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On the role of water utility governance for climate resilience: A Corporate Social Responsibility Directive approach

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ABSTRACT

It is widely recognized that climate change poses one of the main threats to human beings and businesses reliant on natural resources and vulnerable to climate-related events. Given the importance of water as indispensable for individual well-being, water utilities must prioritize climate preparedness to ensure high-quality service production. This effort involves, for instance, adopting a long-term planning approach and implementing measures to adapt to evolving conditions, reduce climate change vulnerabilities, and maintain the production of clean drinking water and wastewater services. According to the literature, governance is recognized as crucial to integrate climate change within the organization, but scholars are also calling for a deeper understanding of how it could be reorganized effectively to handle climate change and guarantee organizational resilience in the long term. Based on the governance framework proposed by the new Corporate Social Responsibility Directive (CSR-D), the research explores if and how AQUA, an Italian water utility, can integrate climate change within its governance. The results suggest that the utility considers climate change from the agility, adaptive, and transformative perspectives depending on the governance dimensions considered. Implications for management and policymakers are discussed.

1. Introduction

Climate change is a priority for society because of its actual and potential impacts on human activities (Ding et al., 2021). Among them, businesses or services based on exploiting natural resources are more affected than others. Water utilities are part of this bunch of activities (Brettle et al., 2015) since climate change phenomena (i.e., floods, drought, and water bombs) can impact the water service (Diaz and Yeh, 2014). Indeed, the 2030 Agenda, through SDG #6, includes the availability and sustainable management of water and sanitation for all as a strategic priority for transitioning to a more sustainable scenario (UN General Assembly, 2015). In particular, under the 2030 Agenda perspective, climate phenomena can impact by interrupting water accessibility (target 6.1), reducing the sanitation capacity (target 6.2 and 6.3), enlarging the amount of untreated wastewater (target 6.4), and spoiling those water-related ecosystems that are at the base of the proper service functioning (target 6.6).

In this context, water utilities should deal with climate preparedness by adopting measures to adapt the service or to give a fast answer to

occurring water-related problems (Hürlimann et al., 2022). Strategically, climate preparedness is the responsibility of water utilities for society (Rawat et al., 2024), and it strengthens the longevity of a monopolistic service that, at least in Italy, is strongly linked to the ability to address local interests and concerns (Homsy and Warner, 2020). Utilities should foster organizational resilience, deal with the turbulent environment in which they are embedded, and exploit emerging opportunities to ensure a prosperous future (Lengnick-Hall et al., 2011). Utilities should develop resilience to integrate climate change into business and service (Giffoni et al., 2022). In this sense, governance is recognized as fundamental in enabling this transformation: strategies and operations should pass through the re-shaping of the current governance structures that are, according to the literature, the cornerstone of Environmental, Social, Governance (ESG) performance (Cámara, 2022; UN Global Compact Network Italy, 2024). Responsible and sustainable governance models are necessary to manage available resources, such as water resiliently (Jiménez et al., 2020; Di Vaio et al., 2021). For this reason, building resilient governance models is essential to tackle the growing uncertainty and more extreme events by adjusting

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and recovering from climate change impacts (Smith et al., 2019).

An empirical description of resilient water governance models has been proposed by Rodina (2019), who observed those governance characteristics and practices that increase resilience. Governance should be multilevel, integrated, inclusive, transparent, and adaptive.

Moreover, resilient water governance should be ensured by water utilities that are both expected to be negatively impacted by climate change (Brettelle et al., 2015) and that can negatively impact it. In this sense, water utilities can be perceived as *reactive* actors on which climate change forces its impact. Traditional water management is shattered by the uncertainty that the historical variability of natural systems will remain consistent in the future (Milly et al., 2008). The projected impacts of climate change are linked to rising temperatures and sea levels and phenomena that may degrade drinking water infrastructure (Chester et al., 2018). Consequently, water utilities are going to face decreased water storage availability (Thorne and Fenner, 2011), alteration in the timing of flows (Mukhopadhyay and Dutta, 2010), algal blooms (IPCC, 2014), rising turbidity levels (Whitehead et al., 2009), and saltwater intrusion of coastal water reserves (Bonte and Zwolsman, 2010). The described climate change risks (Allen et al., 2018) make the water utilities “forced” to build their strategies to ensure reliable water access (Ricalde et al., 2022).

Instead, as a *proactive* actor contributing to climate change, water utilities should be interpreted as traditional organizations that produce emissions (Pascale et al., 2017) and utilize water resources for service provision (Mergoni et al., 2022). From this perspective, a water utility can also impact the availability of the resource itself and modify the original biological and organoleptic characteristics, which can impact local biodiversity and ecosystem balances (Venturelli et al., 2023).

In line with these premises, the presented research uses the resilience theory lens to explore how the governance of a water utility can deal with climate change and integrate the related concerns. The research bases its analysis on using the new sustainability reporting standards (ESRS) introduced in 2022 by the European Commission within the Corporate Social Responsibility Directive (CSR-d) (EU, 2022). Among the novelty introduced by the norm, a new structured definition of governance has been proposed to facilitate organizations in the disclosure of all the elements that characterize the corporate culture. Through this new governance structure, the research explores how an Italian water utility, AQUA, currently faces this turbulent and evolving environment characterized by climate change and water-related threats. Specifically, the paper aims to understand if and how it can incorporate these challenges into its governance to ensure its stability in the long term.

2. Literature review

2.1. The role of governance for water utilities

Businesses are called to strengthen their governance and take greater responsibility to address urgent societal challenges, such as climate change (Eberlein, 2019). Thus, an increasing number of organizations are paying attention to the role of governance for sustainability goals (Naciti et al., 2022; OECD, 2023; Kavadis & Thomsen). Governance is the basis for corporate strategies and planning processes (Khan, 2019; Kavadis and Thomsen, 2023). During the last two decades, research on governance has burgeoned (De Silva et al., 2020) in diverse fields, such as water governance (Neto, 2016). Since, on a global level, water resources are more and more under pressure (Jiménez et al., 2020) and, in general, the global water system is suffering (Gupta and Pahl-Wostl, 2013), this has appeared as an important topic, and it is acknowledged that governance of water utilities is a crucial factor for ensuring water resources management and services in the long term (Di Vaio et al., 2021).

Various definitions of governance and water governance exist. Governance is the decision-making process, including the mechanisms

that help define objectives, targets, and strategies (Di Vaio et al., 2021) and policy implementation (WWAP, 2006). According to Jiménez et al. (2020), it is “a combination of functions, performed with certain attributes, to achieve one or more desired outcomes, all shaped by the values and aspirations of individuals and organizations” (p.3). Moreover, while some scholars consider governance the higher-level decision-making level only (De Stefano et al., 2014), others encompass the entire spectrum of decisions, from policy creation to service production and/or provision (Jacobson et al., 2013). Despite there is not a univocal definition of governance, scholars agree that a multilevel approach is mandatory (Homsy and Warner, 2020; Romano and Akhmouch, 2019), where different actors, such as governments, corporations, and society, are involved and share responsibilities. When referring to the management and governance of water resources, it is evident that this challenge necessitates a collaborative approach. Given the lack of literature on the understanding of what should be governed at which level (Gupta and Pahl-Wostl, 2013), we adopt the perspective of organizations (water utilities) as having an essential role in addressing pressing societal issues and at the very foundations of society (Elkington, 2006; Eberlein, 2019).

2.2. Governance for resilience

The responsibility of water utilities in evolving their governance model and integrating the climate change measures is crucial both for the society (Rawat et al., 2024) and for the political longevity of a monopolistic service that, at least in Italy, is strongly linked to the ability to address local interests and concerns (Homsy and Warner, 2020). But, above all, it is essential to enable themselves to be resilient and to continue to produce water and wastewater services (Giffoni et al., 2022). Given this relevance, in the paper, the resilience theory approach is adopted and proven as appropriate when studying the efficiency and sustainability of businesses (Medd and Chappells, 2007) in this ongoing challenge against climate change. Resilience has become a hot topic in the discussion on managing natural resources, especially because of climate change and the need to adapt to it (Xue et al., 2017). According to Rodina (2019), resilience is “the ability of systems to withstand or cope with risks, shocks or stressors (be they climate change impacts, social crises, economic shocks or catastrophic events) while continuing to maintain certain key functions or structures” (p.2). Moreover, the author recognizes that more and more studies look at resilience in the context of complex environmental changes and how resources are managed (e.g., Rockström et al., 2014; Rodina et al., 2017). In fact, to respond to climate change, water utility governance should be transformed to include complexity and uncertainty and to embrace the idea of adapting towards more desirable states (Folke, 2016). Thus, in the paper, resilience refers to the organizational resilience concept, which is an “organization’s collective ability to absorb, adapt, and capitalize on shocks and stresses” (Giffoni et al., 2022, p.1). Change can be a source of opportunity and threat in turbulent and evolving environments, but a utility requires transformation to capitalize on these opportunities. Thus, resilience is the capacity to enable a firm to realize the occasions that climate change presents (Lengnick-Hall et al., 2011). It implies that utilities absorb complexity and emerge from a challenging situation. Utilities are resilient when leveraging their resources and capabilities (Duchek, 2020; Gover and Duxbury, 2018); they can resolve dilemmas and exploit opportunities, dynamically adapting and sustaining their business.

Governance plays a crucial role in allowing organizational resilience. According to some authors (Arnold et al., 2017; Chaffin et al., 2014), adaptive governance is key to building resilience, defined as the ability to evolve, adapt, or transform in a situation of change; adaptive governance allows one to reach a desirable state (Cosens et al., 2014). To achieve resilience, an organization embodies adaptive governance when it can “self-organize, learn, respond, cope and use adaptive management strategies in situations of uncertainties, risk and nonlinearities” (Jiménez et al., 2020, p.13). Thus, diverse strategies have been appointed as a primary characteristic of adaptive governance. When facing

uncertainties and risks, an organization should be able to maintain or re-create its identity, creating new ways of working together and encouraging learning and innovation (Jiménez et al., 2020).

According to scholars, agile governance is another type similar to but distinct from adaptive governance. Defined as an organization's ability, in terms of budget, to quickly and accurately identify opportunities and implement innovative actions (Huang et al., 2014), agile governance implies organizational agility when facing unexpected developments (Danar, 2023). When a critical situation occurs, agile governance becomes a viable solution (OECD, 2020). Moreover, according to Kumorotomo (2020), this kind of governance is usually implemented by private companies. Organizations adopt agile governance by integrating a responsive management system into their organizational structure, creating an adaptive framework (Danar, 2023). Agility is evident when organizations, for instance, prioritize behavior and practice over procedures, emphasize transparency and engagement over monitoring and control, or focus on sensing and reacting rather than rigidly following a plan (de O. Luna et al., 2020).

Even if agile and adaptive governance allows an organization to be more resilient, some scholars have also explored the role of transformative governance to enable the necessary change for creating the conditions for sustainable development and climate change adaptation and/or mitigation (Visseren-Hamakers et al., 2021). Governance is transformative when it considers the whole system, including all groups involved, at every level of society, thus suggesting that organizations are embedded in a context with different stakeholders, where formal and informal rules enable a radical change of public and private systems. According to Leonardsson et al. (2021), transformative governance (i) integrates the study of human-nature interactions to comprehend climate change (Taylor, 2014), (ii) embraces a *glocal* perspective, and (iii) involves a contextualized, goal-oriented, diverse, and collaborative co-creation of knowledge. This knowledge production is possible because various stakeholders bring experiences, viewpoints, priorities, and values. Thus, transformative governance occurs when the organization's fundamental transformation combines diverse perspectives that produce relevant knowledge (Lang et al., 2012). This governance model recognizes the challenge of climate change and requires adaptive capacity to enable and establish resilience (Rijke et al., 2013). According to UN Global Compact Network Italy, (2024), which believes businesses have a geopolitical responsibility to support the foundations of society, a transformative approach is essential to produce an impact inside and outside the organization.

Despite the level of governance, organizations must adopt a resilient approach, which involves the ability to recognize that external contexts are constantly evolving and not only to commit, self-organize, and respond swiftly subsequently (Arnold et al., 2017) but also to take the floor as an agent of change. Given this dynamic environment, how organizations structure their governance is paramount. Therefore, it is crucial to identify the peculiarities that water utility governance should possess to ensure sustainability and resilience and to explore how these attributes can be practically applied to enhance water resource management within organizations. Despite the widespread recognition of governance as the turning point to making utilities able to deal with climate change, it is unclear how organizational governance should be shaped and rearranged to effectively achieve this goal (Jiménez et al., 2020; Romano and Akhmouch, 2019). In this context, the normative framework encourages businesses to become more resilient and create long-term value.

A new structured definition of governance was introduced in 2022 by the new regulation about the obligation and standardization of

sustainability reporting practices for companies, the Corporate Sustainability Reporting Directive (CSR-d). The directive introduces a standardized model of reporting based on the European Sustainability Reporting Standards (ESRS). Such standards, officially designed by the European Financial Reporting Advisory Group, launch the Governance dimension as the new sustainability dimension to be disclosed instead of the economic one introduced and pursued by the previously available voluntary standards. The standard describes governance as the body with the highest decision-making authority in the organization, including its committees. In particular, the governance establishes the framework and procedures through which the organization's objectives are defined, performance is tracked, and outcomes are assessed. The proposed standard identifies seven key aspects of governance that need to be disclosed to facilitate and operationalize the application of the directive. In particular.

1. *Corporate culture and business conduct policies.* These policies refer to the organization's purpose, values, and strategy and guide employees in approaching sustainability issues. Therefore, disclosure about how the organization's leadership provides direction on sustainability is important to stakeholders to evaluate how these topics are formed, promoted, and managed throughout the organization;
2. *Management of relationships with suppliers and payment practices.* While the previous aspect refers to the organization's strategy around its relationships with its suppliers, aspects around its selection criteria in the context of sustainability, and its support to vulnerable suppliers, the latter includes details about payment practices. Such information may help undertakings detect unfair payment practices and negotiate fairer payment terms;
3. *Measures to avoid corruption and bribery.* Therefore, anti-corruption and/or anti-bribery training must be disclosed. It includes the disclosure of qualitative information as to the organization's strategy and approach, its processes and procedures, as well as its performance along with its performance regarding these business practices;
4. *Engagement by the undertaking to exert its political influence.* Engagement should cover activities and commitments of the organization related to exerting its political influence, including its lobbying activities;
5. *Protection of whistle-blowers.* This protection provides information about the non-retaliation is ensured against own workers who have been granted whistle-blower status following the applicable law and own workers who report any non-ethical behavior incidents;
6. *Animal welfare.* This aspect provides information concerning animal welfare is ensured.

In line with the minimum content disclosure requirements, according to the ESRS, the organization should describe how each topic, policy, strategy, target, and indicator aligns the organization with its mission and sustainability priorities.

In this context, the presented paper addresses the lack of literature about operationalizing the governance dimensions for the utilities to answer the climate change issue and, ultimately, achieve resilience.

3. Method and case profile

The presented research is based on a single case study (Yin, 2009) to explore how a utility's governance can deal with climate change. The selected method allows the researcher to foster a deep comprehension of occurring dynamics concerning an issue, that is, the integration of climate change concerns in the governance system that, even if the

literature appoints as crucial for resilience in the long-term, according to our knowledge, it has been not already thoroughly explored. Due to the explorative nature of the research, the method can drive the generation of future lines of research and can guide researchers in testing other utilities on the same topic or support practitioners in dealing with the same issue (Stebbins, 2001).

The selected case is an Italian¹ water utility, hereafter AQUA, which operates in Central Italy. AQUA is a public utility offering water service to 46 municipalities with more than 1 million and 300.000 inhabitants. As a public service, AQUA has operated since 2000 under a monopolistic regime.

We had the opportunity to build the study thanks to the long-term relationship built between the university and the utility. Indeed, within the research project, we have guided AQUA in building their CSR strategy before (2021–2022) and developing a customized model to answer the CSR-d obligations later (2023–2024). This unique relationship exposed us to a deep immersion in the utility context and the opportunity to collect operational and strategic documentation.

AQUA deals with collecting, treating, conveying, and distributing drinking water. This service involves both groundwater and surface water sources.² AQUA oversees a complex plant system, primarily due to the historical nature of the municipalities in which it operates. Indeed, according to the national statistics, such historicity is the reason for the observed 39,34 % (in 2023) of water network leaks (the national average is 42 %). AQUA's performance on water leakages shows a positive trend: in 2021 and 2022, they reached a total of 40 %, but in previous years, they reached up to 50 %. Water leakage is probably the leading challenge, even nationally, for water-related performance. To minimize resource loss and ensure continuous service, AQUA has developed an advanced remote monitoring system, which has been enhanced over time. The AQUA system includes almost 7.000 km of water network that annually deals with 144 mm/m³ of water (86 mm distributed to the household customers and 58 mm lost in the distribution process).

Moreover, throughout the managed territory, AQUA collects and purifies wastewater. The integrated management of the purification system by a single entity in such a vast territory is an essential prerequisite for its modernization and efficiency and to reduce the level of pollution of the river waters of the region. In the last year, AQUA invested about 27 million euros to make the sewage system more efficient and guarantee the quality of the water reintroduced into the environment.

¹ The Italian water industry exhibits a wide array of water suppliers. These entities display considerable variance in scale and scope, ranging from small-scale utilities servicing a single community to large multi-utilities that, instead, furnish water and other services (gas and energy, waste) to millions of individuals (D'Amore et al., 2024). The regulatory and legislative context in Italy is quite intricate (Argento et al., 2016), since the water sector has undergone, over the years, numerous reforms aimed at improving efficiency (e.g. establishment of an independent regulatory authority (ARERA) to regulate aspects such as tariffs, investments, and the promotion of integrated water services to realize economies of scale (Galli Law – n. 36/1994, followed by D. Lgs.152/2006)). According to ISTAT (2024), in 2022, 84.7 % of water withdrawals in Italy came from groundwater, while 15.2 % originated from surface water sources (artificial reservoirs, surface watercourses, and natural lakes). The total volume of water withdrawn for potable use in Italy was 9.14 billion m³ (9.19 in 2020 and 9.23 in 2018), with a daily withdrawal of 25.0 million m³, equivalent to 424 L per capita. Municipal networks supply an average of 214 L per capita per day for authorized uses (the daily per capita supply has decreased by 36 L compared to 1999, indicating a downward trend).

² In 2022, AQUA supplied approximately 80 million m³ of water, primarily sourced from surface water. The company manages a sewer network of over 3800 km, mainly consisting of mixed gravity sewers with lifting stations. Its wastewater treatment efficiency meets the required standards for BOD, phosphorus (P), and nitrogen (N).

Being dependent on water, AQUA is aware that climate change, characterized by heat waves, drought, and extreme and out-of-control rainfall phenomena, is a serious issue. For instance, in November 2023, a severe flood emergency struck a significant portion of AQUA's service area, leading to various consequences, including a decline in service quality due to system shutdowns and damage to infrastructure. In response to this crisis, AQUA quickly activated dedicated phone lines for citizens to request assistance and, in the early stages of the emergency, deployed an extensive tanker service to supply water to areas where, due to the flood, the regular distribution network could not function. Throughout the event, AQUA also provided timely updates via telephone messaging, keeping residents in the affected areas informed about the progress of water service restoration.

In addition to its immediate emergency response, AQUA has been measuring its Organizational Carbon Footprint since 2019. This effort aims to quantify the total greenhouse gas emissions generated by the company's operations related to the integrated water service. The measurement follows two key international standards: the Greenhouse Gas Protocol (GHG) and the UNI ISO 14064 standard.

The research design has been built to discover the presence of any direct or indirect reference to climate change in official documentation and company strategies and if such reference is integrated into one of the governance dimensions. As the literature suggests, we framed the research topic by identifying a clear connection between variables and outcomes. In particular, to verify the presence of climate change concerns in the governance structures, we considered the six governance themes introduced by the CSR-d. This specific choice was driven by the willingness to increase the validity of each piece of evidence and reduce subjectivity. The research framing process has included extensive confrontation (interviews) with the key managers of AQUA. Indeed, as insiders, the managers have guided the research in gaining a comprehensive perspective on how the climate impacts the utility and how the utility impacts the climate.

Second, we verified the presence of climate change concerns by triangulating data (Stake, 1978). In this sense, the data collection phase has been based on the analysis of (1) public documents, (2) confidential documents, and (3) interviews with seven managers (Table 1). The interviews were conducted in Italian, the native language of the involved managers, between the late winter and summer of 2024. Each interview lasted between 90 and 120 min. Concerning the nature of each analyzed data cluster, we implemented a specific kind of analysis, adopting an inductive approach (Edmondson and McManus, 2007).

Third, we discussed the level of climate change integration in the governance structure by observing the integrated topic and the lack of such integration (Table 2).

Finally, by analyzing collected evidence, we interpret the nature of the observed governance structure. Considering the long-term relationship between our research team and the utility, we have reduced possible bias by working individually to interpret collected data. Later, we compared their results to verify their interpretation's coherence and discuss emerging divergences. We have classified the AQUA's governance approach as (i) agile, (ii) adaptive, or (iii) transformative for each of the observed governance dimensions and based on the meanings of these different kinds of governance from the literature (Table 3), also highlighting where AQUA displays a more reactive or proactive attitude to climate change.

4. Results

The findings are presented here and structured according to the actions, policies, and strategies that prove climate integration in utility governance. Ultimately, the governance approach of AQUA – discussed in the next section – has been profiled as *adaptable* to climate change issues, as *agile* to answer to occurring dynamics, and as *transformative* in terms of system transformation. We have generally observed that the utility's management appears well-informed and trained about the

Table 1
Data sources.

RQ	Used data	Data source	Implemented analysis
How does a utility integrate climate change into its governance?	<i>Public documents:</i> Statute Service charter Regulation for the supply of the integrated water service Quality, environment, health and safety policy Regulation for transparency and the prevention of corruption Integrated Water Service Supply Regulation Mission & Vision Conduct code for competitors and suppliers Purchasing and procurement management Sustainability reporting (2022)	AQUA institutional website	Manual content analysis (inductive approach)
	<i>Confidential documents:</i> CSR Plan Utility organizational chart Utility's history Water quality planning documents Monitoring of atmospheric emissions documents Risk management of context and shareholders	CSR division	Manual content analysis (inductive approach)
	<i>Interviews with managers:</i> 1. Head of Regulation and Communication Division 2. Sustainability specialist 3. Head of Administration, Finance and Control division 4. Head of Risk, Compliance 231/01 and Audit 5. Head of the water resources protection division 6. Wastewater treatment and waste manager 7. Operational management manager	Interviews	Manual content analysis (inductive approach)

climate risks associated with their service.

Then, the analysis of public documents has highlighted a lack of explicit inclusion of the term and concept of “climate change.” Such a lack is probably linked to the level of updating of the documents. Indeed, even if most of the analyzed documents have been updated between 2020 and 2022, the concept of climate change does not yet seem to have fully permeated the organizational culture. Even if such a lack is evident,

corporate governance naturally considers the management of impacts that can also be climate-related. The link is proved by the fact that the current CSR strategy, a strategic and confidential document updated in 2021, fully and explicitly considers climate change an issue to be addressed.

In a few words, we observed that even if corporate governance documents do not include “climate change,” the operative documents do it, ensuring the coherence between the utility mission and the “problem.” If indicators provide the currently implemented actions to measure the ability to answer a specific climate-related event, a lack of monitoring indicators has been observed.

Going deeply into the governance dimensions, the analysis of the **corporate culture and business conduct policies** has highlighted the lack of formal specific roles and responsibilities directly related to climate change. Indeed, the “regulation and communication” division includes a CSR team in which a sustainability specialist is engaged. However, AQUA shows how the sustainability issue is still anchored to the CSR idea of a company’s commitment to ESG priorities, including climate change. In this sense, even if a general strategy occurs, the governance structure has not devoted a specific area of competence to managing and including climate change concerns. The implicit consideration of climate change in the governance structure mirrors the Statute principles. According to the interviewed manager, the environmental management purpose of the utility, as well as the microbiological respect of the natural characteristics of the water resources and the service continuity commitment are the proxy proofs of their responsibility in reducing the generated impact toward the climate change and in reducing the climate change impacts toward the offered service.

Operationally, the business conduct implicitly institutionalized the commitment toward climate change by adopting several certifications. AQUA adopted the ISO 14001:2015 for environmental management systems. The certification supports the utility in improving its environmental performance and de facto acts, making the use of resources more efficient and reducing the impact of the AQUA on climate change. Similarly, concerning the commitment to ensure the preservation of the natural micro-biological and chemical characteristics of the water resources, the utility adopted the UNI-EN ISO/IEC 17025:2018 certification to ensure the competence, impartiality, and consistent functioning of laboratories, ensuring the precision and dependability of their testing and calibration outcomes. The UNI EN ISO 14064–1:2019 is the third operational tool to monitor and disclose the commitment of AQUA as an active actor in fighting climate change. The above-cited certification gives AQUA the method for quantifying and reporting greenhouse gas emissions that should be considered to reduce the generated impacts on the environment. Indeed, no specific targets or indicators have been observed in the official documentation or identified by management.

The **management of relationships with suppliers’** dimension of governance has highlighted an interesting aspect related to interpreting who the suppliers of AQUA are. *According* to AQUA, the principal supplier is the river by which the utility collects the water resources to provide the service. The utility profiles all the other service suppliers as neither relevant nor strategic for their business. The centrality of the river for AQUA is fully mirrored by the presence of policy documents, plans, and actions as targets and indicators that operationalize the climate change perspective in AQUA’s governance. The commitment of AQUA to protecting the river from the impacts of climate change is operationalized by implementing a water balance equilibrium model between resource availability for the current and future needs. Currently, AQUA assesses critical geographic areas from the point of view of water scarcity/excess. This analysis is just for some of the supply sources, and for this reason, the improvement plans include new monitored sources, even if less important concerning the river, and the identification of a predictive indicator to measure the balance between expected water usage and expected water availability. Such an indicator, or a set of indicators, should support the management in finding resolute actions to reduce the risk of a service interruption in the long

Table 2
Research path design.

	Research path design				
	Research framing	Data selection	Data verification	Discussion	
				Level of integration	Lack of integration
<i>Questions guiding the research</i>	What is the most recent effort to operationalize the concept of Governance?	How can such integration be observed?	Is climate change considered or integrated into each of the governance dimensions?	Which documents integrate the topic of climate change? Which aspects of governance integrate climate change?	Which documents do not integrate the topic of climate change? What aspects are missing in integrating climate change into governance?
<i>Answers guiding the research</i>	CSR-d Governance dimensions	Public documents Confidential documents Interview with Managers	Yes/no	Governance structure behavior Identification of room for improvement	

run.

Similarly, the **payment practices** dimension of governance commitment toward climate change has been interpreted with regard to the river basin where AQUA collects the resources. Fully answering the regional water authority regulation, AQUA pays a water collection fee proportionally to the amount of water withdrawn. In this sense, the regional authority, including the concession-specific environmental protection policies, represents the mediator. According to the CSR plan, AQUA's commitment to integrating climate change priorities is linked to the future introduction of the employee awarding system to specific sustainability-oriented goals. Such action should reduce the environmental impact and decrease the annual fee.

The **prevention and detection of corruption or bribery** dimension of governance for AQUA is linked to the risk that some specific roles are exposed to external pressures to adopt unfriendly environment choices. AQUA lacks a structured risk map of the actual and potential impacts of the company and its value chain on biodiversity. Such a lack weakens the utility by leaving a bunch of key actors partially free to act according to their values and without a structured *modus operandi* model. Risk corruption areas linked to climate change are potentially water purification, wastewater management, and contract awarding.

Operationally, AQUA ensures its governance commitment by providing training courses aimed at constantly updating on anti-corruption issues related to the protection of water resources. However, such courses are provided flatly to those who may be concerned without a specific focus on the sustainability or climate change topic and without a specific focus on the covered role.

To date, AQUA is working to draft a risk prevention and mitigation plan that should support management in identifying key roles and responsibilities for preventing and detecting corruption or bribery. The commitment is proved by the presence of a target on the topic and of at least a clear indicator to evaluate the number of internal employees trained as a ratio to the total internal employees.

The **political influence and lobbying activities** dimension of governance has not yet been implemented at an operational level. While AQUA recognizes its role in society, it does not participate in lobbying activities related to the protection of resources or the climate change issue. Indeed, such a dimension is not yet included in AQUA's institutional or foundational documents. However, as an institution, AQUA is called to provide its opinion in decision-making with other actors according to its area of expertise. Thus, the utility is motivated to participate in discussion tables with the regional and national water authority and the regional environmental agency, sharing its experience concerning water resource management and protection. Despite its relevance and the communication between AQUA and public entities, the topic seems to be not a priority since, to date, the utility has not identified strategies, targets, or indicators to pursue such activity.

The following governance dimension refers to the **protection of**

whistleblowers. Indeed, the whistleblower system aims to protect the informers who want to report an illicit link to the water service that can impact climate change. The integration of this system is still at an initial stage, and AQUA has not yet considered specific means of improvement or targets to monitor the action.

The final aspect is **animal welfare**. According to the AQUA perspective, the impact of water service on animal welfare is related to the use of chemicals and the lowering of the water table, which means a decrease in the availability of water resources. Those aspects also impact climate change in terms of the risk of contamination of territories in the event of flooding and a decrease in water resources. Integrating such a topic in utility governance is supported by the Integrated Water Service Supply Regulation, which prohibits the discharge of toxic substances that can be dangerous to people, animals, or the environment. The topic is also included in future strategies of the CSR plan, which introduces new parameters that can monitor animal welfare. However, no indicators have been identified to monitor the process.

The observed AQUA governance structure has been depicted in Fig. 1, which shows how climate change is approached depending on the governance CRS-d dimension. For instance, concerning corporate culture and business conduct policies, AQUA presents an agile and adaptive – but not transformative – governance approach when dealing with climate change.

A detailed description is hereafter provided.

5. Discussion

Through analyzing the selected case study, we have answered the research question, showing the implicit and explicit presence of the climate change topic within its governance structure and proving its significance as a utility concern. Besides the policies, strategies, actions, and indicators developed by AQUA and associated with each governance dimension described in the previous section, the study reveals insights about the attitude of the utility and the governance approaches they have started to develop to handle climate change.

First, the study contributes to the reasoning for the role of water utilities in delivering quality service while facing climate uncertainty (Casalta et al., 2024). Even if the analysis mostly shows that the utility behaves as a *reactive* actor, dealing with climate-related issues that can impact service production, it also tries to adopt a *proactive* approach to reduce its impact on climate change. This double perspective appears relevant because it allows researchers to understand how the utility is internalizing the climate change issue from the point of view of the implemented actions. In this sense, while AQUA recognizes the importance of implementing actions of mitigation and adaptation (Smith et al., 2019), at the same time, it acknowledges the significance of water as a natural resource that is threatened by human activity (Alegre et al., 2020) and which should be protected and preserved (Vilarinho et al.,

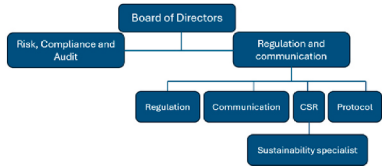
Table 3

Governance CSR-d structure.

How does a utility integrate climate change into its governance?						
Gov. dimension under the CSR-d perspective	Climate change for AQUA based on interviews with the management	Policy Documents providing evidence about the climate change incorporation	Actions implemented	Attitude to climate change Reactive Proactive	Target to be achieved by December 31, 2025 And indicators to measure the achievement	Action approach Agile Adaptive Transformative
Corporate culture and business conduct policies	“AQUA has in its DNA the protection of the territory to manage climate emergencies that can impact the water service or the protection of the territories for those impacts resulting from its service, [...]” Head of Regulation and Communication Division	Statute, (art. 5) “The company’s purpose is: [...] l) Environmental management of the territory: soil protection, management of protected areas, and emergency management.	AQUA provides a devoted telephone communication channel for emergency response. The response time (telephone) is ≤ 90 s. (Service charter, p. 26)	Reactive	No target No indicators	Agile
			AQUA has established an intervention capacity linked to generic risk situations of 1 h (if notified by public authorities) and 3 h (if notified by other subjects). The response capacity is measured in minutes rounded up to the nearest minute. (Service charter, p. 44)	Reactive	No target No indicators	Agile
	“In summer, climate change is observable through long periods of drought. This requires AQUA’s ability to address its main mission (providing water) and respond to the water emergency by ensuring continuity of service.” Sustainability specialist	Statute, (art. 5) “The company’s purpose is: [...] b) the research, collection, lifting, transport, treatment, distribution and marketing of water for any use”	In drought periods, AQUA must give users adequate notice and adopt one of the measures provided for in the Emergency Prevention Plan approved by the Regional Water Authority. The measures adopted may include: • invitation to save water and limit non-essential uses; • use of resources intended for other uses; • limitation of consumption by reducing pressure in the network; • rotation of users. (Service charter, p. 45)	Reactive	No target No indicators	Adaptive
	AQUA is ready and reactive 24h for the chemical and microbiological control of the water resource that can be significantly altered following an exceptional atmospheric event.” Sustainability specialist	Statute, (art. 5) “The company’s purpose is: [...] q) laboratory analytical activity aimed at the chemical and microbiological control of the water cycle.”	AQUA has established an intervention capacity linked to situations of water quality harmful to human health of 1 h (if notified by public authorities) and 3 h (if notified by other entities). The response capacity is measured in minutes rounded	Reactive	No target No indicators	Agile

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Table 3 (continued)

How does a utility integrate climate change into its governance?						
Gov. dimension under the CSR-d perspective	Climate change for AQUA based on interviews with the management	Policy Documents providing evidence about the climate change incorporation	Actions implemented	Attitude to climate change Reactive Proactive	Target to be achieved by December 31, 2025 And indicators to measure the achievement	Action approach Agile Adaptive Transformative
			up to the nearest minute. (Service charter, p. 44)			
			In case of a quality crisis, sanctioned by a mayoral ordinance of non-potability due to exceeding one or more of the legal parameters for water intended for human consumption, but not due to interruption of the flow, AQUA guarantees the availability of potable water in containers or by tanker in the affected areas, at a rate of 5 L per day per inhabitant or the availability of a resource compliant with the legal requirements at one or more public fountains located within the same centre or nucleus. (Service charter, p. 45)	Reactive	No target No indicators	Agile
	<i>“Resilient assets, are guaranteed through a constant analyses of climate risks and through targeted investments to reduce the impact, protect the service and the business continuity.”</i> Head of Administration, Finance and Control division	Statute (art. 21) <i>“The board of directors must: 7) validate proposals to be submitted to the competent bodies regarding investment plans and annual and multi-year financial plans concerning activities connected to the integrated water service”</i>	AQUA is working on the reduction of direct discharges (Corporate Social Responsibility Plan)	Proactive	Implement and increase the actions foreseen by the investment plan to reduce the quantity of direct discharges into the environment	Agile
			AQUA is evaluating the Construction of plants to obtain energy from renewable sources and reduce emissions. (Corporate Social Responsibility Plan)	Proactive	Preparation and presentation of investment proposals for new plant engineering and evaluation of their economic feasibility.	Adaptive
	<i>“The climate risk analysis is provided by devoted roles and bodies ... the sustainability manager and the sustainability committee.”</i> Head of Regulation and Communication Division	Utility organizational chart extract 	AQUA has officially identified roles and responsibilities related to sustainability. (Utility organizational chart extract)	Proactive	No target No indicators	Adaptive
	<i>“Policies and procedures are the tools by which AQUA ensures the operative application of its corporate culture</i>	Quality, environment, health, and safety policy: <i>To address its mission, AQUA works for the implementation and dissemination of an organisation, management, and control model, the definition of the code of ethics, code of conduct, management systems, ERM risk management system, updating of sustainability-oriented</i>	AQUA has obtained the following certifications: UNI-EN-ISO 14001-2015 UNI-CEI-EN ISO/IEC	Proactive	No target No indicators	Adaptive

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Table 3 (continued)

How does a utility integrate climate change into its governance?						
Gov. dimension under the CSR-d perspective	Climate change for AQUA based on interviews with the management	Policy Documents providing evidence about the climate change incorporation	Actions implemented	Attitude to climate change Reactive Proactive	Target to be achieved by December 31, 2025 And indicators to measure the achievement	Action approach Agile Adaptive Transformative
	<i>oriented to the preservation of water and the reduction of climate risks."</i> Head of Risk, Compliance 231/01 and Audit	<i>performance management systems, awareness-raising practices - e.g., promotion of the "water culture."</i>	17025:2018 UNI EN ISO 14064-1:2019 AQUA is provided of: - Organisation and Management Model 231/01 - Code of Ethics - Code of Conduct - ERM risk (Quality, environment, health, and safety policy)			
Management of relationships with suppliers and payment service	<i>"The main and principal supplier is, for us, the river. I mean, the river and all the other aquifers from which we collect water. In this sense, we are working to face climate change through the Implementation of a water balance equilibrium model between resource availability for the current and future needs."</i> Sustainability specialist	Service charter <i>"The Company is therefore called, with a natural temporal progression, to ensure its users' European standards of quality, quantity, and diffusion of the integrated water service, protecting the environment in a clear line of sustainable development, aiming to guarantee an environmental balance between the resource used and the natural replenishment capacity."</i>	AQUA assesses critical geographic areas monthly from the point of view of water scarcity/excess. The analysis is just for some of the supply sources. (Corporate Social Responsibility Plan)	Reactive	Enlarge the amount of monitored sources. (general target) Identification of a predictive indicator able to measure the balance between the amount of expected water volumes and the expected water availability. Such indicators should support identifying resolute actions to reduce the risk of a Service interruption.	Agile
	<i>"AQUA pays a water collection fee to the regional water authority. The amounts depend on the amount of water withdrawn, the type of concession and specific regional regulations and local conditions that in our region are based also on the presence of environmental protection policies."</i> Head of the water resources protection division	Regional water authority regulation	AQUA is working to introduce the employee awarding system to specific sustainability-oriented goals. Such action should reduce the environmental impact and decrease the annual fee. (Corporate Social Responsibility Plan)	Proactive	Update of the current employee awarding system	Adaptive
Prevention and detection of corruption or bribery	<i>"As a public utility, AQUA is provided with a regulation for the prevention of corruption. But it can shortly have an impact on the climate change issue. To date, operationally, we do not have a map of the risk and the actual and potential impacts of the company and its value chain on biodiversity. This lack can expose us to a greater risk of</i>	Regulation for the transparency and the prevention of corruption: AQUA identifies as risk corruption areas: [...] Water purification Wastewater management Contract awarding [...]	AQUA is working to Draft the risk prevention and mitigation plan AQUA provides training courses aimed at constant updating on anti-corruption issues in the protection of water resources	Reactive Proactive	Complete the Drafting of the risk prevention and mitigation plans according to the Water Safety Plan Guidelines Enlarge the number of trained employees No. of internal employees trained/ No. of total internal employees]	Adaptive Agile

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Table 3 (continued)

How does a utility integrate climate change into its governance?						
Gov. dimension under the CSR-d perspective	Climate change for AQUA based on interviews with the management	Policy Documents providing evidence about the climate change incorporation	Actions implemented	Attitude to climate change Reactive Proactive	Target to be achieved by December 31, 2025 And indicators to measure the achievement	Action approach Agile Adaptive Transformative
	corruption and bribery. In the absence of this type of assessment, in fact, choices can be guided more by individuals, and it can weaken attention to environmental protection.” Head of the water resources protection division					
Political influence and lobbying activities	“Aqua does not participate or finance lobbying activities in any way. If we consider lobbying as a political commitment to the protection and prevention of water resources (also in terms of climate change), AQUA participates in discussion tables with the regional and national water authority and with the regional environmental agency. In these contexts, AQUA brings its contribution by sharing its experiences in managing the service and trying to find solutions for the protection of water resources.” Head of Regulation and Communication Division	No structured policy	No implemented actions	Proactive	No target No indicators	Transformative
Protection of whistleblowers	“AQUA is provided of a whistleblower system by which informers that wants to report an illicit linked to the water service and (that can impact or not on the climate change) are protected.” Head of Risk, Compliance 231/01 and Audit	Regulation for the transparency and the prevention of corruption: “The analysis, control, and verification activities initiated by the Company will allow for the progressive implementation of further prevention measures in order to strengthen the process of minimizing corruption risks, such as those provided for by Law 179/2017 (whistleblowing). To this end, the forms of protection provided for private sector employees who report an illicit act have been introduced. This prevention measure is applied using a specific IT platform and/or with a form available on the company intranet. Both reporting tools guarantee the protection of confidentiality and anonymity to the whistleblower.”	AQUA has implemented a whistleblower system	Proactive	No target No indicators	Adaptive
Animal welfare	"The integrated water service involves the use of chemicals both for water purification processes and for wastewater treatment. The respect for water resources and the reduction of the risk of contamination of	Integrated Water Service Supply Regulation, (art. 15): “In carrying out its function, AQUA can't discharge toxic substances that may, even in combination with other wastewater, constitute a danger to people, animals, or the environment or that may, in any case, jeopardize the proper functioning of the public purification plant process.”	AQUA uses chemical products in compliance with the reference regulations to guarantee the quality of the water resource introduced into the network and, subsequently, that it returns to the	Proactive	Identify and introduce new parameters able to monitor animal welfare (Corporate Social Responsibility Plan)	Adaptive

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Table 3 (continued)

How does a utility integrate climate change into its governance?						
Gov. dimension under the CSR-d perspective	Climate change for AQUA based on interviews with the management	Policy Documents providing evidence about the climate change incorporation	Actions implemented	Attitude to climate change Reactive Proactive	Target to be achieved by December 31, 2025 And indicators to measure the achievement	Action approach Agile Adaptive Transformative
	territories in the event of flooding. The aim is not to alter the chemical-physical and biological balance of the water while respecting the fauna that inhabits it and/or uses it as a source of supply." Sustainability specialist		environment. The processes of potabilization and treatment of wastewater.			
	"The lowering of the water table and the decrease in the availability of water resources in the basin can impact the existing animal and plant species." Head of the water resources protection division	No structured policy	No implemented actions	Proactive		Adaptive

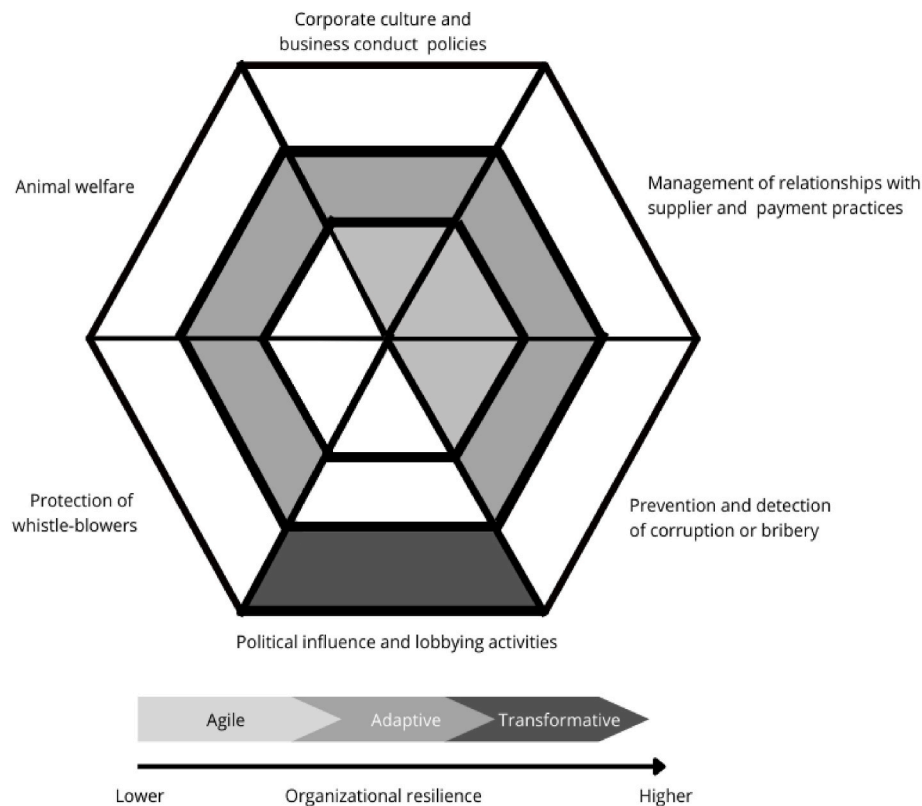


Fig. 1. AQUA governance approach assessment and structure for climate change.

2023). Moreover, the new EU regulations (such as CSR-d and CSDD-d (EU, 2024)) stress the role of big companies in acting as agents of change: through its proactive commitment, AQUA shows its willingness to answer that call. However, the results suggest that AQUA's proactive

approach is still in its initial stage.

Second, the study contributes to the current research that explores the role of governance as essential for handling challenges like climate change and ensuring business resilience (Giffoni et al., 2022) in the long

term, showing that climate change is beginning to be integrated within the utility and, especially, that this integration can happen at different levels and converted into practices in different ways (Di Vaio et al., 2021; Duchek, 2020). To ensure their resilience, given the current relevance of the topic, water utilities do not have the opportunity but the duty to incorporate it.

We discovered that AQUA had considered all the governance dimensions of the CSR-d regulation. Even if it could be true because of the obligation to adhere to the regulation in the next year (from 2025), thus anticipating future requirements, this comprehensive approach to governance is uncommon for most utilities and, in general, for most organizations. Moreover, we can confirm that, despite AQUA's work to implement an ESG roadmap, this is still far from being structured according to the regulation. Even if the literature suggests numerous failures of water utilities governance transformation (Kummu et al., 2016; Ménard et al., 2018), some organizations are rethinking governance.

Moreover, they discussed how the utility embraces climate change under an agility, adaptive, or transformative approach. According to Fig. 1, overall, and depending on the governance dimension, the utility applies a *hybrid* governance approach. In particular, when an agile approach prevails, the utility has internalized the recognition of the problem and has implemented some actions and changes to answer problems related to climate change quickly. Agile governance is an operative approach based on implementing actions (Huang et al., 2014), which implies many minor improvements and continuous evaluation (Janssen and van der Voort, 2020). For AQUA, this occurs in three governance dimensions: (i) corporate culture and business conduct policies, (ii) management of relationships with suppliers and payment practices, and (iii) prevention and detection of corruption or bribery.

Instead, when the utility adopts an adaptive approach to its governance, it prioritizes the creation of a strategic framework (Danar, 2023), mainly descriptive, which is not focused on the implementation of procedures and processes yet. The emphasis is no longer only on the organizational environment (De O. Luna et al., 2020), but it begins considering stakeholders of other interests. Through this approach, AQUA tends to understand what is happening and develop adaptive management strategies (Jiménez et al., 2020) to fit into this new environment. However, given that the scope is broad, such as in the case of climate change, it is often hard to apply the created framework. According to Fig. 1, AQUA proves to have developed adaptive governance for almost all the dimensions - except for the fourth one (political influence and lobbying activities). Thus, the utility has strategically embedded the climate change topic, allowing itself to reorganize, develop a new identity, and cope with risks. However, while AQUA has developed adaptive governance, thus laying the foundations for organizational resilience in the long term (Giffoni et al., 2022), it is then able to put into practice only some aspects of it, elaborating an agile approach actualized as concrete actions and new procedures. AQUA has not yet found mindful methods and tools for (i) protection and whistle-blowers and (ii) animal welfare areas.

Third, a transformative governance perspective concerns the fourth dimension - political influence and lobbying activities. AQUA is here approaching climate change from a higher-level point of view. Specifically, the utility recognizes the importance of acting as an agent of change, which enables it to contribute to a system change (Visseren-Hamakers et al., 2021), questioning mindsets and modifying conceptual networks (Chaffin et al., 2016). While it is similar to the adaptive approach, since it happens at a higher level and, at least at an initial stage, it is difficult to operationalize, it significantly differs from it in considering a wider network of actors and stakeholders - in other words, the whole system AQUA is embedded in (Zukin and DiMaggio, 1990) - when reasoning on its responsibility for guiding a society transformation (UN Global Compact Network Italy, 2024). Through participation in discussion tables with public entities, AQUA plays an active role in sharing its experience and suggesting solutions for water

resources protection, and it tries, ultimately, to assure organizational and system resilience. However, at the moment, since this commitment has not been integrated throughout organizational procedures, while AQUA recognizes its role and tries to incorporate a system perspective, it does not yet concretely operationalize this perception of itself. In other words, it is not yet fully exploiting its position as a potential change-maker for climate change and water protection goals.

Thus, these findings help understand how governance could be rearranged to effectively pursue its climate-related goals (Martínez-Córdoba et al., 2020; Romano and Akhmouch, 2019). Although the results confirm that water utilities are aware of their responsibility against climate change (Rawat et al., 2024) and are organizing their governance for this challenge, AQUA's case suggests that no linear approach exists. While some governance dimensions develop a more bottom-up approach (from agile to transformative), following implementation at an operational level first, followed by a strategic one, other dimensions are developed with an opposite approach (top-down), where the creation of new knowledge is prioritized (Leonardsson et al., 2021) and, only later, concretely applied. For instance, AQUA acts explicitly against climate change starting from the operative document (i.e., the CSR plan). Conversely, as mentioned above, the policy documents consider the climate change issue as an implicit matter. Lastly, despite implementing some actions or strategies to address climate change, the findings suggest that the evolution of AQUA governance is at its initial stage.

We draw from our study's findings to identify practical implications for both managers of water utilities and policymakers. Starting with the former, the added value of the study is the application of the ESRS governance framework as a tool to provide an evaluation of the integration of climate change within the governance of a utility. In this sense, the role of the ESRS is enlarged from a disclosure tool to an evaluation, practical, and analytical tool, which managers should consider as a starting point for strategy elaboration. Moreover, it could be used to build historical monitoring of the utility's governance as a basis for a continuous improvement and evolution of the governance structure to deal with climate change both in a short-term perspective and in a long-term strategic direction.

Regarding the practical insights for policymakers, the study underlines that since water utilities produce an essential service to society (Rubio-Martín et al., 2023), they must be resilient in the long term. Indeed, they should encourage the collaboration and interaction of different societal actors, such as water managers, operators, and climate scientists, for knowledge creation and sharing. In addition, they should promote the alignment of business governance models to those strategic topics that, according to the global priorities identified by the national and supranational organizations, are crucial to handle current challenges. In this sense, with the willingness to foster sector adaptation and transformation, policymakers may work to identify the best practices mapped for different cases and collect them in a devoted syllabus to be shared by the supranational organizations with the utilities.

6. Conclusions and perspectives for future research

The paper presents a case study of a public water utility operating in Italy. The presented analysis has worked to test and verify the integration of the climate change issue in the governance structure of the utility. Starting from the premises that, according to scholars, water utilities will be significantly impacted by climate change (Brettell et al., 2015) and that governance is essential for handling it but, above all, for ensuring business resilience (Giffoni et al., 2022), the study has highlighted that AQUA is currently beginning to deal with climate change (Hürlimann et al., 2022) by embracing a hybrid governance model. Its approach is based on a simultaneous agility, adaptive, and transformative perspective and the coexistence of proactive and reactive approaches. While the findings highlight a comprehensive strategy for embedding climate within the governance structure, they also show the

need for some improvements in specific governance areas.

In this sense, notwithstanding the significance of the findings, certain limitations emerge, which are starting points for future research. The case study findings are based on a limited amount of interviews, documents, and data. Additional limitations may arise from our long-term relationship and the observed utility. However, this bias is partially mitigated by our extensive experience working with water utilities over time. Moreover, to enhance the objectivity of their results, we worked independently during the analysis phase.

Nevertheless, these limitations can turn into avenues for future research. Nevertheless, even if it could be considered a critical aspect, the transversality of the topic and the adopted normative framework make the study replicable for other organizations facing the same challenge. The study contributes to the broad debate on the role of governance in addressing climate change for utilities and other organizations and businesses that have significant impacts (generated or suffered) linked to climate change. Indeed, the designed research method – the governance framework proposed (the six dimensions) by the CSR-d – represents an element of novelty in the sector for understanding governance dynamics and approaches. It could be used to monitor the continually evolving governance structures in general and to meet their changes in the growing demands of climate action. A longitudinal analysis of the same case study could provide relevant insights into the evolving governance structure. Moreover, since CSR-d will become effective for most organizations starting in 2025, we recommend further testing and elaborating on this method to verify the match between policy and organizational perspectives and explore its potential as a guideline for ESG improvements.

Additionally, future research, through comparative studies among utilities operating not only in the same sector but also in different geographical contexts and sectors, could deepen the analysis investigating if and how the hybrid governance approach observed in this study can be standardized, contributing to a more unified approach to climate action. In this sense, the identification of best practices mapped for different cases could be collected in a devoted syllabus to be shared by the supranational organizations with the utilities.

CRedit authorship contribution statement

Chiara De Bernardi: Writing – original draft, Visualization, Validation, Supervision, Methodology, Data curation, Conceptualization.
Nora Annesi: Writing – original draft, Methodology, Data curation, Conceptualization.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Data availability

No data was used for the research described in the article.

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