 3. Mechnizam of how Social ESG practices contribute to planetary health issues

Social ESG Practice	Mechanism Addressing Planetary Health Issues	Reference
Employee Diversity and Inclusion Statistics	Promotes equitable opportunities, creating supportive work environments that can reduce mental health problems and workplace stress.	Vohra et al., 2015
Labor Practices (e.g., Fair Wages, Working Conditions)	Improves workers' health and well-being, fostering a healthier, more resilient workforce that can indirectly mitigate climate change impacts.	Sorensen et al., 2021
Health and Safety Incidents (e.g., Accident Rates)	Reduces workplace accidents and health issues, minimizing heat-related illnesses and other health impacts of extreme weather events.	Levy & Roelofs, 2019; Varghese et al., 2020
Community Engagement and Impact	Supports initiatives that address local environmental degradation, such as pollution and biodiversity loss.	Jolibert & Wesselink, 2012
Human Rights Policies and Performance	Ensures fair treatment and support for vulnerable populations, addressing disparities and enhancing resilience to environmental and health challenges.	Levy & Patz, 2015

Training and Development Hours per Employee	Enhances employees' skills and knowledge, potentially leading to innovative solutions to environmental and social challenges.	Hilton & Pellegrino, 2012
Employee Turnover and Retention Rates	Indicates stable work environments, contributing to better mental health and productivity, indirectly supporting planetary health efforts.	Cvenkel, 2020
Customer Satisfaction and Data Protection	Builds trust and supports transparency, encouraging responsible environmental and social practices among businesses.	Parris et al., 2016
Supply Chain Labor Standards and Compliance	Prevents exploitation and supports ethical practices, contributing to broader social and environmental sustainability goals.	Govindan et al., 2021

Table 3. Mechnizam of how Governance ESG practices contribute to planetary health issues

Governance ESG Practice	Mechanism Addressing Planetary Health Issues	Reference
Board Diversity and Independence	Ensures diverse perspectives in decision-making, which can lead to more comprehensive approaches to addressing environmental and health issues.	Rao & Tilt, 2016
Executive Compensation Tied to ESG Performance	Aligns executive incentives with sustainability goals, encouraging actions that mitigate climate change and environmental degradation.	Ritz, 2020; Keddie & Magnan, 2023
Anti-Corruption Policies and Whistleblower Programs	Prevents unethical practices that could exacerbate environmental harm or hinder efforts to address planetary health issues.	Kaur et al., 2024
Shareholder Rights and Voting Mechanisms	Enhances accountability and encourages shareholder support for environmental and social initiatives, promoting better governance on health and sustainability.	Guay et al., 2004
Tax Transparency	Ensures that companies contribute fairly to public funds, which can support environmental and health programs, and discourage tax avoidance that could limit public resources.	Payne & Raiborn, 2018
Regulatory Compliance (e.g., Legal Fines, Litigation)	Adheres to environmental regulations, reducing incidents of pollution, deforestation, and other activities that contribute to planetary health issues.	Sagar & Chandrappa, 2023
Business Ethics and Corporate Behavior	Promotes responsible corporate behavior, which can help address pollution, resource depletion, and other environmental impacts.	Branco & Rodrigues, 2006
Governance Structure (e.g., Board Committees, ESG Oversight)	Provides structured oversight for ESG issues, ensuring that environmental and health considerations are integrated into corporate strategy and operations.	Câmara, 2022
Risk Management Frameworks	Identify and mitigate risks related to climate change and environmental degradation, enhancing resilience to extreme weather events and other health impacts.	Kumar et al., 2021

Environmental ESG practices are essential for tackling planetary health issues. Environmental ESG practices and organizations contribute to the mitigation of numerous planetary health issues, enhancing overall environmental sustainability and resilience. Social ESG practices enhance community resilience, improve health outcomes, and support ethical practices, which collectively contribute to addressing various planetary health challenges. Governance ESG practices collectively address various planetary health challenges by promoting ethical behavior, transparency, and effective environmental and social performance oversight.

Systems Dynamics of the Relationship of ESG & Planetary Health

Environmental Dynamics Modelling

The environmental dynamics modeled using Causal Loop Diagrams (CLDs) principles illustrate how environmental ESG practices address planetary health issues. The key takeaway is that reducing carbon emissions and increasing renewable energy usage help mitigate climate change, leading to fewer extreme weather events and reduced health impacts such as heat-related illnesses. Conversely, higher waste generation contributes to increased soil and water pollution, worsening ecosystem degradation and food system vulnerabilities, reinforcing negative environmental health outcomes.

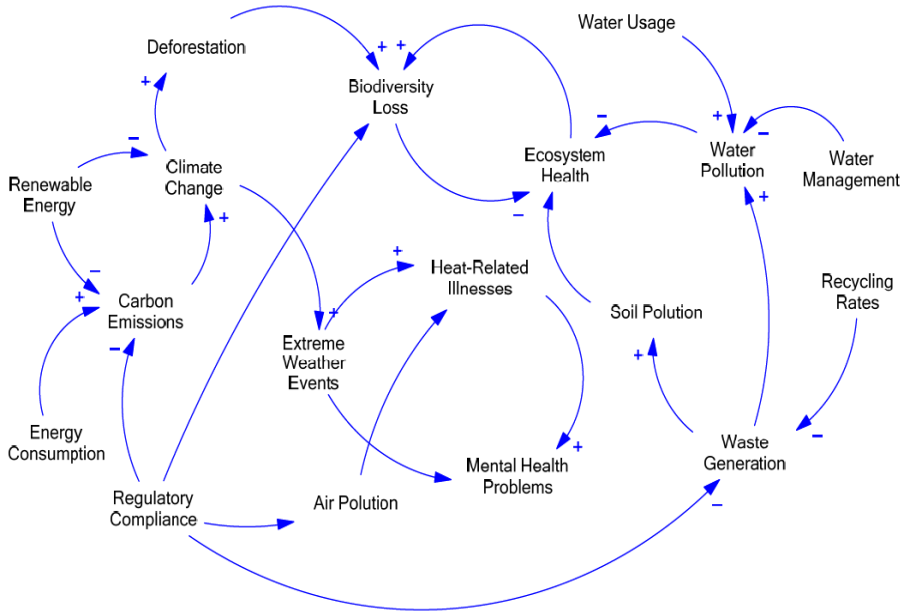

Fig. 1. Causal Loop Diagrams of the dynamics of the environmental ESG and planetary health issues

Social Dynamics Modelling

The relationships depicted in the CLD demonstrate how enhancing social ESG practices positively impacts the workforce and environmental sustainability. A feedback loop strengthens the organization's capacity to tackle planetary health challenges such as climate change and

environmental degradation by fostering social well-being and resilience. For instance, improving employee diversity and inclusion reduces mental health issues, improving well-being and workplace outcomes. The CLD highlights how factors like fair wages, safety, and community engagement boost worker well-being and productivity and drive innovation for addressing environmental challenges. This ultimately contributes to better planetary health by mitigating pollution, biodiversity loss, and other environmental concerns.

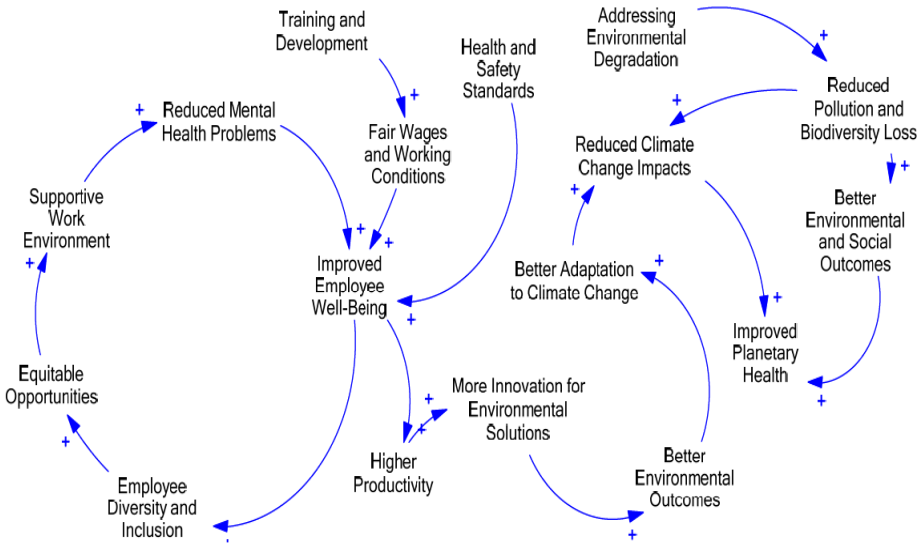

Fig. 2. Causal Loop Diagrams of the dynamics of the social ESG and planetary health issues

Governance Dynamics Modelling

The integrated CLD demonstrates how governance ESG practices, such as board diversity, executive compensation, anti-corruption measures, and strong risk management frameworks, form a complex feedback loop system that positively influences corporate environmental behavior. These practices help address climate change, reduce pollution, and enhance planetary health by promoting responsible decision-making, aligning incentives with sustainability, and ensuring regulatory compliance. This leads to a cycle of improvement in both corporate governance and planetary health outcomes.

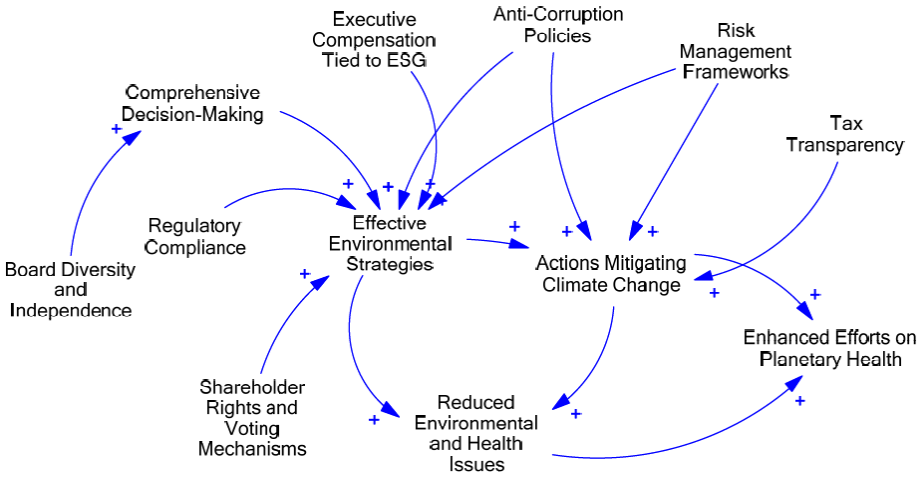

Fig. 3. Causal Loop Diagrams of the dynamics of the social ESG and planetary health issues

Integration of Causal Loops Diagrams of ESG and Planetary Health Issues

Commented [BT1]: Under Development

The integrated CLD shows how ESG practices are interconnected and influence each other. For example, improvements in governance practices such as Regulatory Compliance and Anti-Corruption Policies drive better environmental outcomes and enhance social well-being by ensuring fair practices and reducing disparities.

In Environmental ESG practices, carbon emissions and renewable energy usage significantly influence climate change. Lowering carbon emissions and increasing renewable energy reduce the impacts of climate change, such as extreme weather events and heat-related illnesses. Energy consumption and recycling rates affect waste generation and air pollution, whereas higher recycling rates and efficient energy use can minimize waste and pollution, improving ecosystem health. Water usage and waste generation impact water pollution and soil erosion, contributing to biodiversity loss and food system vulnerabilities. Sustainable water management and waste reduction enhance water quality and ecosystem health.

In Social ESG practices, employee diversity and inclusion enhance worker well-being, which increases productivity and fosters innovation. They also support solutions to environmental challenges and improve planetary health. Fair wages and good working conditions strengthen workforce resilience, aiding adaptation to climate change and reducing its impacts. Health and safety standards lower heat-related illnesses and workplace accidents, enhancing overall worker health and productivity.

In Governance ESG practices, board diversity and executive compensation tied to ESG performance promote effective environmental strategies and regulatory compliance, which reduce carbon emissions, air pollution, and water pollution, improving planetary health. Anti-corruption policies and shareholder rights ensure transparency and accountability, leading to more substantial environmental and health initiatives.

The CLD highlights both balancing and reinforcing feedback loops. Balancing loops, such as those involving carbon emissions and climate change, demonstrate how reductions in negative impacts lead to stabilizing environmental health. Reinforcing loops, such as those connecting employee diversity to innovation, illustrate how positive changes in social ESG practices can amplify benefits across various dimensions of planetary health.

By integrating these loops, the CLD provides a comprehensive view of how ESG practices collectively impact planetary health. It illustrates the dynamic nature of these relationships, showing how improvements in one area can lead to cascading benefits across others, ultimately supporting a healthier planet.

This holistic approach underscores the importance of a systems-thinking perspective in addressing complex planetary health challenges. It also emphasizes the need for continued improvements in ESG practices to drive positive, systemic environmental and social outcomes changes.

5.0 Discussion

This research provides valuable insights for policymakers, businesses, investors, and other stakeholders by bridging the gap between ESG principles and planetary health, particularly in the context of industries' significant contributions to global environmental challenges. With sectors like energy responsible for 73.2% of greenhouse gas emissions, agriculture, forestry, and land use (AFOLU) accounting for 22%, and industrial processes and buildings adding 5.2% and 16%, respectively (including electricity use), it is clear that these industries are critical drivers of environmental degradation. Moreover, agriculture has led to the clearing of large portions of global ecosystems, including 70% of grasslands, 50% of savannas, and significant portions of forests. Such impacts, coupled with the anticipated harvesting of 800 million hectares of forest by 2050 and urban expansion over 80 million hectares, underline the urgency for transformative action.

The profound influence of these industries on biodiversity and ecosystem health underscores the need for implementing robust ESG frameworks. By integrating environmental, social, and governance (ESG) principles, businesses can better address these pressing planetary health challenges. Respecting planetary boundaries and recognizing critical ecological tipping points are crucial components of this effort. ESG initiatives, such as the Sustainable Development Goals (SDGs), nature-based solutions, and circular economy models, provide essential strategies to mitigate the negative impacts of industry on ecosystems while fostering social progress. These approaches not only promote environmental sustainability but also contribute to poverty eradication, income equality, and the empowerment of vulnerable communities through ethical labor practices, fair wages, and local hiring.

Moreover, ESG-driven investments play a pivotal role in addressing planetary boundaries and tipping points. By aligning investment strategies with environmental limits, investors can drive

businesses toward more sustainable and regenerative practices. The example of Eurazeo's €750 million Planetary Boundaries Fund, which supports a circular economy and climate transition, illustrates how ESG investing can fuel innovation and sustainability. Companies like L'Oréal and Kering have also embraced ESG-aligned strategies to operate within planetary boundaries, a trend that is gaining momentum as investor demand for sustainable practices grows.

This research advocates for the adoption of holistic approaches to planetary health management, leveraging ESG principles not only to mitigate climate change but also to address broader ecological challenges such as biodiversity loss. By fostering financial incentives for companies to improve their environmental and social performance, ESG investing can create a ripple effect across industries, encouraging responsible corporate behavior. As ESG frameworks continue to evolve and expand their scope, they have the potential to reshape corporate policies, ensuring that businesses respect planetary boundaries and contribute to a more sustainable and resilient future for the planet. This integrated approach emphasizes the need for informed decision-making and policy shifts that can transform industries, making them active participants in preserving planetary health.

Commented [BT2]: Have to be edited

6.0 Conclusion

In conclusion, the growing global emphasis on sustainability has significantly reshaped corporate responsibility, with businesses increasingly adopting Environmental, Social, and Governance (ESG) frameworks. While Corporate Social Responsibility (CSR) provided an initial foundation for addressing social and environmental concerns, ESG criteria have emerged as a more comprehensive and measurable approach. By linking sustainability directly to business risks and financial performance, ESG frameworks offer standardized metrics that enable companies to assess and report on their environmental, social, and governance practices more effectively.

The integration of ESG indicators is crucial in addressing planetary health issues. Environmental ESG practices focus on reducing carbon footprints and managing natural resources, significantly mitigating climate change and pollution, and addressing challenges like extreme weather events and biodiversity loss. Social ESG practices enhance community resilience and promote equitable health outcomes, while governance ESG practices ensure responsible leadership and transparency, driving effective environmental and social strategies.

Systems dynamics modeling further clarifies the interconnectedness of these ESG practices and their cumulative effects on planetary health. Causal Loop Diagrams (CLDs) illustrate how improvements in one ESG dimension can create positive feedback loops, amplifying benefits across environmental, social, and governance spheres. For instance, better governance can lead to more effective environmental policies, while enhanced social practices can drive innovation and resilience.

The interplay between ESG practices and planetary health underscores the importance of a systems approach that accounts for the complex relationships between environmental degradation, human well-being, and corporate governance. This holistic perspective highlights the need for continued refinement and implementation of ESG frameworks to address pressing planetary health challenges. As industries are critical drivers of environmental degradation, robust ESG practices

offer a pathway to mitigate these impacts, fostering a more sustainable and resilient future. By aligning corporate strategies with planetary health objectives, businesses, investors, and policymakers can collectively contribute to preserving the planet's ecological balance and ensuring long-term well-being for all.

Commented [BT3]: Have to be edited

References

Tsang, A., Frost, T., & Cao, H. (2023). Environmental, social, and governance (ESG) disclosure: A literature review. *The British Accounting Review*, *55*(1), 101149.

Writer, S. (2019). A brief history of corporate social responsibility (CSR). *THOMAS NET,(Sept. 25, 2019, 4: 00 PM) https://www. thomasnet. com/insights/history*.

Latapí Agudelo, M. A., Jóhannsdóttir, L., & Davídsdóttir, B. (2019). A literature review of the history and evolution of corporate social responsibility. *International journal of corporate social responsibility*, *4*(1), 1-23.

Lau, F., & Kuziemsky, C. (2016). *Handbook of eHealth evaluation: an evidence-based approach*.

Morgan, R. L., & Florez, I. D. (2022). Principles of systematic reviews and meta-analyses. *Meta-Research: Methods and Protocols*, 1-15.

Conservice. (n.d.). *ESG reporting matrix: Understanding the alphabet soup of ESG*. Conservice. Retrieved September 17, 2024, from https://www.conservice.com/esg-reporting-matrix

Quantive. (n.d.). *What are ESG frameworks? Choose the right one for your business*. Quantive. Retrieved September 17, 2024, from https://www.quantive.com/esg-frameworks

Azeus Convene. (n.d.). *Your guide to ESG reporting frameworks & standards*. Azeus Convene. Retrieved September 17, 2024, from https://www.azeusconvene.com/esg-reporting-frameworks

Sustainability News. (2024). *ESG reporting frameworks in 2024: Everything you need to know*. Sustainability News. Retrieved September 17, 2024, from https://www.sustainability-news.net/esg-reporting-frameworks-2024

LinkedIn. (2024). *5 best ESG reporting frameworks explained with examples — 2024*. LinkedIn. Retrieved September 17, 2024, from https://www.linkedin.com/pulse/best-esg-reporting-frameworks-explained-examples-2024

Rangan, K., Chase, L., & Karim, S. (2015). The truth about CSR. *Harvard Business Review*. https://hbr.org/2015/01/the-truth-about-csr

ESCE International Business School. (n.d.). What are the challenges of CSR for companies? *ESCE International Business School*. https://www.esce.fr/en/faq-all-the-answers-to-your-questions/what-are-the-challenges-of-csr-for-companies/

Fehre, K., & Weber, F. (2016). Challenging corporate commitment to CSR: Do CEOs keep talking about corporate social responsibility (CSR) issues in times of the global financial crisis?. *Management Research Review*, *39*(11), 1410-1430.

Aggarwal, P., & Kadyan, A. (2014). Greenwashing: The darker side of CSR. *Indian Journal of Applied Research*, *4*(3), 61-66.

Jenkins, H. (2009). A 'business opportunity' model of corporate social responsibility for small-and medium-sized enterprises. *Business ethics: A European review*, *18*(1), 21-36.

Wang, M. L., & Phillips-Fein, K. (2023). Environmental, Social, and Corporate Governance: A History of ESG Standardization from 1970s to the Present. *Undergraduate. Senior Thesis, Columbia University, New York, NY, USA*.

Daugaard, D., & Ding, A. (2022). Global drivers for ESG performance: The body of knowledge. *Sustainability*, *14*(4), 2322.

Matos, P. (2020). ESG and responsible institutional investing around the world: A critical review.

Jebe, R. (2019). The convergence of financial and ESG materiality: Taking sustainability mainstream. *American Business Law Journal*, *56*(3), 645-702.

Hoang, T. (2018). The role of the integrated reporting in raising awareness of environmental, social and corporate governance (ESG) performance. In *Stakeholders, governance and responsibility* (pp. 47-69). Emerald Publishing Limited.

Escrig-Olmedo, E., Fernández-Izquierdo, M. Á., Ferrero-Ferrero, I., Rivera-Lirio, J. M., & Muñoz-Torres, M. J. (2019). Rating the raters: Evaluating how ESG rating agencies integrate sustainability principles. *Sustainability*, *11*(3), 915.

Singhania, M., & Saini, N. (2023). Institutional framework of ESG disclosures: comparative analysis of developed and developing countries. *Journal of Sustainable Finance & Investment*, *13*(1), 516-559.

Ayyoob, A., & Sajeev, A. (2024). Navigating Sustainability: Assessing the Imperative of ESG Considerations in Achieving SDGs. In *ESG Frameworks for Sustainable Business Practices* (pp. 53-84). IGI Global.

Ebi, K. L., Harris, F., Sioen, G. B., Wannous, C., Anyamba, A., Bi, P., ... & Capon, A. (2020). Transdisciplinary research priorities for human and planetary health in the context of the 2030 agenda for sustainable development. *International journal of environmental research and public health*, *17*(23), 8890.

Talukder, B., Ganguli, N., Choi, E., Tofighi, M., & Obrinski, J. (2024). Exploring the nexus: Comparing and aligning Planetary Health, One Health, and EcoHealth. *Global Transitions*, *6*, 66-75.

Myers, S. S. (2017). Planetary health: protecting human health on a rapidly changing planet. *The Lancet*, *390*(10114), 2860-2868.

Whitmee, S., Haines, A., Beyrer, C., Boltz, F., Capon, A. G., de Souza Dias, B. F., ... & Yach, D. (2015). The Rockefeller Foundation–Lancet Commission on planetary health. Safeguarding human health in the Anthropocene epoch: report of The Rockefeller Foundation–Lancet Commission on planetary health. *Lancet*, *386*(10007), 1973-2028.

Bayram, H., Rice, M. B., Abdalati, W., Akpinar Elci, M., Mirsaeidi, M., Annesi-Maesano, I., ... & Balmes, J. R. (2023). Impact of global climate change on pulmonary health: susceptible and vulnerable populations. *Annals of the American Thoracic Society*, *20*(8), 1088-1095.

Iyer, H. S., DeVille, N. V., Stoddard, O., Cole, J., Myers, S. S., Li, H., ... & Golden, C. D. (2021). Sustaining planetary health through systems thinking: Public health's critical role. SSM-Population Health, 15, 100844.

Chopra, S. S., Senadheera, S. S., Dissanayake, P. D., Withana, P. A., Chib, R., Rhee, J. H., & Ok, Y. S. (2024). Navigating the Challenges of Environmental, Social, and Governance (ESG) Reporting: The Path to Broader Sustainable Development. *Sustainability*, *16*(2), 606.

Sauer, P. W., Pai, M. A., & Chow, J. H. (2017). *Power system dynamics and stability: with synchrophasor measurement and power system toolbox*. John Wiley & Sons.

Sahin, O., Salim, H., Suprun, E., Richards, R., MacAskill, S., Heilgeist, S., ... & Beal, C. D. (2020). Developing a preliminary causal loop diagram for understanding the wicked complexity of the COVID-19 pandemic. *Systems*, *8*(2), 20.

Ryan, E., Pepper, M., & Munoz, A. (2021). Causal loop diagram aggregation towards model completeness. *Systemic Practice and Action Research*, *34*, 37-51.

Scavarda, A. J., Bouzdine-Chameeva, T., Goldstein, S. M., Hays, J. M., & Hill, A. V. (2006). A methodology for constructing collective causal maps. *Decision Sciences*, *37*(2), 263-283.

Groundstroem, F., & Juhola, S. (2021). Using systems thinking and causal loop diagrams to identify cascading climate change impacts on bioenergy supply systems. *Mitigation and Adaptation Strategies for Global Change*, *26*(7), 29.

Treepongkaruna, S., Au Yong, H. H., Thomsen, S., & Kyaw, K. (2024). Greenwashing, carbon emission, and ESG. *Business Strategy and the Environment*.

Işık, C., Ongan, S., Islam, H., Balsalobre-Lorente, D., & Sharif, A. (2024). ECON-ESG factors on energy efficiency: Fostering sustainable development in ECON-growth-paradox countries. *Gondwana Research*, *135*, 103-115.

Kocmanova, A., Nemecek, P., & Docekalova, M. (2012). Environmental, social and governance (ESG) key performance indicators for sustainable reporting. In *The 7th International Scientific Conference* (pp. 655-663).

Weber, O., & Saunders-Hogberg, G. (2018). Water management and corporate social performance in the food and beverage industry. *Journal of cleaner production*, *195*, 963-977.

Rajesh, R., & Rajendran, C. (2020). Relating environmental, social, and governance scores and sustainability performances of firms: An empirical analysis. *Business Strategy and the Environment*, *29*(3), 1247-1267.

Keeley, A. R., Chapman, A. J., Yoshida, K., Xie, J., Imbulana, J., Takeda, S., & Managi, S. (2022). ESG metrics and social equity: Investigating commensurability. *Frontiers in Sustainability*, *3*, 920955.

Dathe, T., Helmold, M., Dathe, R., & Dathe, I. (2024). ESG Metrics. In Implementing Environmental, Social and Governance (ESG) Principles for Sustainable Businesses: A Practical Guide in Sustainability Management (pp. 159-174). Cham: Springer International Publishing.

Boerner, H. (2015). Importance of intangibles reflected in esg performance metrics for a growing number of investors. *Corporate Finance Review*, *19*(5), 28.

Zumente, I., & Bistrova, J. (2021). ESG importance for long-term shareholder value creation: Literature vs. practice. *Journal of Open Innovation: Technology, Market, and Complexity*, *7*(2), 127.

Kotsantonis, S., & Serafeim, G. (2019). Four things no one will tell you about ESG data. *Journal of Applied Corporate Finance*, *31*(2), 50-58.

Gholian-Jouybari, F., Khazaei, M., Saen, R. F., Kia, R., Bonakdari, H., Hajiaghaei-Keshteli, M., & Ramezani, M. (2024). Developing environmental, social and governance (ESG) strategies on evaluation of municipal waste disposal centers: A case of Mexico. *Chemosphere*, *364*, 142961.

Mneimneh, F., Al Kodsi, M., Chamoun, M., Basharoush, M., & Ramakrishna, S. (2023). How can green energy technology innovations improve the carbon-related environmental dimension of ESG rating?. *Circular Economy and Sustainability*, *3*(4), 2183-2199.

Oliver Yébenes, M. (2024). Climate change, ESG criteria and recent regulation: challenges and opportunities. *Eurasian Economic Review*, *14*(1), 87-120.

Sadriwala, K. F., Shannaq, B., & Sadriwala, M. F. (2024). GCC Cross-National Comparative Study on Environmental, Social, and Governance (ESG) Metrics Performance and Its Direct Implications for Economic Development Outcomes. In *The AI Revolution: Driving Business Innovation and Research: Volume 2* (pp. 429-441). Cham: Springer Nature Switzerland.

Kopnina, H., Zhang, S. R., Anthony, S., Hassan, A., & Maroun, W. (2024). The inclusion of biodiversity into Environmental, Social, and Governance (ESG) framework: A strategic integration of ecocentric extinction accounting. *Journal of Environmental Management*, *351*, 119808.

Atkins, J., Doni, F., Gasperini, A., Artuso, S., La Torre, I., & Sorrentino, L. (2023). Exploring the effectiveness of sustainability measurement: which ESG metrics will survive COVID-19?. *Journal of Business Ethics*, *185*(3), 629-646.

Bellandi, F. (2022). Further developments of the financially-ESG sustainable growth matrix. *International Journal of Business and Management*, *17*(2), 112-122.

Giampetro-Meyer, A. (2022). Transforming the future of work by embracing corporate social justice. *Wash. & Lee J. Civ. Rts. & Soc. Just.*, *29*, 67.

Torres, L., Ripa, D., Jain, A., Herrero, J., & Leka, S. (2023). The potential of responsible business to promote sustainable work–An analysis of CSR/ESG instruments. *Safety Science*, *164*, 106151.

Kotsantonis, S., & Serafeim, G. (2019). Four things no one will tell you about ESG data. *Journal of Applied Corporate Finance*, *31*(2), 50-58.

Keeley, A. R., Chapman, A. J., Yoshida, K., Xie, J., Imbulana, J., Takeda, S., & Managi, S. (2022). ESG metrics and social equity: Investigating commensurability. *Frontiers in Sustainability*, *3*, 920955.

Schleich, M. V. (2022). What are the human resources policies and practices most used by companies with the best ESG ratios in Brazil?. *Revista de Administração de Empresas*, *62*, e2021-0370.

Chang, X., Fu, K., Jin, Y., & Liem, P. F. (2022). Sustainable finance: ESG/CSR, firm value, and investment returns. *Asia-Pacific Journal of Financial Studies*, *51*(3), 325-371.

Aksoy, L., Buoye, A. J., Fors, M., Keiningham, T. L., & Rosengren, S. (2022). Environmental, Social and Governance (ESG) metrics do not serve services customers: A missing link between sustainability metrics and customer perceptions of social innovation. *Journal of Service Management*, *33*(4/5), 565-577.

Bartley, T. (2022). Corporate social responsibility: codes, compliance and ESG ratings. In *Handbook on Globalisation and Labour Standards* (pp. 400-415). Edward Elgar Publishing.

Romano, M., Cirillo, A., Favino, C., & Netti, A. (2020). ESG (Environmental, Social and Governance) performance and board gender diversity: The moderating role of CEO duality. *Sustainability*, *12*(21), 9298.

Cohen, S., Kadach, I., Ormazabal, G., & Reichelstein, S. (2023). Executive compensation tied to ESG performance: International evidence. *Journal of Accounting Research*, *61*(3), 805-853.

Cardoni, A., & Kiseleva, E. (2023). Sustainable Governance and Its Components. In *Sustainable Governance: Concept, Metrics and Contexts* (pp. 27-41). Cham: Springer International Publishing.

Dalby, S., Marlier, F., Weaver, B., & Whipp, M. (2021). ESG Tax Transparency: You Might Want to Check out BRT's Statement Signed by 181 CEOs. *Tax Executive*, *73*, 16.

Dell'Erba, M., & Gomtsyan, S. (2024). Regulatory and investor demands to use ESG performance metrics in executive compensation: right instrument, wrong method. *Journal of Corporate Law Studies*, 1-40.

Fiaschi, D., Giuliani, E., Nieri, F., & Salvati, N. (2020). How bad is your company? Measuring corporate wrongdoing beyond the magic of ESG metrics. *Business Horizons*, *63*(3), 287-299.

Elmghaamez, I. K., Nwachukwu, J., & Ntim, C. G. (2024). ESG disclosure and financial performance of multinational enterprises: The moderating effect of board standing committees. *International Journal of Finance & Economics*, *29*(3), 3593-3638.

Dathe, T., Helmold, M., Dathe, R., & Dathe, I. (2024). ESG Metrics. In *Implementing Environmental, Social and Governance (ESG) Principles for Sustainable Businesses: A Practical Guide in Sustainability Management* (pp. 159-174). Cham: Springer International Publishing.

Garcia, A. S., Mendes-Da-Silva, W., & Orsato, R. J. (2017). Sensitive industries produce better ESG performance: Evidence from emerging markets. *Journal of cleaner production*, *150*, 135-147.

Duque-Grisales, E., & Aguilera-Caracuel, J. (2021). Environmental, social and governance (ESG) scores and financial performance of multilatinas: Moderating effects of geographic international diversification and financial slack. *Journal of Business Ethics*, *168*(2), 315-334.

Arvidsson, S., & Dumay, J. (2022). Corporate ESG reporting quantity, quality and performance: Where to now for environmental policy and practice?. *Business strategy and the environment*, *31*(3), 1091-1110.

Matakanye, R. M., van der Poll, H. M., & Muchara, B. (2021). Do companies in different industries respond differently to stakeholders' pressures when prioritising environmental, social and governance sustainability performance?. *Sustainability*, *13*(21), 12022.

Watts, N., Amann, M., Arnell, N., Ayeb-Karlsson, S., Beagley, J., Belesova, K., ... & Costello, A. (2021). The 2020 report of The Lancet Countdown on health and climate change: responding to converging crises. *The lancet*, *397*(10269), 129-170.

Tong, S., Bambrick, H., Beggs, P. J., Chen, L., Hu, Y., Ma, W., ... & Tan, J. (2022). Current and future threats to human health in the Anthropocene. *Environment international*, *158*, 106892.

Demaio, A. R., & Rockström, J. (2015). Human and planetary health: towards a common language. *The Lancet*, *386*(10007), e36-e37.

Myers, S. S. (2017). Planetary health: protecting human health on a rapidly changing planet. *The Lancet*, *390*(10114), 2860-2868.

Whitmee, S., Haines, A., Beyrer, C., Boltz, F., Capon, A. G., de Souza Dias, B. F., ... & Yach, D. (2015). Safeguarding human health in the Anthropocene epoch: report of The Rockefeller Foundation–Lancet Commission on planetary health. *The lancet*, *386*(10007), 1973-2028.

Talukder, B., Ganguli, N., Matthew, R., VanLoon, G. W., Hipel, K. W., & Orbinski, J. (2021). Climate change-triggered land degradation and planetary health: A review. *Land Degradation & Development*, *32*(16), 4509-4522.

McKinney, A. (2019). A planetary health approach to study links between pollution and human health. *Current Pollution Reports*, *5*(4), 394-406.

Marinova, D., & Bogueva, D. (2022). *Food in a planetary emergency* (pp. 1-232). Singapore:: Springer.

Wijeskara, N. (2023). Planetary Health: Rethinking Health. *One Health: Human, Animal, and Environment Triad*, 363-387.

Ebi, K. L., Harris, F., Sioen, G. B., Wannous, C., Anyamba, A., Bi, P., ... & Capon, A. (2020). Transdisciplinary research priorities for human and planetary health in the context of the 2030 agenda for sustainable development. *International journal of environmental research and public health*, *17*(23), 8890.

Câmara, P. (2022). The systemic interaction between corporate governance and ESG. In *The Palgrave handbook of ESG and corporate governance* (pp. 3-40). Cham: Springer International Publishing.

Gutterman, A. S. (2018). *Sustainability and Corporate Governance: A Practice Guide to Implementing a Sustainability Governance System*. Kluwer Law International BV.

Jinga, P. (2021). The increasing importance of environmental, social and governance (ESG) investing in combating climate change. *Environmental Management-Pollution, Habitat, Ecology, and Sustainability*.

Mneimneh, F., Al Kodsi, M., Chamoun, M., Basharoush, M., & Ramakrishna, S. (2023). How can green energy technology innovations improve the carbon-related environmental dimension of ESG rating?. *Circular Economy and Sustainability*, *3*(4), 2183-2199.

Veenstra, E. M., & Ellemers, N. (2020). ESG indicators as organizational performance goals: Do rating agencies encourage a holistic approach?. *Sustainability*, *12*(24), 10228.

Rahdari, A. H., & Rostamy, A. A. A. (2015). Designing a general set of sustainability indicators at the corporate level. *Journal of Cleaner Production*, *108*, 757-771.

Kandpal, V., Jaswal, A., Santibanez Gonzalez, E. D., & Agarwal, N. (2024). Corporate social responsibility (CSR) and ESG reporting: redefining business in the twenty-first century. In *Sustainable Energy Transition: Circular Economy and Sustainable Financing for Environmental, Social and Governance (ESG) Practices* (pp. 239-272). Cham: Springer Nature Switzerland.

Chang, D., Lee, C. K. M., & Chen, C. H. (2014). Review of life cycle assessment towards sustainable product development. *Journal of cleaner production*, *83*, 48-60.

Pelletier, N., & Tyedmers, P. (2008). Life cycle considerations for improving sustainability assessments in seafood awareness campaigns. *Environmental management*, *42*, 918-931.

Laffoley, D., Baxter, J. M., Amon, D. J., Currie, D. E., Downs, C. A., Hall-Spencer, J. M., ... & Woodall, L. C. (2020). Eight urgent, fundamental and simultaneous steps needed to restore ocean health, and the consequences for humanity and the planet of inaction or delay. *Aquatic Conservation: marine and freshwater ecosystems*, *30*(1), 194-208.

Percival, R. V., Schroeder, C. H., Miller, A. S., & Leape, J. P. (2021). *Environmental regulation: Law, science, and policy [connected EBook with study center]*. Aspen Publishing.

Sandifer, P. A., Sutton-Grier, A. E., & Ward, B. P. (2015). Exploring connections among nature, biodiversity, ecosystem services, and human health and well-being: Opportunities to enhance health and biodiversity conservation. *Ecosystem services*, *12*, 1-15.

Wunderlich, S. M., & Martinez, N. M. (2018). Conserving natural resources through food loss reduction: Production and consumption stages of the food supply chain. *International Soil and Water Conservation Research*, *6*(4), 331-339.

Aghamohammadi, N., Fong, C. S., Farid, N. D. N., Ramakreshnan, L., & Mohammadi, P. A. (2022). Heat and Mental Health in Cities. In *Urban Overheating: Heat Mitigation and the Impact on Health* (pp. 81-107). Singapore: Springer Nature Singapore.

Sorensen, C., & Hess, J. (2022). Treatment and prevention of heat-related illness. *New England Journal of Medicine*, *387*(15), 1404-1413.

Crowley, R. A., & Health and Public Policy Committee of the American College of Physicians*. (2016). Climate change and health: a position paper of the American College of Physicians. *Annals of internal medicine*, *164*(9), 608-610.

Field, C. B., Barros, V., Stocker, T. F., & Dahe, Q. (Eds.). (2012). *Managing the risks of extreme events and disasters to advance climate change adaptation: special report of the intergovernmental panel on climate change*. Cambridge University Press.

Ye, J., & Xu, W. (2023). Carbon reduction effect of ESG: empirical evidence from listed manufacturing companies in China. *Frontiers in Ecology and Evolution*, *11*, 1311777.

Shah, W. U. H., Hao, G., Yan, H., Zhu, N., Yasmeen, R., & Dincă, G. (2024). Role of renewable, non-renewable energy consumption and carbon emission in energy efficiency and productivity change: Evidence from G20 economies. *Geoscience Frontiers*, *15*(4), 101631.

Ofremu, G. O., Raimi, B. Y., Yusuf, S. O., Dziwornu, B. A., Nnabuife, S. G., Eze, A. M., & Nnajiofor, C. A. (2024). Exploring the Relationship between Climate Change, Air Pollutants and Human Health: Impacts, Adaptation, and Mitigation Strategies. *Green Energy and Resources*, 100074.

Gordon, L. J., Finlayson, C. M., & Falkenmark, M. (2010). Managing water in agriculture for food production and other ecosystem services. *Agricultural Water Management*, *97*(4), 512-519.

Cosgrove, W. J., & Loucks, D. P. (2015). Water management: Current and future challenges and research directions. *Water Resources Research*, *51*(6), 4823-4839.

Rajmohan, K. V. S., Ramya, C., Viswanathan, M. R., & Varjani, S. (2019). Plastic pollutants: effective waste management for pollution control and abatement. *Current Opinion in Environmental Science & Health*, *12*, 72-84.

Govindan, K., Shaw, M., & Majumdar, A. (2021). Social sustainability tensions in multi-tier supply chain: A systematic literature review towards conceptual framework development. *Journal of cleaner production*, *279*, 123075.

Parris, D. L., Dapko, J. L., Arnold, R. W., & Arnold, D. (2016). Exploring transparency: a new framework for responsible business management. *Management Decision*, *54*(1), 222-247.

Cvenkel, N. (2020). *Well-being in the workplace: governance and sustainability insights to promote workplace health*. Springer Nature.

Hilton, M. L., & Pellegrino, J. W. (Eds.). (2012). *Education for life and work: Developing transferable knowledge and skills in the 21st century*. National Academies Press.

Levy, B. S., & Patz, J. A. (2015). Climate change, human rights, and social justice. *Annals of global health*, *81*(3), 310-322.

Jolibert, C., & Wesselink, A. (2012). Research impacts and impact on research in biodiversity conservation: The influence of stakeholder engagement. *Environmental Science & Policy*, *22*, 100-111.

Varghese, B. M., Hansen, A. L., Williams, S., Bi, P., Hanson-Easey, S., Barnett, A. G., ... & Pisaniello, D. L. (2020). Heat-related injuries in Australian workplaces: Perspectives from health and safety representatives. *Safety science*, *126*, 104651.

Levy, B. S., & Roelofs, C. (2019). Impacts of climate change on workers' health and safety. In *Oxford research encyclopedia of global public health*.

Vohra, N., Chari, V., Mathur, P., Sudarshan, P., Verma, N., Mathur, N., ... & Gandhi, H. K. (2015). Inclusive workplaces: Lessons from theory and practice. *Vikalpa*, *40*(3), 324-362.

Sorensen, G., Dennerlein, J. T., Peters, S. E., Sabbath, E. L., Kelly, E. L., & Wagner, G. R. (2021). The future of research on work, safety, health and wellbeing: A guiding conceptual framework. *Social science & medicine*, *269*, 113593.

Kumar, N., Poonia, V., Gupta, B. B., & Goyal, M. K. (2021). A novel framework for risk assessment and resilience of critical infrastructure towards climate change. *Technological Forecasting and Social Change*, *165*, 120532.

Câmara, P. (2022). The systemic interaction between corporate governance and ESG. In *The Palgrave handbook of ESG and corporate governance* (pp. 3-40). Cham: Springer International Publishing.

Branco, M. C., & Rodrigues, L. L. (2006). Corporate social responsibility and resource-based perspectives. *Journal of business Ethics*, *69*, 111-132.

Sagar, R., & Chandrappa, U. (2023). Environmental Law and Sustainable Development: A Comparative Analysis. *Available at SSRN 4615776*.

Payne, D. M., & Raiborn, C. A. (2018). Aggressive tax avoidance: A conundrum for stakeholders, governments, and morality. *Journal of Business Ethics*, *147*, 469-487.

Guay, T., Doh, J. P., & Sinclair, G. (2004). Non-governmental organizations, shareholder activism, and socially responsible investments: Ethical, strategic, and governance implications. *Journal of business ethics*, *52*, 125-139.

Kaur, H., Singh, K., & Kaur, A. (2024). Corruption and Environmental Degradation: Challenges and Solutions for Effective Climate Action. In *Modern Concepts and Practices of Climate Finance* (pp. 325-350). IGI Global.

Keddie, S. L., & Magnan, M. (2023). Are ESG performance-based incentives a panacea or a smokescreen for excess compensation?. *Sustainability Accounting, Management and Policy Journal*, *14*(3), 591-634.

Ritz, R. (2020). Climate targets, executive compensation, and corporate strategy.

Rao, K., & Tilt, C. (2016). Board composition and corporate social responsibility: The role of diversity, gender, strategy and decision making. *Journal of business ethics*, *138*, 327-347.