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Can the Sustainable Development Goals support nexus thinking in companies? The case of water

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Abstract

Many initiatives and targets have been developed to address the unsustainable consumption of resources that consider the interconnected impacts and trade-offs that exist between different resources that are critical for the functioning of human societies and economies. Despite efforts to engage with the business sector to achieve these aims, there lacks sufficient integration of globally agreed targets (such as the United Nations Sustainable Development Goals) into business operations, and even less is understood on how these goals translate into management processes. Using a case study of water, and a consideration of the Water-Energy-Food-Ecosystem (WEFE) nexus, this paper looks at the public communications made by FTSE 100 companies via their annual and CSR reports, identifying that where present, water management disclosures remain in silo and are not explicitly linked to global sustainable development goals.

KEYWORDS
nexus perspectives, sustainability reporting, sustainable development goals, water management

1 | INTRODUCTION

The UN 2023 Water Conference declared that water is "a fundamental part of all aspects of life" and describes how "water is inextricably linked to the three pillars of sustainable development, and it integrates social, cultural, economic and political values" (United Nations, 2023). The special status of water is evidenced by its status of a "Universal Service," meaning that all citizens should have the right to the same service wherever they live (Eliassen & From, 2009). Water is also declared by the United Nations as public good and a human right (Lieberherr & Fuenfschilling, 2016), while European Union (EU) Directive 2000/60/EU states that "water is not a commercial product like any other but, rather, a heritage that must be protected, defended and treated as such" (Commission of the European Union, 2000). These declarations highlight the need to manage water in ways that differ from other resources that are used for economic activity. In terms of managing water resources, Rockström et al. (2023) call for the treatment of water as a common good, and addressing water challenges requires actions that draw on multiple sectors spanning public-private divisions and considers global and local strategies to achieve water sustainability. This provides a role for businesses to manage water resources and address water sustainability challenges through wider sustainability goals and targets such as the Sustainable Development Goals (SDGs) and identify the links to other key priorities including energy, food, and the environment (United Nations, 2023). The World Economic Forum (2015) states that water scarcity is a growing challenge for business operations (World Economic Forum, 2015). Supporting water sustainability actions is

Abbreviations: AWS, Alliance for Water Stewardship; CSR, Corporate Social Responsibility; EU, European Union; FTSE 100, Financial Times London Stock Exchange; GRI, Global Reporting Initiative; GSK, GlaxoSmithKlein; SDGs, Sustainable Development Goals; UN, United Nations; WBCSD, World Business Council for Sustainable Development; WEFE, Water-Energy-Food-Ecosystem.

emphasised by the SDGs, specifically Goal 6 (clean water and sanitation) as well as the efficient and effective use of water resources comprising part of Goal 12 (responsible consumption and production) (United Nations, 2019). The SDGs are relevant for corporate water sustainability management, the goals themselves were introduced to conceptualise a sustainable future and to trace a path towards the achievement of this (Mio et al., 2020), therefore providing an important guide for policy development and sustainable business practices.

Whilst research is continuing to advance in terms of measuring sustainability impacts resulting from business operations and the consumption of resources, there remains a gap in evaluating the interactions between resource consumption by businesses (including their suppliers) and the effect this has on the wider socio-ecological system. Previous research has discussed how using the SDGs alone can lead to silo thinking and a lack of consideration of potential trade-offs (van Zanten & van Tulder, 2021). This also gives rise to the need to explore the interconnectivity between resources (e.g., through taking a nexus perspective) to uncover pathways for sustainable development (Aggestam et al., 2023; Bleischwitz et al., 2018). Sustainability at a corporate level has often focused on climate change and specifically on the reduction of carbon emissions. Other pressing sustainability challenges such as water sustainability are listed as a separate topics, with attention paid by companies with obvious large water demands, such as in mining or beverage production (Bunclark & Scott, 2021), and relatively overlooked in other industries. Focus on water resources management should go beyond narrow definitions of efficiency and cost minimisation but instead consider interconnections and trade-offs between different aspects of resources (e.g., connecting to energy generation, or to the protection of ecosystems). This can have relevance at a business level but is also critical at a regional or national level, as policy-makers seek to minimise negative associations and optimise positive connections between different resources (Williams et al., 2019).

Fostering resource-nexus thinking into company strategizing would overcome challenges of disconnected silo decision-making and ensure companies would address wider perspectives of sustainable development. This can overcome accusations SDG-washing (Heras-Saizarbitoria et al., 2022; van Zanten & van Tulder, 2021), whereby companies struggle with impact-realisation challenges and focus on reporting against SDGs which are relatively easy to report against rather than explore future challenges and impacts from company operations (van Zanten & van Tulder, 2021). This requires identifying the connectivity and trade-offs between different resources and different sustainability impacts (Ferrón Vílchez et al., 2022). Taking a resource-nexus approach would enable the analysis of interconnections between different dimensions of sustainable development and different outcomes of resource management (van Zanten & van Tulder, 2021).

The objective of this paper is to explore the issue of water sustainability from the perspective of large companies, as evidenced by their corporate social responsibility strategies, and understand how water sustainability strategies connect to a wider range of sustainability management of resources. This is achieved using the SDGs and nexus approaches. Using public statements (e.g., reporting disclosures) as a proxy for the activities and strategies employed by companies enables an understanding of the interlinkages to a wider sustainability agenda. The disclosures from publicly available company reports can aid in identifying interconnectivities between different resources, which can assist in meeting multiple sustainable development goals, addressing trade-offs, and move beyond silo thinking (Bleischwitz et al., 2018). To do this, the paper addresses the following research questions:

1. What evidence exists in company reports that indicate alignment with the SDGs relating to water resource consumption?
2. What evidence is there of a resource-nexus approach when reporting against water issues?
3. What is the nature of reporting multiple resource issues as part of water sustainability reporting strategies and how do the SDGs relate to this?

To gain an overview of the water-related challenges that companies report against, this paper takes a case study of companies listed on the FTSE 100 stock-exchange and examine these self-disclosed challenges against water and resource efficiency-related targets of the SDGs. The next section explores the links between water sustainability performance, company reporting, nexus approaches, and institutional aspects. This is followed by the outline of the methodological approach and description of activities found in company resorts. Finally, the paper discusses the results in the context of sustainable development goals and nexus thinking before providing concluding thoughts.

1.1 | Resources and the SDGs

Guidelines and goals developed by external organisations such as the SDGs can play a useful role for companies to frame sustainability challenges and provide the motivation for managers and suppliers towards achieving sustainability objectives and increasing visibility of these actions (Hák et al., 2018). Within the SDGs are targets to be achieved, which are of relevance from a corporate water sustainability perspective, including improving water quality through reducing pollution; minimising the release of hazardous chemicals and materials into water courses, halving the proportion of untreated wastewater and promoting the sustainable management and efficient use of resources (United Nations, 2019). In addition, there is an emphasis on "large and transnational companies [to] adopt sustainable practices and to integrate sustainability into their reporting cycle" (United Nations, 2019). Whilst the SDGs were originally developed for countries and national politicians, it is unlikely that they can be achieved without the actions of companies (Silva, 2021). A review by Mio et al. (2020) highlights difficulties for businesses to integrate SDGs into their operating and reporting practices and a lack of long-term perspectives in business (and academia) on how emerging business and political strategies can be designed to aid the implementation of SDGs at a business level. The actions of multinational companies can therefore have a significant global impact on sustainability outcomes, and the impacts from

pursuing sustainable development goals extend beyond the geographical operating boundary of the firm (e.g., within the supply chain) and can extend beyond the confines of the resources of the goals that are being pursued. This section discusses the connection between sustainable development goals in water reporting, exploring their relationship to corporate activity in the context of sustainability management and strategy, as well as the links to institutionalisation of SDGs into these processes. We also consider the connections between SDGs, corporate water sustainability, and the nexus perspective with energy and ecosystems resources, as well as the connection to food, following the WEFE-nexus approach.

1.1.1 | Sustainable development goals as a framework for resource sustainability

Identifying managerial attitudes and the actions taken by companies to support water sustainability can be identified through the communications that are published by companies (Bebbington & Larrinaga, 2014; Morris et al., 2023). This information can be presented through accounting-style techniques such as disclosing targets and performance indicators whilst also providing expressive, narrative approaches that indicate the nature of the challenges faced and the activities made in response to water challenges, including the nature of the relationship with stakeholders (Li & Haque, 2019; Opferkuch et al., 2021). A study by Tsalis et al. (2020) highlights the usefulness of using corporate reporting to gain insights into potential challenges and subsequent activities in improving sustainability performance, particularly regarding targets connected to the sustainable development goals. Their study of reports from 20 Greek firms also discusses the challenges of using existing reporting guidelines such as the Global Reporting Initiative (GRI), which often address different targets and goals of the SDGs simultaneously (Tsalis et al., 2020). Despite the opportunities for integrating the SDGs into corporate reporting frameworks (Bebbington & Unerman, 2018), there remains a lack of integration of SDGs into company reporting and sustainability strategies (Pizzi et al., 2021; PwC, 2019; Silva, 2021). The "SDG Challenge Report" released by PricewaterhouseCoopers (PwC) in 2019 highlights this further, stating: "While there is a general acknowledgement of the importance of the goals, there is still not enough understanding of what concrete action should be or is taking place. It means effort and investment is not being directed to where it is needed the most" (PwC, 2019, p. 6). Pizzi et al. (2021) discuss how reporting against the SDGs at a corporate level is often not explicit, and SDG-related activities are contained within general nonfinancial reporting. The explicit use of SDGs to support sustainability strategies remains in development. According to the World Business Council for Sustainable Development (WBCSD, 2018), only 50% of the 250 companies interviewed claim to have realigned their strategies and objectives towards the SDGs. Combined with fears of SDG-washing, there is a gap for exploring the potential for SDG-influenced reporting to address a number of sustainability objectives, and move beyond what Pizzi et al. (2021) term as "tick-box approach." Building on this, the research presented here focused on sustainability challenges concerning water resources, and use the water-energy-food-ecosystem (WEFE) nexus approach to identify interconnected sustainability performance potential against two sustainable development goals.

1.1.2 | The role of water and the WEFE nexus

Water sustainability is related to the concept of water stewardship, which is defined by the Alliance of Water Stewardship (2019, p. 4) as "the use of water that is socially and culturally equitable, environmentally sustainable and economically beneficial, achieved through a stakeholder-inclusive process that involves site-and-catchment-based actions" is therefore critical for a functioning economy, while the threat of water scarcity, for example, through physical shortages and reduced access to resources is a potential limiting factor on the functioning of economies and societies (World Economic Forum, 2020). In the European Union only 2.4% of treated wastewater is currently being re-used (Santos et al., 2021). The SDGs contain targets and objectives that deal with repurposing wastewater, driving water efficiencies and enhancing access to water resources.

This research considers the definition of natural resources from the 2011 Bonn Nexus Conference as "part of the natural world that can be used in economic or social activities to produce goods and services. Material resources are biomass (e.g., crops for food, forest products, energy and bio-based materials), fossil fuels (e.g., coal, gas and oil), metallic minerals (e.g., iron, aluminium and copper used in construction and manufacturing) and non-metallic minerals" (Aggestam et al., 2023). Research on resource nexus, such as by Aggestam et al. (2023) considers key natural resources as water, energy, food, and biodiversity, which are used for their research on the barriers and opportunities for applying a nexus approach in sustainability-oriented policy making. While food is not a resource in the same way as energy, water, and ecosystem services, there are clear links between the management of water resources and the viability and productivity of agriculture. Drawing on the summary of the nexus approach by van Zanten and van Tulder (2021), applying the nexus approach to water management involves the examination and management of interlinkages of water sustainability issues, which understands the trade-offs and synergies from implementing water management strategies, as opposed to focusing on improvements in isolated areas and can benefit corporate decision-making as well as enhancing monitoring and measurement systems for local policy makers.

The nexus perspective can also provide a framework for companies to implement and refine sustainability strategies that achieve a wide range of objectives and support the achievement of different SDGs, without these resources necessarily being the primary focus of company sustainability strategies. Considerations of natural resources often focus on each resource individually, with targets often developed to address overconsumption or recycling/repurposing of a specific resource. This approach however overlooks the connectivity between natural resources, which can lead to both positive and negative impacts from resource use. The resource-nexus and nexus

thinking provides a concept that looks beyond the individual and often disconnected silos of resource consumption towards simultaneous assessment across different impacts of resources and across the different (economic, environmental, social) pillars of sustainability (Hogeboom et al., 2021; Malagó et al., 2021; Stephan et al., 2018). Connections between water, energy, food, and ecosystem services have gained increasing attention. This type of approach is needed as previous studies have explored trade-offs between the different "pillars" of sustainability (i.e., the social, environmental, and economic), for example, the study of Martínez-Bravo et al. (2019) explore the liveability of cities and the trade-offs between the different pillars of sustainability, concluding that policy-makers should be aware and committed to evaluating the trade-offs between different sustainability criteria in order to improve overall quality of life. In the example of water consumption, it can be stated that focusing on reducing water consumption often overlooks the wider impacts to society, with justifications for actions to conserve water framed in narrow terms (White, 2013). This presents a missed opportunity to build a framework for addressing water sustainability that also addresses the nexus approach, namely, the implications for the food, energy, and ecological impacts, as well as the associated wastewater impacts (Allouche et al., 2015).

1.1.3 | Sustainability reporting and institutionalisation

The SDGs can provide guidance on what to disclose and report against in order to meet expectations of existing sustainability goals, and targets, while a nexus approach assists companies to move beyond the tendency to frame water challenges in terms of solo perspectives of water use, which do not consider the trade-offs and interactions as part of overall sustainability performance. Understanding how these approaches are considered and implemented by businesses can be identified by the contents of their sustainability reporting. Corporate reports, whether annual, sustainability, or integrated can provide insights into strategic management perspectives and cover processes such as goal development, resource allocation, management of change, and monitoring and assessment (Opferkuch et al., 2021). The ability to communicate the sustainability challenges that arise is critical for companies as part of their reporting strategies, signalling credentials to stakeholders (Damert et al., 2020), and sustainability reporting can therefore be seen as a direct expression of a companies' managerial approach to sustainability.

The institutional context within which firms operate creates conformity, based on institutional characteristics emerging from coercive action (i.e., mandatory compliance to regulations and legislations), normative action (i.e., actions that have become professionalised and accepted ways of doing things), and mimetic mechanisms (i.e., the copying of valuable ways of doing things) (Clegg, 2010; Scott, 2008). Pressures from stakeholders impact on company strategic objectives, which are adopted by companies in order to conform to expectations and therefore links to the types of activities pursued as part of water management strategies. Managing these relationships and potential dependencies requires engagement, management, and collaboration in order to maintain access to physical resources and the societal and ecological impacts of their consumption (Wieland, 2014). In the context of water resources, firms are dependent on the stakeholders in their value chains, which include their suppliers but also the custodians of water resources, who may not be formal suppliers but instead critical stakeholders such as community groups. These expectations to satisfy stakeholder demands for legitimacy purposes (Suchman, 1995) can have further institutionalising pressures on companies to adopt sustainability practices, which relate not only to the SDGs but further embed nexus thinking into their strategies. In the context of water sustainability and the SDGs, the implementation of the nonfinancial reporting directive 2014/95/EU for companies of more than 500 employees may also place additional institutional pressures on companies to disclose further information regarding water sustainability practices (Pizzi et al., 2021), which may lead to an increase in the use of sustainability goals for guiding sustainability strategies, as well as increased consideration and application of nexus approaches.

2 | METHODOLOGY

The empirical analysis in this paper utilises documented corporate communication to present an understanding of the connection between SDGs and nexus thinking, through the case of water resources. A protocol to classify water-related corporate disclosures was developed to understand how water resources are identified and related to company operations. In particular, these communication disclosures were framed through the concepts of sustainable purchasing and the SDG goals as the basis for assessing how company reporting on water sustainability challenges are dealt with and related to the targets of SDG 6 (Clean Water and Sanitation for All) and 12 (Responsible Consumption and Production). SDG 6 is chosen due to its direct connection to water issues, while SDG 12 is relevant to corporate reporting, for example, SDG 12.6 is seen as connected to Directive 2014/95/EU (Pizzi et al., 2021). The exploration of how company reports report against small number of specific SDGs has previously been taken by Ferrón Vílchez et al. (2022) to explore the extent of SDG-washing and the evidence of companies reporting beyond narrow confines of silo reporting approaches. While this paper is not primarily concerned with SDG-washing, the presence of reporting statements that go beyond siloed reporting will likely indicate a firmer commitment to sustainability activity. The justification of using formal reports is the acceptance of documents as part of CSR strategies and use by wider stakeholders, providing an overview of company sustainability practice (Tsalis et al., 2020). The use of FTSE 100 companies is well established in research relating to sustainability management and performance (Ferrón Vílchez et al., 2022; Opferkuch et al., 2021). This offers advantages over databases such as Asset4 and CDP, which are less accessible and often require a financial contribution for access.

2.1 | Data sources

This research uses reports from companies which were listed on the FTSE 100 in December 2022. As the primary focus of this research relates to the SDGs, the sustainability report (which may be termed "CSR report," "sustainability report," "environmental report," and other such variations, subsequently referred to as "CSR report") were downloaded from company websites. Where a stand-alone CSR report was not available (or only dealt with statistical data), the relevant sections of the companies' annual report was analysed instead. A keyword search of "water" was performed, with relevant paragraphs of text extracted from each report into a separate document. These documents were then reviewed and irrelevant passages were removed (e.g., where reference is made to processes such as solar water heating, or referencing bottled water).

The FTSE 100 was chosen due to the relatively strong pro-environmental culture of the companies listed, the diversity of sectors represented, and the global reach of the companies registered on the exchange and is a commonly studied exchange in research on company sustainability reporting (Helfaya & Moussa, 2017; Okereke, 2007). The purpose of analysing these reports is to investigate the disclosed information regarding water sustainability considerations evident in company communications and further determine to what extent the targets of SDG 6 and 12 are covered (Table 1).

2.1.1 | Content analysis and categorisation of disclosures

Content analysis has been used in many studies of previous CSR research and is a favourable method for examining disclosures in corporate reporting (Clarkson et al., 2008; Montabon et al., 2007; Wu et al., 2018). The technique enables researchers to condense text into manageable units of analysis for further evaluation (Montabon et al., 2007) and can be utilised to infer environmental performance types from disclosures in company reports (Clarkson et al., 2008). This provides an appropriate framework to combine business management perspectives of water sustainability against actions that are oriented towards achieving SDG objectives. Content analysis for assessing developments of frameworks has been carried out by Opferkuch et al. (2021) to provide an overview of how well circular economy issues are embedded into reporting approaches, while Hassan et al. (2022) use a thematic analysis of corporate reports to identify the extent to which companies consider biodiversity accountability in their reports using a sample of the top 200 companies of the Fortune 500.

Primary codes were created based on targets from SDGs 6 and 12, covering objectives that are both water specific and general resource related targets. These targets are 6.3; 6.4, 6.5, 6.6; 6a; 12.2, 12.4; 12.6 and 12.8. These are described by the United Nations (2019):

- Target 6.3—"By 2030, improve water quality by reducing pollution, eliminating dumping and minimizing release of hazardous chemicals and materials, halving the proportion of untreated wastewater and substantially increasing recycling and safe reuse globally"—this relates to activities which deal with the *treatment of wastewater and avoidance of discharge*.
- Target 6.4—"By 2030 substantially increase water-use efficiency across all sectors and ensure sustainable withdrawals and supply of freshwater to address water scarcity and substantially reduce the number of people suffering from water scarcity"—in this context, actions which refer to *wider societal benefits* of company operations relating to water resources are classified against this target.
- Target 6.5—"By 2030 implement integrated water resources management at all levels, including through transboundary cooperation as appropriate." Here all actions, which involve *cooperation and collaboration with stakeholder organisations* to promote water resources management, are classified against this target.
- Target 6.6—"By 2020, protect and restore water-related ecosystems, including mountains, forests, wetlands, rivers, aquifers and lakes," which *prioritise protection of the natural environment*.
- Target 6a—"By 2030, expand international cooperation and capacity-building support to developing countries in water- and sanitation-related activities and programmes, including water harvesting, desalination, water efficiency, wastewater treatment, recycling, and reuse technologies," which *prioritise the provision of water for community groups and associated infrastructure*. In this study, we consider communities in any area where companies operate, and not solely limited to developing countries.
- Target 12.2—"Achieve the sustainable management and efficient use of natural resources" is assigned to actions and targets, which *prioritise measuring water consumption levels and efficient use of water*.

TABLE 1 Industrial sector of companies listed on the FTSE 100.

Company sector	Number of companies	Number of disclosures
Communication services	8	31
Consumer discretionary	17	138
Consumer Staples	11	174
Energy	3	21
Financials	3	53
Health care	3	44
Industrials	16	188
Information technology	4	5
Materials	14	245
Real estate	2	16
Utilities	8	145
Total	99[a]	1059

[a]Haleon PLC spun-out from GSK in July 2022. The company became listed on the FTSE 100 but had yet to publish an annual report at the time this research was conducted.

- Target 12.4—"By 2020, achieve the environmentally sound management of chemicals and all wastes throughout their life cycle, in accordance with agreed international frameworks, and significantly reduce their release to air, water and soil in order to minimize their adverse impacts on human health and the environment," which relates to the *processing and treating of chemicals and pollutants* during water and wastewater management.
- Target 12.6—"Encourage companies, especially large and transnational companies, to adopt sustainable practices to integrate sustainability information into their reporting cycle" is used to categorise disclosures, which relate to *data and performance requirements for suppliers*.
- Target 12.8—"By 2030, ensure that people everywhere have the relevant information and awareness for sustainable development and lifestyles in harmony with nature" relates to the *education and informing* of stakeholders regarding the efficient and safe use of water and wastewater.

The first round of coding was performed using QDA-Miner software. Results of this coding were then exported into Microsoft Excel for additional analysis. Disclosures that were applied to more than one code were indicated to explore the connections between different SDG targets. Here, inductive codes applied as they emerged from the analysis of these disclosures to highlight the main themes describing the connections between overlapping SDG themes. After an initial round of assigning themes to these overlapping disclosures, the number of codes was consolidated, and themes that were applied to 10 or more disclosures in a set of overlapping SDG targets were highlighted for additional analysis. Coded segments were also further reviewed and classified where Water-Energy, Water-Ecosystem, and Water-Food related disclosures could be identified.

3 | RESULTS

Of the 100 FTSE 100 companies, 99 produced either an Annual or Sustainability Report, of which 86 contained disclosures relating to water sustainability, and 1059 disclosures were extracted, which fit the scope of this study. When exploring the theme of disclosure relating to the SDGs, we see that there are a higher number of water-related disclosures that are focused around highlighting water efficiency, or water reduction strategies. These are assigned to SDG 12.2 according to our classification.

3.1 | Linking SDGs to water issues

Exploring water sustainability reporting against SDGs reveals a broad focus on managing water resources as part of a water-efficiency strategy or in response to water scarcity risks, thereby indicating closer engagement with SDG 6.4 and 12.2. While a number of communications are focused on internal facing strategies, there is evidence of disclosures that relate to engaging with stakeholders, either in community groups or partnering with NGOs—indicating a closer link towards addressing goal 6.5. Operationalising this involves developing indicators and resources for stakeholders to use in order to improve their own performance. This is further manifested in actions to achieve SDG 12.8, whereby companies actively engage with educational actions for their suppliers and wider stakeholders.

Although companies do not always explicitly report against the SDGs, there are a number of recurring themes that emerge from corporate reporting, which present actions that are related to the overall intentions of the goals. Within company water-related reporting, there are clear links to SDG 6 with regards to managing water resources effectively and protecting communities. In addition, there is evidence of reporting activities for SDG 6.6, which indicate wider framing of water challenges to consider the impact on the environment and biodiversity. While SDG 12 is not explicitly related to water activities, there are a number of disclosures that deal with resource efficiency, the removal of polluting chemicals, and data, data communication, and education and knowledge sharing, which link to SDG targets 12.2, 12.4, 12.6, and 12.8. A bulk of the water-related disclosures therefore correspond to SDG 6.4 and 12.2, dealing with themes of efficiency, target setting, and understanding the implications for water scarcity.

3.2 | Connected SDG targets

Disclosures often relate to topics that could cover a number of SDGs. These multitopic discussions were of interest to highlight the

TABLE 2 Overlaps between SDG targets and Target 12.2.

SDG code	Number of disclosures which connect to Target 12.2
6.3	62
6.4	108
6.5	44
6.6	23
6a	29
12.4	22
12.6	58
12.8	20

TABLE 3 Classification of overlapping SDG targets.

Classification	Description
Limited connectivity	Two SDG targets share 0–9 disclosures that are coded against both targets
Low connectivity	Two SDG targets share 10–19 disclosures that are coded against both targets
Moderate connectivity	Two SDG targets share 20–29 disclosures that are coded against both targets
High connectivity	Two SDG targets share 30–39 disclosures that are coded against both targets
Very high connectivity	Two SDG targets share over 40 disclosures that are coded against both targets

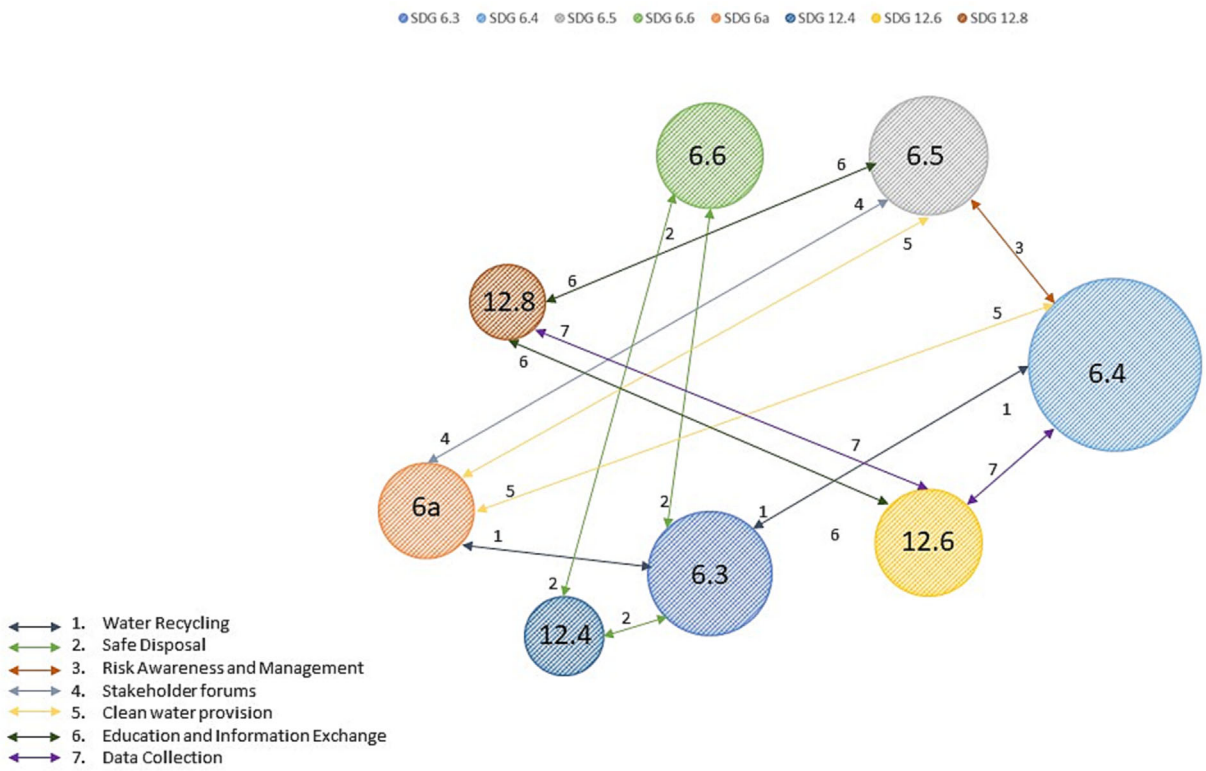

FIGURE 1 Thematic connections between SDG targets.

connectivity in activities between the different SDG targets and where there are obvious connections and potential opportunities for wider diffusion of SDG practices, particularly in boundary spanning activities. In considering SDG 12.2, we see from Table 2 that there are connections that relate targets and efficiency towards addressing water scarcity (6.4) but also water re-use and data collection.

Given the spread of overlapping connections between Target 12.2 and other SDG targets, the rest of this section focuses on the overlaps between the other SDG targets. A connection is defined as one disclosure that addresses a theme that is coded against two (or more) SDG targets. The development of this classification is documented in Table 3. Of further interest is the type of themes that are reflected where SDG targets are connected. Figure 1 maps these connections where the themes present in the disclosures of the connecting themes are associated with at least 10 disclosures. The information on themes and strength of connections are displayed in Table 4.

Exploring overlaps between SDG 6.3 and 6.4, there are activities that not only refer to water recycling and wastewater treatment but also deal with the knock-on impacts on water scarcity, for example, in terms of promoting recycled water as a resource to reduce stresses on freshwater consumption and emphasising the benefits for society and community groups. For SDG 6.3 and 6.5, this is advanced further with an explicit focus on how stakeholders can be involved in this process, for example, through training and incorporating stakeholders into decision-making, as in the example of United Utilities, who explain:

> In 2019, we engaged with other risk management authorities, catchment partners such as the Rivers Trust, and the community group of the Wyre Flood Forum, to develop a plan to tackle the joint issues in the catchment … The scope of the agreed solution included: 3.3 hectares of wetlands, 1,000m3 of flood storage and restoring the river to its natural state; 1,300m3 of storage and wetlands habitat constructed in collaboration with McDermott Homes; and an investment of £220k to the Wyre Rivers Trust.

This example shows how different stakeholders can be engaged into managing a range of water issues within the local river catchment by moving beyond water consumption measures and single SDG approaches. Further overlaps of high connectivity can be seen between 6.3 and 6.6, whereby activities are described that cover biodiversity management and providing resources to communities, through actions that build environmental resilience through environmentally sustainable treatment of waste water. Other high-level connections can be seen between 6.5 and 6a. Here, the focus is on the importance of engaging with stakeholders to develop systems for increasing the availability of clean water provision. This is best represented by Coca-Cola, who discuss:

> Defining Regenerative Water Use "Regenerative" is our new integrated metric reflecting the concept of circularity in using water in our operations. By 2030, the Coca-Cola system manufacturing facilities that we designate as high priority ("Leadership Locations") must

TABLE 4 Connectivity between SDG targets.

	6.3	6.4	6.5	6.6	6a	12.4	12.6	12.8
6.3		Very high connectivity	Low connectivity	Very high connectivity	Low connectivity	Very high connectivity	Low connectivity	Limited connectivity
6.4	Water recycling; actions to benefit society; reducing water demands		Very high connectivity	Low connectivity	High connectivity	Low connectivity	Moderate connectivity	Limited connectivity
6.5	Water recycling Treatment of waste water	Water recycling; Risk awareness and management; stakeholder forums		Low connectivity	High connectivity	Limited connectivity	Moderate connectivity	Low connectivity
6.6	Safe disposal of waste water; actions for environmental benefit; treatment of waste water	Water recycling; actions to benefit the environment; risk awareness and management	Stakeholder forums Water efficiency measures		Low connectivity	Moderate connectivity	Limited connectivity	Limited connectivity
6a	Water recycling; providing clean water; actions to benefit society	Providing clean water Water recycling	Stakeholder forums Providing clean water	Actions to benefit the environment; providing clean water; actions to benefit society; water recycling; safe disposal of wastewater; risk awareness and management		Limited connectivity	Limited connectivity	Limited connectivity
12.4	Safe disposal of wastewater	Water recycling; stakeholder forums; safe disposal of wastewater; awareness and management of risk	Safe disposal of wastewater; reducing pollution; financial support for stakeholders; stakeholder forums; water efficiency measures	Safe disposal of wastewater Treatment of wastewater	Safe disposal of wastewater; risk awareness and management; stakeholder forums; actions to benefit the environment and society		Limited connectivity	Limited connectivity
12.6	Collection and provision of data Water recycling	Collection and provision of data Water targets	Stakeholder forums Information and education activities	Actions to benefit the environment Management strategies	Collection and provision of data	Safe disposal of wastewater Awareness and management of risk		Moderate connectivity
12.8	Water recycling Supporting stakeholder practices	Information and education activities; water recycling; supporting suppliers	Information and education activities Stakeholder forums	Activities to support stakeholders	Collection and provision of data	Supporting suppliers	Information and education activities; collection and provision of data; stakeholder forums; supporting suppliers	

> reduce, reuse, recycle and replenish the water used in operations in the local correlated watersheds for beneficial social, economic and/or environmental uses by other stakeholders and nature.

Other areas of high connectivity relate to the removal of dangerous chemicals (12.4) and water recycling (6.3), which would be expected given the nature of the targets, while the themes that connect the overlapping indicators in disclosures are connected by discussions of safe disposal and discharge of wastewater. However, there is a relative disconnect between disclosures that relate to data collection (12.6) and education/information sharing (12.8). In terms of low and limited connectivity, the targets surrounding data sharing are often lacking connectivity to water management issues. Where there are connections, these are concerned with themes such as the collection and provision of data for benefiting the environment or management of wastewater. Finally, educational and information communication activities (e.g., relating to those of SDG 12.8) are underdeveloped with relation to water issues. Where there is some connectivity is between 12.6 and 12.8, which highlights two-way information and data sharing. For example, Reckitt Benckiser highlights:

> Mitigation activity includes site location and design, including building design to mitigate temperature, adverse weather and water stress risks. Water stress is also mitigated by our water efficiency and catchment area management activity, aiming for all sites in water stressed locations to be water neutral by 2030. Site location planning in water-stressed regions already considers future water resource planning … Our sustainable product innovation programme, supported by the Sustainable Innovation Calculator, targets products and their use by consumers. This enables design for lower carbon and water footprints in use, helping mitigate physical risks in the marketplace and meeting emerging consumer preference.

Overcoming data availability issues therefore can be seen as important for broadening the activities to address water sustainability challenges across the supply chain, across community groups and ensuring that water issues are considered as part of a wider nexus perspective for the protection of ecosystems and the generation of energy and water. Enhancing the processes of data collection and distribution is an area that should be developed further to ensure water sustainability issues become a truly cross-cutting topic for company management strategies.

3.2.1 | Resource nexus reporting versus SDG target "theme"

Beyond the discussions of how companies report in line with SDGs, there is some evidence of moving beyond silo thinking and towards a focus on nexus activities. There are company disclosures that discuss a number of resources simultaneously in the same passage but do not demonstrate connections between them. Therefore, descriptions of simultaneous resources as well as weak associations between resources are not discussed here. In terms of Water-Energy connections, the Utilities companies of United Utilities and Severn Trent Water discuss how they use wastewater for energy generation, for example, through the generation of biogas. Other companies are able to set up their own energy generation from treating their wastewater, such as Mondi and Smurfit Kappa who use wastewater treatment plants to generate electricity for local communities (and as a result demonstrating a branching across firm boundaries). In terms of water-ecology, there are examples of nature-based solutions to deal wastewater management, for example, installing wetlands and grass buffer strips to reduce phosphorous run-off into rivers (and therefore protecting water resource), as indicated by Severn Trent. Anglo American also discuss the use of wetlands to act as a natural filtration system to manage surface water; while other examples of Water-Ecosystem connections reveal practices such as adjusting business practices to protect ecosystems and biodiversity, for example, through monitoring pollution and chemical discharge levels (Intertek) or by highlighting the importance of water management for ecosystem functionality (Rio Tinto). In examples of food, there are examples of collaborations with farming stakeholders, which focus specifically on crop production rather than ecosystem services in general. These include engaging with suppliers to improve yields and protect water resources (Unilever), using treated wastewater in agricultural operations for irrigation and helping farmers explore regenerative farming techniques (Associated British Food), and assessing water risks in order to ensure that the ingredients are secure (Coca-Cola).

In reporting the water reporting themes, which indicate potential resource nexus thinking, the primary identified nexus connections are between water and ecology. When contrasting these to the SDG-related themes used in this paper, it is the water-ecology nexus against SDG 6.6 themes, which are most identifiable in our sample, as highlighted in Table 5. These relate to activities such as highlighting the co-benefits of nature-based solutions and catchment measures for managing water levels and processing wastewater, which is

TABLE 5 Number of disclosures relating to the resource nexus.

	Water-energy	Water-ecology	Food
6.3	24	19	11
6.4	8	40	11
6.5	3	30	8
6.6	6	66	8
6a	1	13	1
12.2	47	47	12
12.4	5	18	2
12.6	2	13	4
12.8	2	12	5
Total unique disclosures	75	138	37

simultaneously beneficial for the biodiversity of the local area. As an example, the water utilities company Severn Trent (2021) highlights:

> The main sources of Phosphorus in rivers are agricultural runoff and treated wastewater effluent. Phosphorus creates water-quality problems and removing it in our treatment works is expensive, needing both chemicals and energy. By working with farmers to install phosphate-reducing interventions like wetlands, hedgerows, and grass buffer strips at the edge of fields, and by encouraging regenerative agriculture approaches, we can reduce phosphate levels by 50% more than through traditional treatment technology.

This connection between regenerative agriculture and company water operations may be difficult to replicate for nonheavy water consuming industries; however, smaller scale activities are possible in this regard.

Water-Energy disclosures are linked to wastewater and water recycling themes (6.3). The types of activities described here range from discussing renewable energy in the same disclosure as treating wastewater (e.g., Diageo), through to developing facilities that can generate electricity to power the treatment plant (Smurfit Kappa), and to provide services to the community (e.g., Mondi).

What is noticeable for Water-Ecology activities is how the focus remains on dealing with stakeholders and dealing with environmental and community impacts from water and wastewater operations that more closely align with the targets of SDG 6. In terms of SDG 12, these disclosures focus on cost savings and consumption reduction (12.2). In the Water-Energy disclosures, however, these are largely about improving the efficiency of energy generation and the role that water plays, either in terms of cooling or as the source of generation (such as through wastewater processing). As an example of an integrated activity, which provides energy generation and connections to food production, whilst aiming to protect the environment, United Utilities (2021) discuss their activities as follows:

> Once the water goes down customers' drains, or surface water flows into the sewers, our job begins again as it requires separation and treatment before it is clean enough to return to the natural environment. We maintain wastewater treatment works and thousands of kilometres of wastewater pipes to collect, transport, treat and return water to begin the cycle again. We waste nothing, turning sludge by-product into compost for farmers and capturing gas to generate renewable energy.

When comparing nexus reporting against the SDGs with the highest levels of connectivity, it is shown how changes to the way in which water and water disposal are managed can have impacts on the protection of different resources. For example, Severn Trent discusses how as a water company they have the potential to shape water management practices, highlighting how the company is "building capacity and resilience" into its systems, through addressing objectives including reducing leaks, conserving water resources, and ensuring the protection of ecosystems and biodiversity. The company goes on to state that "for every £1 we spend on reducing agricultural run-off, we think we can avoid between £2 and £20 of treatment costs" and prioritise the use of partnership and stakeholder partnerships, adding "because no one organization can solve all that needs solving, we are working closely with NGO partnerships." These types of disclosures demonstrate the benefits for working across stakeholder groups, and crucially, to address the management of multiple resources simultaneously.

4 | DISCUSSION

Connecting water sustainability disclosures to SDGs is the first step towards identifying pathways towards connective sustainability actions in company water management activities, which can enable the overcoming of narrow, silo perspectives in sustainability strategies (Ferrón Vílchez et al., 2022). The objective of this paper was to explore the issue of water sustainability from the perspective of large companies and understand how water sustainability strategies connect to a wider range of sustainability management of resources, addressing the gap between company reporting and sustainability practices.

4.1 | Variations of disclosure themes

The first objective was to understand the variations in theme of water-related disclosures. The results build on previous research findings in sustainability reporting concerning the institutional pressures that are felt by companies and the extent to which reporting is informed according to the demands from the key stakeholders of different industrial sectors. We see in the patterns of disclosures from FTSE 100 companies that there is a tendency to cluster themes of disclosure, which address wastewater treatment with water scarcity responses as well as environmental protection, while providing water for communities is related to stakeholder engagement and response. We also see that there is little evidence to support objectives relating to boundary-spanning activities—for example, in terms of collecting and providing data for customers or suppliers. This is consistent with previous research that suggests that companies currently report against the most well-understood objectives and targets (Heras-Saizarbitoria et al., 2022; van Zanten & van Tulder, 2021). Therefore, there is a need to demonstrate best practices and highlight exemplars of water sustainable reporting and set targets, which promote and facilitate connected strategic objectives and overcome the underdevelopments in connected, nexus reporting. From this study, the connections between Water and Ecology themes are relatively well developed via the links through SDG 6.6, primarily related to protecting ecosystems. What is missing is a connection to the information and education-based targets

(12.6 and 12.8) which could raise awareness of water practices are explicitly linked to managing the natural environment.

4.2 | Institutionalising nexus and connectivity approaches to SDG reporting

From an institutional perspective, there is still the need for frameworks that explicitly support and promote nexus reporting and cross-cutting themes according to the themes of the SDGs. There is a need to advance the institutional pressures that drive companies to report against the SDGs and to show clearer connections between different SDG targets, which should be addressed simultaneously to achieve water sustainability. Furthermore, much work is required to normalise and mainstream resource-nexus approaches, for example, through the development of new targets and guidelines that connect to different SDGs and activities. Simultaneously, further development of targets is required to push further to produce institutional expectations of companies to report against SDGs in a more consistent and explicit manner and clearly highlight the nexus of objectives that they are addressing. While WBCSD (2018) state 50% of the companies they surveyed realign their strategies and objectives towards the SDGs, this research highlights the divergence in the types of goals and targets reported against, even within a small focus on SDG 6 and 12. Therefore, there remains a need to embed water sustainability and nexus approaches into company reporting, which extend beyond popular themes of reacting to water scarcity, water efficiency, and wastewater management.

4.3 | Advancing SDG and nexus oriented reporting

There is a further interest in exploring how individual companies with high sustainability engagement go beyond the existing institutional pressures to integrate resource-nexus perspectives into reporting activities and corporate strategy. The number of nexus-related disclosures for the topic of water remains relatively low, and companies still often approach water sustainability reporting in single topics. Moving beyond this is important for achieving one of the key purposes of the SDGs, namely, that they are "integrated and indivisible and balance the three dimensions of sustainable development" (United Nations, 2015). It is possible in this context to cut across multiple dimensions of sustainability when taking a nexus approach towards water resources. What is required for further exploration is to consider other natural resources and to highlight how these patterns may differ from those associated with water, which can inform business and policy decision-making.

5 | CONCLUSIONS

This paper analyses water-related sustainability from the FTSE 100 companies through content analysis on company reports. This was done to examine evidence of strategies that address water sustainability issues that link to SDG targets, while also seeking examples of best practices that connect reporting of multiple resources in line with resource-nexus approaches. The intention of this research was not to identify direct reporting against SDG targets but instead to use these targets to set themes, which could be explored for evidence of company water sustainability strategies. We find patterns between different themes, which indicate a degree of overlap in the types of activities that are reported by companies that can have implications for policy design beyond corporate sustainability. For example, the connections between water recycling and environmental protection can provide opportunities for regional policy incentives to promote increased public–private partnerships for wastewater treatment and environmental management. Connections between stakeholders and education and information exchange can also be supported by governmental and nongovernmental agencies to grow and diffuse institutional knowledge on water sustainability issues.

Moving forward, it is possible to develop practical frameworks for companies to further align their water sustainability disclosures against the SDGs, through the identification of common topics and which cut across the SDGs and across nexus topics. Based on the findings of this paper, some implications are highlighted to advance research and practice in this field and help address the deficits identified by PwC (2019) in understanding of what actions should and could take place to achieve SDG goals and overall sustainability objectives. From an institutional theory perspective, more is required to ensure that large, multinational companies are incentivised to take a nexus approach towards resource management and integrate this into the vision and leadership of their resource management perspectives.

While this study is limited to a single year sample of FTSE 100 companies and is based on self-reported activities, there are opportunities to extend the development and applications of a SDG-nexus reporting framework. Future research should take a time series perspective of companies across different world regions and identify what impact the introduction of SDGs has had on the reporting practices of different companies, as well as the impacts of Directive 2014/95/EU. This could be combined with in-depth studies on different industrial sectors and site-specific regions to provide guidelines and frameworks for connected general SDG-reporting, especially for sectors that have low levels of reporting against SDG goals. Investigating and building on these examples will be of importance for the development of nexus and Sustainable Development reporting criteria, which extend beyond water management into a comprehensive and holistic approach towards reporting, measuring, and assessing water sustainability activities which can inform analysis for companies across different geographical sites, as well as for policy when assessing the water sustainability implications of industries located within their regions.

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