

## Unleashing capacity in the water sector: A framework for public entities

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### ABSTRACT

Capacity development in the water sector is crucial to achieving universal, sustainable, and resilient services. It has been broadly recognized as a priority, connected with governance of water resources and water and sanitation services. Through a scoping review including 153 scientific articles and 103 other documents, complemented with a consultation of experts, this article presents how the concept of 'capacity development' has evolved, what levels it consists of, and which are the key elements of success for effective capacity development processes. Most existing frameworks do not conduct any in-depth analysis of the determinants that define capacity at different levels and that there is no specific framework for public water-related entities. To address this gap, a dedicated capacity development framework is proposed for the public water sector, defining the key determinants at the individual, organizational, sectoral, institutional and structural levels and presenting types of interventions for each level. The framework will enable practitioners and policymakers to develop more systematic work on capacity development in water.

**Key words:** Capacity development, Determinants, Framework, Public administration, Water

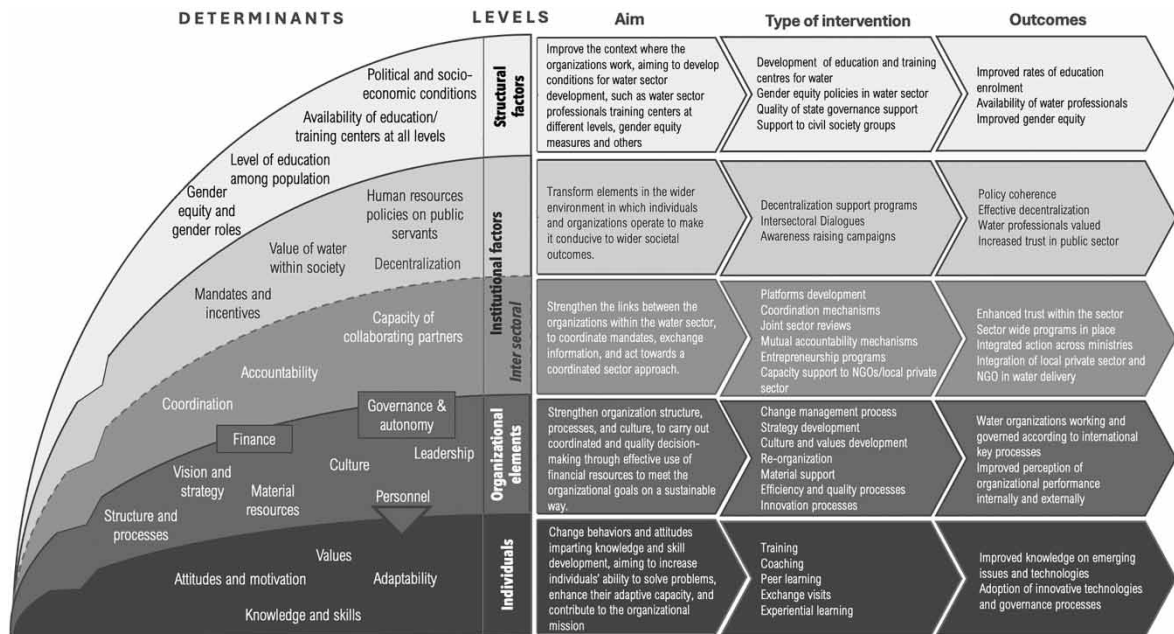
### HIGHLIGHTS

- The article presents a scoping review on capacity development for water including 153 scientific articles and 103 other documents.
- A framework with 4 interconnected levels and 23 determinants for capacity is presented, together with interventions and expected outcomes.
- The framework enables structured discussion, assessment, and definition of capacity development interventions.

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## GRAPHICAL ABSTRACT



## 1. INTRODUCTION

The origins of the term 'capacity building' date back to the 1970s in the United States, linked to the need to improve the capacity of state and local governments to implement fiscal decentralization policies (Warner *et al.*, 2017). Since then, the concept has shifted from individual capacities to organizational capabilities in the 1980 and 1990s, later incorporating the broader social, economic, and political environment (Lusthaus *et al.*, 2002; Morgan, 2006; Bester, 2015).

The terms 'capacity building,' 'capacity development,' and, to a lesser extent, 'capacity strengthening,' 'performance improving and management,' and 'change management' have been used indistinctly to refer to the improvement of the capabilities of an individual or institution to perform their functions (Hughes *et al.*, 2017; USAID, 2022; UN n.d.). Originally, the term 'capacity development' was also tightly related to education and training activities and concepts such as 'knowledge sharing' and 'knowledge transfer' (Lupton & Beamish, 2017; Vlachos *et al.*, 2019).

Capacity development is understood as a long-term approach, which includes realistic and manageable activities to deal with complex scenarios (Alaerts & Kaspersma, 2022). Several organizations such as the European Union, the Department for International Development (DFID, currently Foreign, Commonwealth and Development Office (FCDO)), the European Centre for Development Policy Management (ECDPM), and the Food and Agriculture Organization (FAO) adopted the definition of capacity development stated by the Organization for Economic Cooperation and Development (OECD): the process whereby people, organizations, and society as a whole unleash, strengthen, create, adapt, and maintain capacity over time (OECD, 2006; OECD, 2011b). Other widely referenced definitions include similar concepts, enhancing the systemic approach of the term (UNDP, 2009; Ubels *et al.*, 2010; ADB, 2014; Zamfir, 2017; Kacou *et al.*, 2022). However, many capacity

development activities and strategies are still very much aimed at the individual level, by proposing traditional knowledge-strengthening activities, as training.

The concept of capacity development has been part of the discussion in the development arena, as an essential part of the operational activities of the cooperation agencies at the country level, to strengthen national capacities in the fields of policy and program formulation, development management, planning, implementation, coordination, monitoring, and review (Evans *et al.*, 2004; Bester, 2015). Knowledge and capacity development activities account for 25% of aid expenditure, representing about US\$15bn a year (Green, 2017), including (i) education, research and innovation; (ii) the improvement of organization capabilities; (iii) working with communities and civil society, creating awareness and better governance; and (iv) sector-wide development (De Montalvo & Alaerts, 2013). It is increasingly acknowledged that development cooperation projects are more likely to be successful in countries where there are internal reformers and when development emphasizes the need for countries to take care of their own development (Mvulirwenanda *et al.*, 2017), as reflected in several General Assembly resolutions from the United Nations (UN), the Paris Declaration (2005), the Accra Agenda for Action (2008), and the Busan Partnership for Effective Development Cooperation (2011).

In the water sector, capacity development has been connected mainly with governance and management of water resources and water and sanitation services (WSS). While having been discussed over 40 years, definitions, approaches, determinants, and how to ensure and measure long-term sustainable and successful results continue to be debated. The International Drinking Water Supply and Sanitation Decade (1981–1990) exposed the failure to make progress in access to WSS due to multiple reasons, including the focus on infrastructure, with very little attention to institutions, social behaviors, and environmental issues (Mvulirwenanda *et al.*, 2017). Over the next decade, the importance of considering an integrated approach to capacity within WSS programs was emphasized. The symposium ‘A Strategy for Water Sector Capacity Building’ was held in 1991 by the United Nations Development Programme (UNDP), and the then International Institute for Hydraulic and Environmental Engineering recognized the importance of capacity-building processes for sustainable development at national, subregional, and local levels, consisting of three elements: (i) an enabling environment with appropriate policy and legal frameworks; (ii) the institutional development, including community participation; and (iii) the human resources development and strengthening of managerial systems (IHE/UNDP, 1991; Alaerts *et al.*, 1996). Several authors also highlighted the shifting focus to the promotion of governance (Mvulirwenanda *et al.*, 2017).

More recently, the Sustainable Development Goal (SDG) 6b refers to the participation of local communities in improving WSS. The SDG 6 Global Acceleration Framework (UN-WATER, 2020) included capacity development as one of the key accelerators to ‘ensure availability and sustainable management of water and sanitation for all’, and this role was reinforced during the UN Water Conference held in New York in March 2023 (UN, 2023a) and its follow up resolution (UN, 2023b).

Despite the focus on the topic, progress is insufficient. The last UN-Water Global Analysis and Assessment of Sanitation and Drinking-Water (GLAAS) Report (2022) highlighted the lack of trained personnel in the water sector, where only one-third of the countries had more than 75% of the human resources needed to carry out the key functions to deliver WSS, and over 80% of countries had an insufficient supply of trained professionals to meet the needs for management of onsite sanitation and small drinking water systems (WHO, 2022). If we consider the gender roles in the sector, the scenario is even worse, since only one in five water workers is a woman and the proportion was even less at the managerial level (World Bank, 2019). Utilities also show limited capacity to ensure the efficiency of services (Cetrulo *et al.*, 2020).

This research reviews the literature on capacity development for water and proposes a dedicated capacity development framework for water with a focus on the public sector, considering the main determinants to be pondered in the analysis of the situation at different levels (contextual factors, institutional factors, organizational

elements, and individuals). The article also discusses aims, types of interventions, and potential outcomes at each level, to achieve improvements of capacity development in the water sector.

## 2. METHODS

This article combines desk review and consultations with experts, as shown in Figure 1.

The desk review included two sources: a scientific scoping review and a review of grey literature, including a review of frameworks and capacity development approaches. For the scoping review, the PRISMA method was applied (Prisma, 2022).

The methodology for the scoping review used keywords criteria (single and varied word combinations) for search, using the Scopus database, including (i) capacity development, (ii) capacity building, (iii) institutional reform/strengthening/development change, (iv) organizational reform/strengthening/ development/change, (v) systems strengthening, (vi) change management, (vii) performance improvement, and (viii) public sector reform.

The first search in the Scopus database returned 2,371 papers with positive matches. Of them, 531 papers were selected for further review, considering the following criteria: (i) be published since 2005, (ii) English language, and (iii) discuss capacity development topics.

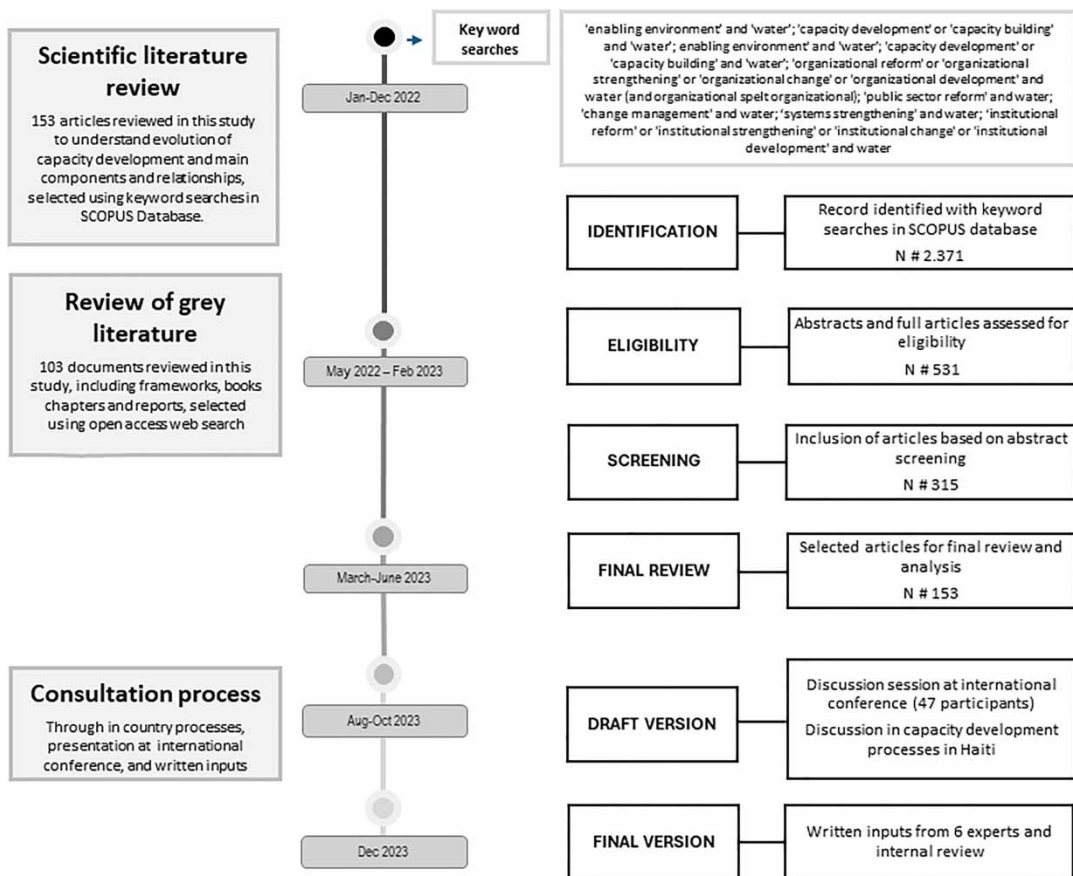


Fig. 1 | Methods: Scoping review. Source: Authors' own elaboration.

From the second selection, an abstract screening resulted in 315 selected papers. The screening considered the following criteria: (i) linked to water services or water resources management and (ii) focused on public sector institutions. Out of this selection, 153 papers were fully reviewed for analysis when containing specific information on a capacity development framework theory, experience, or evaluation. Fifty-nine of these papers had a single-country focus, while 51 had a regional or multi-country scope; as shown in Table 1, the case studies cover all continents and income levels. The remaining 43 of them were global, not based on the experience of a specific region or group of countries.

For the review of existing capacity development frameworks and other relevant documents of grey literature, free web searches were carried out using keywords and references from the analyzed articles. The scope included public sector official documents and literature from bilateral and multilateral organizations (frameworks and their applications/evaluations), research and training institutions, governments, academic literature and documents from non-governmental organizations (NGOs), and civil society organizations (CSO). From the initial screening, 35 frameworks were found and 13 were analyzed in detail. Furthermore, 78 additional relevant documents focused on lessons, recommendations, and guidance on capacity development were added as part of the grey literature selected review.

In terms of expert consultation, three different processes were undertaken. The framework was presented and discussed at an open session at the Stockholm World Water Week in August 2023, with 47 participants. After incorporating the comments received, six capacity development international experts were consulted and provided written feedback to the final version, by December 2023. In parallel, the framework was used to guide and inform capacity development assessment processes in Haiti with senior government officials of these countries. The framework was well received and was instrumental in defining the focus of the capacity development assessment process.

### 3. RESULTS

#### 3.1. The interrelated levels of capacity development

In the last decades, several capacity development frameworks have been developed by international development institutions and organizations following the evolution of the concept of capacity development (Lusthaus *et al.*,

**Table 1** | Scope of the papers reviewed in detail.

Scope	Papers (n)	% of total	Additional information on scope
Global	43	28	Not focused on a certain region or country – global reviews or general frameworks
Regional	25	16	Africa, Sub-Saharan Africa, East Africa, West Africa, Southern Africa; Central Asia, South Asia, South East Asia, Pacific Caribbean
Multi-country	26	17	Basins: Mekong, Senegal, Niger, Nile, Yellow river, Ganga Low Middle Income Countries; Post conflict countries Group of countries from different regions (see list of countries included below)
Country	59	39	<i>Africa:</i> Burkina Faso, Ethiopia, Ghana, Kenya, Malawi, Mali, Mozambique, Nigeria, Somalia, South Africa, Tanzania, Uganda, Zambia <i>Asia (West and Central):</i> Iraq, Jordan, Mongolia, State of Palestine, Tajikistan, Uzbekistan <i>Asia (South and East):</i> Bangladesh, Cambodia, China, India, Indonesia, Myanmar, Nepal, Pakistan, Vietnam <i>America:</i> Bolivia, Brazil, Chile, Ecuador, Mexico, St Lucia, USA, Venezuela <i>Europe:</i> Greece, Germany, Netherlands, Norway, Ukraine <i>Oceania:</i> Australia, Papua New Guinea

2002; Bester, 2015). These frameworks guided the organizations and their partners in analyzing jointly the existing situations in terms of capacities and identifying the appropriate type(s) of intervention. Some of these frameworks are generic and address broader development issues, while others are more specific to the water sector, such as the World Bank's Water Utility Turnaround Framework (Soppe *et al.*, 2018) or the Water Aid's guide on capacity assessment for regulators in WSS (WaterAid, 2021).

One common element that stands out in the analysis of the capacity development frameworks is the definition of levels of intervention. Currently, capacity development is seen at three levels, namely, individual, organizational, and a broader enabling environment, interlinked and defined depending on the approach and the particular development issues to be addressed. This three-level approach is followed by OECD, FAO, DFID, or the UNDP. The African Union/New Partnership for Africa's Development (NEPAD) considers four levels of capacity development (individuals, groups, institutions, and societies) (NEPAD, 2012). The Swedish International Development Agency (Sida) adds further granularity to the three main levels discussed, including (i) the individual knowledge and professional skills, (ii) organization and units in an organization, (iii) the systems of organizations, (iv) institutional frameworks, and (v) the contextual factors (Illes *et al.*, 2005).

In a broad sense, the individual level addresses skills, competence, motivation, experience, and knowledge that allow individuals to perform. The organizational level refers to the internal structure, policies, and procedures to carry out coordination actions to achieve the organization's effectiveness (DfID, 2013). Finally, the enabling environment is level with the widest variety of definitions, including the broad social and political system in which individuals and organizations interact through policies, laws, and power relations, among others. Access to resources and experiences that can develop individual capacity are largely shaped by organizational and environmental factors, which in turn are influenced by the degree of capacity development of each individual (Blokland *et al.*, 2009; DfID, 2013; UNDP, 2015a).

### 3.1.1. Developing individual competence to build organizational capacity to perform

Many capacity development activities are still very much focused on the individual level. Individual capacities are acquired formally, through education and training, while others come informally, through doing and observing (exchange visits, peer-to-peer learning).

The activities that specifically target individuals are often focused on improving knowledge and skills, such as training courses providing new knowledge. However, training does not have an impact until the knowledge or skills acquired by the trainees have been successfully applied to a specific work situation, which, in turn, results in a measurable improvement in performance (USAID, 2011). Thus, individual capacity development approaches must be complemented with activities that put the new knowledge into practice, including coaching and mentoring through a certain process or period. These also cover soft skills such as negotiation or communication skills. Very frequently exchange or twinning programs are developed to have more constant support (see Water Operators Partnerships (WOP)), which can also cover organizational elements (UN-HABITAT n.d). Massive Open Online Courses (MOOC) have been a successful capacity development mechanism to improve the knowledge and skills of individuals using recent opportunities of new IT technologies and social networks (Mayfield, 2017).

### 3.1.2. Embedding improved capacities into organizational performance

Capacity development activities at this level are often labeled as change management processes (UNDG, 2018). They can be targeted at more structural dimensions of the organization, such as material support, re-structuring of the organization, or redefinition of processes. Capacity development at this level can also cover cultural dimensions such as leadership development, definition of internal values and cultures, improvement or internal cohesion, and communication.

In the water sector, there have been specific programs related to enhancing organizational capacity, e.g., the water utilities' performance, which cover (i) strengthening the operational efficiency of the utility; (ii) improving the governing environment; and (iii) improving access to funding for WSS (Soppe *et al.*, 2018).

In Uganda, for example, the National Water and Sewerage Corporation implemented a series of change management initiatives to reverse operational and financial inefficiencies such as the Service and Revenue Enhancement Programme and the Area and Service Performance Contracts (Mugisha, 2019). Some success factors pointed out from this experience were as follows: (i) involvement and empowerment of staff to make decisions at appropriate levels of operation; (ii) customer and 'private management' style efficiency; (iii) good planning and challenging performance targets; (iv) outsourcing non-core activities; (v) systematic use of external contracts versus short-term internal performance contracts; (vi) clear oversight and monitoring system; and (vii) information sharing through benchmarking. Another study analyzing the reforms in Kampala, Nairobi, and Dar es Salaam (Mugisha & Brown, 2010) added additional key elements for success, such as (i) managerial autonomy; (ii) accountability in relation to performance; (iii) committed leadership for reform; (iv) individual and group economic incentives linked to performance; and (v) political support, through strategic alliance networks with government and donors.

### 3.1.3. Support the enabling environment for systemic change

UNDP defines an enabling environment as the broad social system within which people and organizations function. It includes all the rules, laws, policies, power relations, and social norms that govern civic engagement (UNDP, 2015a). FAO relates the dimension of enabling environment to political commitment and vision, legal and economic frameworks, national public sector budget allocations and processes, governance and power structures, incentives, and social norms (FAO, 2010).

Capacity development activities at this level are often focused on wider government reforms beyond the water sector, as well as social norms change. Within the wider sector reforms, support for decentralization, public finance management and fiscal policies, or state modernization can be mentioned. These programs are often long term (10 years or more) and are implemented through ministries such as Finance, Local Government, or Planning. Jensen (2019) highlights the case of water sector policy reform in Manila Philippines, and Malaysia, and states that along with developing operational efficiency, it is equally important to address the wider factors that influence policy design and implementation, such as the political capacity gaps. In Indonesia, a 20-year-long capacity development program for irrigation sector reform contributed toward developing the institutional capacity of both the local governments and farmers. The process led to increased political and budgetary power to local governments and society, making them also accountable for service delivery (Alaerts, 2008).

Within the sphere of enabling environment, creating a link between educational institutions, skill development partners, and the water sector employers is critical to fulfil the future human capital needs in the sector (Bogardi & Hartvelt, 2002; Water Europe, 2022). Thus, support for education at all levels is essential, from primary to university education, as well as technical and professional training centers, to prepare the adequate labor force for the future. Over the years, the traditional education system has evolved to more integrated approaches; while traditional (hard) engineering skills are still needed for water engineers, the softer aspects such as sustainability and stakeholder participation are equally important (Vehmaa *et al.*, 2018). Several countries also focus on formal and informal technical vocational education and training (TVET) as a priority area for education development and to foster inclusive growth. At the global level, the UNESCO-UNEVOC International Centre for TVET guides TVET educators and practitioners for over 280 UNEVOC Centers across UNESCO Member States (UNESCO n.d).

### 3.1.4. Determinants for capacity at each level

Another important consideration in framing a capacity development intervention is to understand that this process is driven by determinants or elements that influence the existing capacity within each level. [Drennan & Rasheed \(2020\)](#) define determinants as the theoretical place-based elements that may influence both policy development and the success of implementing adaptation mechanisms, such as information and skills, equity, institutions, technology, infrastructure, economic resources, and social capital. As an example, the level of knowledge of an individual is a determinant of their capacity, as this influences the type of tasks that this person can perform. The finances of an organization are a determinant of organizational capacity, as chronically underfunded organizations will struggle to deliver on their mandate.

The World Bank adopts an approach focused on outcomes rather than determinants, listing six types of learning outcomes: raised awareness, enhanced skills, improved consensus/teamwork, fostered coalitions/networks, formulated policy/strategy, and implemented plan/strategy ([Otoo \*et al.\*, 2009](#)).

### 3.1.5. The challenge of measuring outcomes

As a result of the interconnected levels that influence capacity, measuring capacity development outcomes remains an important challenge. The outcome and impact of capacity development efforts are long term and very difficult to capture, as impacts depend on simultaneous changes in beneficiaries, organizations, and external factors ([UNDP, 2010](#); [Gunawardana \*et al.\*, 2013](#)) Existing literature points that there are limited assessment and evaluation tools to measure and monitor capacity development outcomes as well as quantifying the contribution that capacity development makes to achieve a specific development goal ([Brown \*et al.\*, 2001](#); [UNDP, 2015b](#)). Results and logical frameworks for the assessment of capacity development have evolved, from simple casual linear relationships to more complex models, based on systems thinking theory where processes, patterns, and relationships interact with each other ([Long, 2001](#); [Mvulirwenanda \*et al.\*, 2017](#)).

The evaluation approaches suggest the need to view capacity development systematically, considering multiple factors and defining linkages among these factors and boundaries that distinguish them ([Brinkerhoff & Morgan, 2010](#)). To evaluate this type of systemic relationship, participatory and inclusive approaches are generally used, valuing the 'best fit' over the 'best practice' ([OECD, 2006](#); [UNDP, 2015a](#)).

### 3.1.6. Designing interventions in fragile settings

OECD defines fragility as 'the combination of exposure to risk and insufficient coping capacity of the state, system and/or communities to manage, absorb or mitigate those risks.' Fragility is expressed across different dimensions such as economic, environmental, human, political, security, and societal and can lead to negative outcomes including violence, poverty, inequality, displacement, and environmental and political degradation ([OECD, 2016](#)). When implementing capacity development interventions in countries or regions defined as fragile, it is essential to consider with special attention the socio-political and economic context and the conditions of the institutions to adapt strategies and achieve successful results ([Baser, 2011](#); [OECD, 2011a](#); [SIWI/UNICEF, 2020](#)).

Differences with nonfragile contexts lie in pressure to restore services and security quickly, short timeframe, limited capacity to build on, often not simply rebuilding but creating new capacities, little 'margin of error,' and 'hyper-politicized' environment, among others ([Brinkerhoff, 2007](#); [Brinkerhoff, 2010](#)). The risk of doing harm to existing national capacity in these contexts is considerable. Although technical assistance is useful in the early post-recovery period to restart services, too much of it and for too long has contributed to brain drain out of government and resentment among nationals over salary differentials. It is important to ensure that country partners play a role in the management of technical assistance from the beginning of the program and to increase their contribution in phases as national capacity is built and demonstrated ([OECD, 2011a](#)).



Furthermore, interventions require more consideration to balance short-term priorities to build confidence in the state and long-term capacity (DfID, 2013). Adaptation to their complex and changing contexts may require the greater flexibility inherent in emergent or incremental approaches (OECD, 2011b).

### 3.2. Common principles for effective capacity development processes

Capacity development should be seen as a long-term effort that needs to be embedded in broader change processes. Most of the literature highlights key tangible and intangible principles that enable the development of an effective capacity development initiative or program. These can be condensed in the definition of capacity development as a locally driven process of learning by leaders, coalitions, and other agents of change that brings about changes in socio-political, policy-related, and organizational factors to enhance local ownership for and the effectiveness and efficiency of efforts to achieve a development goal (Otoo *et al.*, 2009). These common principles are described in detail below.

#### 3.2.1. Led and owned locally

The starting point of the capacity activities should be existing capacities and local ownership of the process (Illes *et al.*, 2005; Hope, 2009), to make it demand and need based. The external actors would then play a supporting role only in the capacity development process. OECD (2011a) emphasizes strong political ownership as an essential condition to ensure results, especially in fragile contexts. In capacity development processes, the identification of local, national, and organizational champions to catalyze change is crucial (FAO, 2010). Leaders are de facto change agents and refer to both individuals and a group of individuals (as large social movements or government units that take the lead), and both formal and informal (UNPD, 2008; DfID, 2013).

#### 3.2.2. Framed in the context

Attention to national, regional, and subregional context needs to be constant during the entire capacity development process, to adapt the strategies (OECD, 2011a). Thus, it is essential to continuously assess the specificities of needs and changes in context to better tailor the support given (Carneiro *et al.*, 2015). Most of the frameworks consider existing local knowledge, structures, and processes as an essential starting point for capacity development. Outside partners – domestic or foreign – can support, facilitate, trigger, or catalyze capacity development and related change processes, but integrating local knowledge will be essential for sustained development (UNDP, 2015a). Undertaking targeted needs assessment at all levels (individual, organization, and enabling environment) is another critical factor for the success of capacity development efforts (FAO, 2010).

#### 3.2.3. Participatory

Building and sustaining good relations among stakeholders is a prerequisite for capacity development processes to succeed (Keijzer *et al.*, 2011). Early engagement and involvement of different stakeholders using participatory approaches are needed for need assessment (WaterAid, 2021). Over time, successful approaches include building knowledge networks, experience sharing, and dissemination of best practices and experiences (FAO, 2010). Including diverse stakeholders enhances legitimacy and provides room for increased accountability and sustainability of the process (Jiménez *et al.*, 2019).

#### 3.2.4. Adaptive

Learning from the experience is needed so that activities can be adapted accordingly (Tropp, 2007). Adaptive capacity to meet unknown future challenges and opportunities is seen as an increasingly crucial factor, particularly in the water sector, and in connection to climate change (Hagelsteen *et al.*, 2021; USAID, 2022). This is especially relevant in fragile contexts or countries with special characteristics in relation to water issues, such

as small island developing states (SIDS) or landlocked countries. It is critical to repeat the assessment process at regular intervals, as capacity development is a continuous process of assessing, analyzing, developing, implementing, and evaluating (Hagelsteen *et al.*, 2021). As domestic capacity accumulates, the role of external agencies should taper off, ultimately becoming redundant as capable and legitimate states take shape (UNDP, 2015a).

### 3.2.5. Innovative

Integrating innovation into capacity development often attracts attention and motivates organizations to engage. Organizational innovation capacity refers to the ability to produce and exploit new products, services, processes, or systems over periods of time (Wilkinson, 2021), including data management, digitalization, human resource management, finance, and planning. The African Union and NEPAD (NEPAD, 2012) consider innovation as part of the intangible types of capacity development. The learning aspect of the capacity development process should be underpinned by transparency and openness at all stages of the process (OECD, 2006).

### 3.2.6. Long term

Capacity development takes time and is normally at odds with the traditional project approach and related pressure to demonstrate progress to stakeholders and donors (UNDP, 2008). Adoption of medium- to long-term approaches, focusing on results and impacts, is crucial to achieving sustainable changes (FAO, 2010; OECD, 2011b). OECD (2011b) also refers to flexible funding as one of the steps of capacity development, as flexible, adaptable long-term funding allows a goal to be achieved even when the path changes. Capacity development must be scaled up and structured with a long-term perspective to support change and reform at policy and organizational levels building on iterative adaptation (Alaerts & Kaspersma, 2022). Long-term, sustainable partnerships are essential to support capacity-building processes, and external support might be needed for a long period.

## 4. DISCUSSION

Most conceptual frameworks on capacity development elaborate on the process and the interconnected levels. However, most of them contain no in-depth analysis of the determinants that define the capacity at the distinct levels, and these are not focused on the water sector in particular. However, this is needed, as processes with a focus on capacity development require defining an adequate upfront assessment of capacity and incorporating ways to monitor and evaluate results (Thomas, 2016).

As a result of the research conducted, a dedicated capacity development framework in the water public sector is proposed, defining the key determinants to be pondered in the analysis of the situation at different levels and types of interventions to achieve expected outcomes within each level.

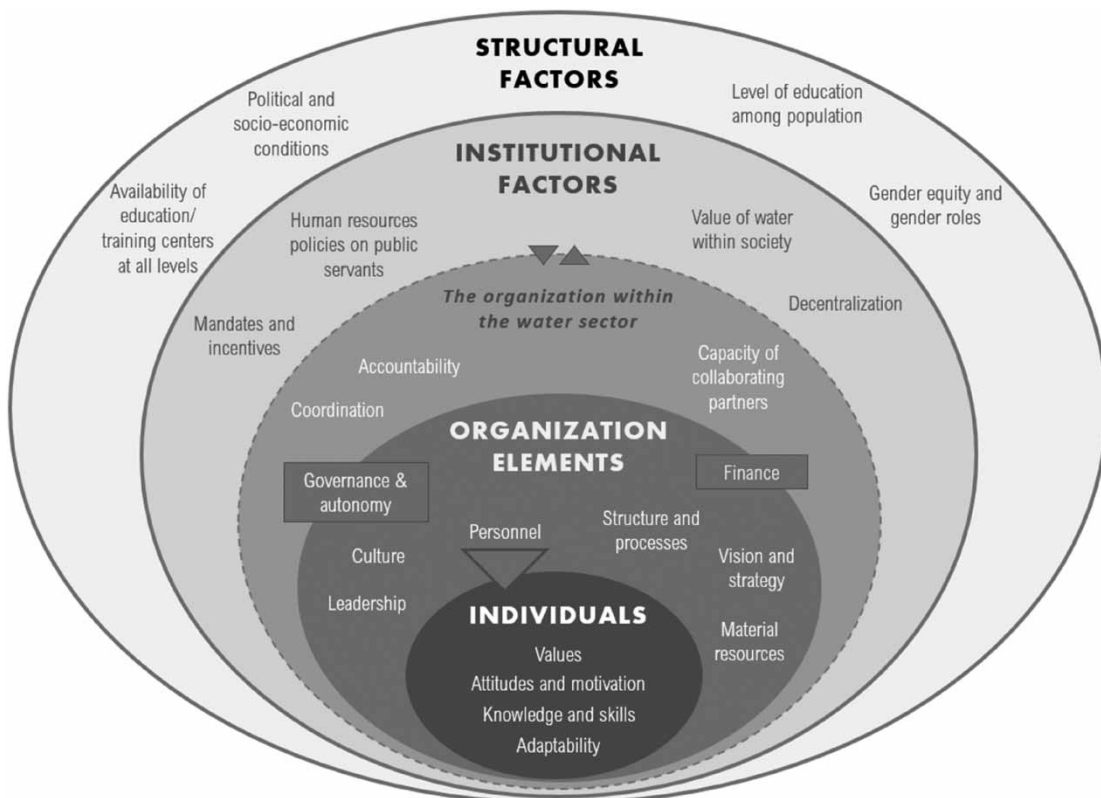
Water management cuts across society. Connected to basic services such as education and health, linked to environmental and cultural values, economic development, and disaster risk management, water management requires multiple institutions to be considered, both horizontally (different ministries) and vertically (distinct levels within the administration). In contrast with other key services within a country, like education or health, water and sanitation responsibilities often sit scattered within several ministries. Water management also cuts across administrative boundaries within a country and internationally, as the geographical watersheds define the boundaries of the river basin authorities. The multiplicity of stakeholders in water management is often referred to as 'water sector,' which is a loose definition that alludes to the stakeholders who take part in water management in a certain country. Hence, formal and informal coordination mechanisms play important roles in the water sector. Within the formal sphere, these would include inter-ministerial coordination mechanisms, donor coordination groups and sector-wide approaches, which aim to have unified sector planning and move

away from individual project approaches (Cassels & Kanovsky, 1998). With a higher degree of informality, there are platforms and networks combining government, nongovernment, private sector, donors, and other stakeholders.

Given the importance of this set of interrelations for water management, the capacity development framework proposed for water includes four interrelated levels, including a specific sublevel to focus on the water sector: (1) individuals, (2) organizations, (3) institutional level, including how these organizations relate to other organizations within the water 'sector' (3a), how the water 'sector' sits within the wider institutional framework (3b), and (4) the context of the country where it operates (structural context).

The framework is presented in Figure 2, including the four levels of interrelated capacity and determinants within each level.

Each level comprises the determinants for the capacity at each level and is mostly focused from a public sector organization perspective. The combination of these determinants explains the capacity of organizations to be dependent on each other. The framework also highlights several types of interventions or activities to implement at each level. The decision on what type of interventions and which determinants to target will depend on the objectives defined, available economic resources for the development of the activities, time frame, and level of ambition. The prioritization of potential activities and tools at one or more levels of intervention also should consider the key principles for successful capacity development processes previously mentioned in the results of this



**Fig. 2** | Capacity development interconnected levels within the water sector.

article. Finally, the framework provides the outcomes to be expected in the medium and long term, resulting from the proposed interventions in relation to capacity development, aligned with the different orders of outcome (Jiménez *et al.*, 2020).

#### 4.1. Individual level for capacity development in water

Developing individual capabilities, skills, and abilities is essential to an organization's capacity to innovate, change, and prosper (Johnson *et al.*, 2018). The development of capacity-building interventions at the individual level aims at changing behaviors and attitudes to increase individuals' ability to solve problems, enhance their adaptive capacity, and contribute to the organizational mission.

Determinants at this level are linked with the changing behavior and attitudes of individuals through knowledge and skill development. The performance of individuals within an organization is determined by the following:

- *Values*. Understood as the individual beliefs that motivate people to act one way or another and guide their behavior. Values, emotions, and beliefs are keys to generating change processes of any kind within an organization (Morrison, 2001). In particular, when the values of the individual are aligned with the purpose of the organization they work for, a higher degree of commitment and motivation can be expected, and vice versa.
- *Attitude and motivation*. Attitude is understood as the overall way of relationship of the individual at work (Damianus *et al.*, 2021). It is a way of thinking or feeling about something, and it is usually reflected in behavior (Baldwin & Wengrzyn, 2022). Within this determinant, we include the willingness to collaborate, the openness to give and receive feedback, politeness, and friendliness in the interaction. Attitude is connected to motivation, understood as the engagement at work, and is connected to the capacity to relate and cooperate with others. This is influenced by tangible measures (competitive pay rates, adequate work environment, human resources policies, and work–life balance) as well as from less tangible elements (inspiration, appreciation received from colleagues and leaders, meaningful work, and personal aspirations within the professional career).
- *Knowledge and skills*. Under this determinant, we include the understanding and capacity to apply the main concepts, theories, methodologies, and processes related to the domain of work (also named as professional skills); the ability to perform functional and managerial tasks (e.g., budgeting, planning, reporting), and the ability to establish and keep relationships both internally and with external partners (relational skills). Relational skills include social capabilities such as empathy, patience, honesty, reliability, or persuasiveness, among others, and can have a significant impact when building relations and solving conflicts (McCallum & O'Connell, 2009).
- *Adaptability*. Described as the ability and willingness to perform different tasks, the flexibility to take on unplanned tasks, and the capacity to change priorities in the short term. Adaptability is a change in behavior characterized by innovative or creative approaches in anticipation of, or in response to, environmental changes. Adaptability is both proactive and reactive (Boylan & Turner, 2017). This also includes the ability to learn and apply new concepts and ideas. This determinant is particularly important in scenarios of unpredictability and shocks, such as those triggered by climate change or conflicts in fragile contexts (Blokland *et al.*, 2009; Schreiber & Loudon, 2020).

The most common capacity development activities at the individual level include (i) training, including formal education, (ii) coaching, (iii) peer-to-peer learning, (iv) participation in learning or dissemination activities, such as conferences and webinars, and (v) exchange and exposure visits. In general, the generation and dissemination of knowledge take place through formal education and training (Blokland *et al.*, 2009). Training interventions

often involve three types of learnings: experiential, social, and formal, based on the premise that the combination of these three types of learnings is particularly effective in management and leadership development (Johnson *et al.*, 2018). Online training has been on the rise worldwide, allowing for more flexible and accessible ways of learning. MOOCs have proved to be effective in the sector (Leal *et al.*, 2022). Trainings are often combined with learning from peers (Blokland *et al.*, 2009), including exchange, networking, and exposure visits to other similar organizations, which can show progress in new methods, technologies, or governance approaches. Individual customized support from leadership and/or other sector experts, who work as coaches, is also a common practice, but it is often more focused on the leadership of the organization. Other activities, such as awareness-raising campaigns or informal networking, are informal mechanisms to build up capacities and change behaviors.

#### 4.2. Organizational level for capacity development in water

The aim of an intervention at this level is to strengthen the organization's structure, processes, and culture, to carry out coordinated and quality decision-making through effective use of financial resources to meet the organizational goals in a sustainable way.

Organizations have a formal structure in place (formal dimension), where people interact in a certain way, through what are typically called the cultural dimensions of an organization. The determinants proposed in the performance of a public organization are as follows:

*Formal dimension.* Those that constitute the architecture of the organization are typically formally codified through different sets of written documents. These are as follows:

- **Structure and processes:** An organizational structure is a system that outlines how staff is organized and activities are directed to achieve the goals of an organization. Organizational structure is also understood as a way or a method by which organizational activities are divided, organized, and coordinated (Ahmady *et al.*, 2016). A process is a series of actions that produce something or that lead to a particular result. The organization achieves its goals through a series of interrelated processes. The design and implementation of these processes are keys for the efficiency of the organization and must be tailored to the needs of the organization (Turner, 2014). Key processes within an organization include strategic processes (e.g., strategy, planning, finance, decision-making, evaluation, and learning), management processes (e.g., procurement, budgeting, monitoring), technical service delivery and/or production processes (those linked to the mission of the organization), and support processes (e.g., human resources, administration, communication) (Castro & Heller, 2009; Iribarnegaray & Seghezze, 2012).
- **Vision and strategy:** The vision of an organization can be defined as a statement that shows the organization's aspirations for the future, the 'directions for action' (Zaccaro & Klimoski, 2001). It can also be understood as the purpose of the organization. It serves to guide and motivate all members of the organization in the same direction. A strategy provides a more detailed plan, typically with objectives and means, to advance toward the vision. A strategy aims to guide organizational activities and resources to meet the identified objectives (AlDhaheri *et al.*, 2020).
- **Finance:** Refers to the available financial resources for the organization to use. It includes not only the volume of funds available but also its predictability (stability over the long term) and composition – whether it is dependent on a single source or diverse sources of funding and how it can be diversified if needed (Grozdanovska *et al.*, 2017). This determinant sits partially outside the organization itself, as public organizations might be given budget limits or restrictions from other parts of the public administration or the legislative power.
- **Material resources:** By material resources, we refer to the infrastructure, equipment, materials, and software that the organization can use to carry out its mission.

*Cultural dimension.* This dimension speaks to how the organization works to deliver on its mission, including the daily communication, decision-making, participation, and interaction among its members. This element

requires a higher degree of understanding of the organization to be transformed. These are also often called soft elements or org-ware (Garret & Moarif, 2018).

- *Governance and autonomy.* The mechanisms set up to take strategic decisions and control the performance of the organization from the outside are typically referred to as governance mechanisms. This includes, as well, the level of autonomy or protection of the entity from the pressures of other actors (SIWI/UNICEF/WHO/IADB, 2021). Within this determinant, we include the nomination of the top management, and control procedures for the organization. This determinant sits partially outside the organization itself, as it is typically decided by a different body within the public administration and might also include the legislative power.
- *Leadership.* Leadership is defined as the act of directing and managing a project, groups of people, or an organization, which promotes team and organizational goal attainment by being responsive to contextual demands (Zaccaro & Klimoski, 2001). At the highest level, leadership has been defined as consisting of three main elements: (i) creating a common vision and goal; (ii) aligning efforts and resources; and (iii) unleashing the motivation, talent, and creativity of individuals and organizations (De Montalvo & Alaerts, 2013). However, in modern organizations, leadership is not solely the responsibility of those who reside at the higher levels of the hierarchy. Instead, it is an activity in which everyone within the organization can take part, and self-leadership skills have been positively related to innovative behaviors at work (Carmeli *et al.*, 2006).
- *Culture.* Organizational culture includes an organization's expectations, experiences, and philosophy, as well as the values that guide members' behavior (Ledford *et al.*, 1995). Culture in an organization is based on shared attitudes, beliefs, customs, and written and unwritten rules that have been developed over time and are considered valid. Within these, there are management and communication styles, teamwork procedures, degree of consultation, deliberation, and the organization's wider involvement in decision-making and quality control, among others (Nazir & Zamir, 2005).
- *Personnel.* People within the organization are the main performers of its activities. The knowledge, skills, attitudes, and adaptability are determinants of their performance, as explained in detail earlier. Also, motivation, values, and wellbeing are critical determinants of performance (Adams, 2019; Hart, 2020).

Interventions at this level are typically labeled as change management processes; these can be focused on more formal aspects, such as strategy development, reorganization, or review of internal processes for increased efficiency. In the water sector, there has been work toward the improvement of internal management systems through ISO qualification processes, or more comprehensive assessment tools such as Aquarating (Krause *et al.*, 2018) or Utilities of the Future (Lombana *et al.*, 2022). These approaches can also work on the less tangible elements of the organization, such as culture, or leadership. On occasions, their improvement programs focused on the achievement of certain outcomes such as becoming climate smart (IWA, 2019) or reducing non-revenue water (World Bank, 2016). In the area of regulation, there have been recent developments to support the improvement of both the technical aspects as well as the internal organization of regulators (SIWI/UNICEF/WHO/IADB, 2021). The main outcomes of capacity development processes at this level are that the water organizations are governed and deliver their mission according to internationally recognized benchmarks, and there is an improved perception of organizational performance internally and externally.

#### 4.3. Institutional level for capacity development in water

No organization can be successful in isolation (Mugisha, 2019). The organizations operate within a network of stakeholders: citizens, partners, civil society, and other institutions. In this regard, we distinguish two sublevels: first, the organization within the water sector; second, the water sector sits within the wider institutional framework of the state.

#### 4.3.1. The organization within the water sector

Capacity development activities within the water sector aim to strengthen the links among stakeholders to coordinate mandates, exchange information, and act toward a coordinated sector approach. The main determinants considered to describe the performance of an organization within the water sector are as follows:

- *Coordination (formal and informal)*. Coordination is understood as the set of mechanisms, instruments, and platforms that ensure multilevel, multisectoral, and multistakeholder cooperation among actors. Coordination requires information sharing, dialogue, and collaborative decision-making; it consists of a set of formal and informal mechanisms (Jiménez *et al.*, 2020). The degree of coordination among institutions that operate in the same 'sector' (e.g., organizations dealing with water issues) can vary greatly. At the extreme, when organizations do not speak to each other but work on similar issues, overlapping and duplication of activities might occur, which hinder the effectiveness of each of the organizations involved.
- *Capacity of collaborating partners*. Any organization needs others to fulfill their mandate; research studies, supplies, technical assistance by experts, or the introduction of new processes are needed. Hence, the capacity of other stakeholders within the water sector such as other governmental departments, local private sector, or academia affects the ability of any organization to perform its duties.
- *Accountability*. Accountability refers to the principle whereby elected officials and those who have a responsibility account for their actions and answer to those they serve, and in which those affected by decisions and actions have the capacity to hold those in power to account. Accountability creates three conditions: authorities and institutions can be held responsible for their actions, are answerable to those they serve, and are subject to enforceable sanction as necessary (Jiménez *et al.*, 2020). At the organization level, it refers to how the organization presents and justifies its decisions and performance to others, and the mechanisms in place allowing stakeholders to monitor reporting systems, demand information or redress, correct any misconduct, or reward performance. At the water sector level, it refers to the willingness and abilities of public institutions to put in place systems and mechanisms to engage citizen groups, capture and utilize their feedback, and create trust between organizations.

At this level, interventions tend to be focused on increasing interactions and collaboration across stakeholders. These can be in the form of intergovernmental coordination processes, often needed due to the transversal nature of water management (SIWI, 2016), but they also can have a more diverse nature. In the context of resilience, informal multistakeholder platforms are put in place to work collaboratively toward a common goal. In the case of Hull, the United Kingdom, the platform brings together the local government, the regulatory agencies, the water utility, and the academia, to improve flood resilience (Living with water, 2023). Joint sector reviews (JSRs) are a more regular accountability mechanism for sector coordination. JSRs are a process articulated around regular meetings (typically annually), where sector partners discuss the current status and define priorities. Key to the success of JSRs is the need to be conceived as a process rather than a single event, be government led, and with a clear definition of responsibilities (Holvoet & Inberg, 2009; Danert, 2016). In addition to national processes, there are also international initiatives. The Sanitation and Water for All Partnership gathers over 100 partners including global organizations, national governments, the private sector, civil society, external support agencies, and academia, toward a joint objective of water, sanitation, and hygiene for all, always, and everywhere (Sanitation and Water for All, 2023).

The main outcomes of capacity development processes at this level include improving trust among the sector stakeholders, developing sector-wide programs with a more integrated action across ministries, as has been the case in Ethiopia (Goyol & Girma, 2015), and integration of diverse stakeholders in the delivery of services, such as local private sector and NGOs.

#### 4.3.2. The organization within the wider institutional setup

The aim of capacity initiatives at the level of the institutional setup is to transform the wider social and public administration elements that influence the water sector and that the water sector can also influence to some extent.

The main determinants of capacity development at this level are as follows:

- *Mandates and incentives.* Mandates define the roles of institutions in the public sector. They are typically codified in laws, decrees, and norms (Festré & Garrouste, 2008). A lack of clarity and overlapping mandates hinder the performance of public institutions, as these can lead to competition, mistrust, or fragmented information collection. There may also be overlaps between various governmental levels (local, regional, and national). Incentives are external elements that motivate individuals or organizations to perform in a desirable way. Incentives to cooperate openly with others, to innovate, and to increase efficiency are efficient methods to encourage organizations to continuously develop. However, nonfinancial incentives within government agencies are not as clearly codified as financial incentives. In addition, narrow mandates and control mechanisms that focus on processes rather than on performance may hinder the impact of incentives in transforming organizations (Zoutenbier, 2005).
- *National human resource policy on public servants.* This entails the aspects of staff recruitment, remuneration, promotion, and development within the public service. Human resource policies might affect either positively or negatively the performance of civil servants. For example, public organizations might have difficulty retaining talented and motivated employees if educational levels are not aligned with the requirements of the post, or when compensation is too low compared to the private sector (Aguilar *et al.*, 2005).
- *The value of water (and its professionals) within society.* This determines the attractiveness of a field of activity as a professional career, and therefore the capacity of the sector to secure a robust, skilled, and sustainable workforce. The value of the sector and its professionals within society is part of social norms, which evolve over time. A society that values water as a resource and/or service will also value the professionals who deal with it (Smith & Ballard, 2021).
- *Decentralization.* The degree of devolution of responsibilities at different levels of government has an influence on the mandates and roles of organizations. Often, responsibilities are transferred but are not matched with sufficient human and organizational capacities, at least in the short term. In addition, different service delivery models will require different capacities. Sometimes new models are decided (e.g., community water management), but the shift of capacities and resources needed from the central to the local level does not follow.

At this level, decentralization support programs with a focus on water, are key instruments. However, improved capacity will not deliver better services if not accompanied by adequate guidance and control mechanisms and improved downward accountability (Jiménez & Pérez-Foguet, 2011). Another important target is to develop closer policy alignment across different sectors; for example, through the collaboration among water and climate stakeholders for better climate risk integration into water policies and better consideration of water into climate-related policies and commitments (Swedenborg *et al.*, 2022), or bringing finance ministers together to discuss water issues, as in the high-level Finance Ministers' Meeting organized regularly by Sanitation and Water for All (SWA) partnership (Sanitation and Water for All, 2023).

Awareness-raising campaigns, to increase the value of water, have been identified as crucial elements in an integrated human capital strategy (Water Europe, 2022). As the gap in the demand for water-related jobs is widening, the need to attract the interest of young professionals to water increases (UNESCO, 2016).

The main outcomes of capacity development efforts at this level are related to an increase in policy coherence, effective decentralization, and availability of valued water professionals.



#### 4.4. Structural level for capacity development in water

The aim of the interventions at this level is to improve the context where the organizations work, developing conditions for water sector development, including the improvement of overall economic and social situation, and implementing gender equity measures.

For a public water organization, there are structural elements that affect its performance:

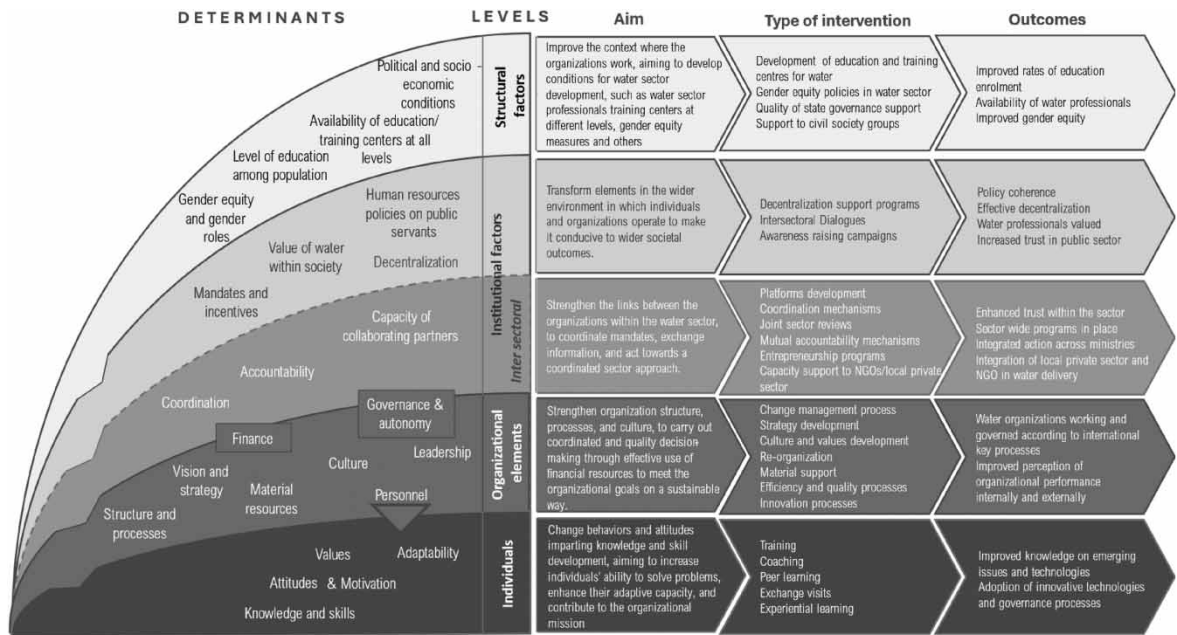
- *Level of primary, secondary, and tertiary education among the population.* A lower level of general education in the country will increase the demand for individuals with higher education. This can make it difficult for a public institution to recruit and retain a qualified workforce.
- *Political and socio-economic conditions.* For example, low living standards, limited connectivity and digitalization, remoteness, lack of access to good quality basic services such as health or education, or security issues hinder the willingness of qualified staff to move to remote areas. Similarly, security aspects, excessive prices, and limited housing options in some cities might deter professionals. These aspects will influence the capacity of an organization to deploy staff in certain areas, and thus, its performance.
- *Availability of higher education/training centers.* On occasions, insufficient higher education and training centers mean that qualified staff needs to be trained abroad or be brought from other countries, with the associated costs and challenges to retain staff in the organization.
- *Gender equity and gender roles.* The overall level of gender equity and the gender roles in society might limit the level of integration of women in the work force, which will hinder the performance of the organization.

Progress toward the full and equal participation of women in water professions depends on society-wide efforts. Efforts to understand and promote gender equality in water professions are underway in many institutions (such as the World Bank, Interamerican Development Bank, and Asian Development Bank, among others). The UNESCO World Water Assessment Programme (WWAP) Toolkit on Sex-disaggregated Water Data contributes to this objective. It outlines gender-responsive indicators for water assessment, monitoring, and reporting (Imburgia *et al.*, 2020). Interventions are also underway to increase the visibility and the role of women in the sector, for example, women's networks in water (Ray, 2007). At the same time, efforts need to be complemented through both university degrees, specialized training centers in water-related issues, and early engagement of children and youth in water and environment issues. This is carried out through the formal curriculum as well as with additional educational interventions that prove to be more effective when they also involve local action, community engagement, and direct intervention (Ardoin *et al.*, 2020). Several development organizations and donors are actively promoting capacity development programs for young water professionals. One example is the International Water Association (IWA) program providing a platform for networking opportunities, technical sessions, discussion workshops, and professional development sessions (IWA, 2019). Finally, support and prizes related to water are powerful tools to raise the awareness of young people about water issues (Maheshwari, 2023). As an example, many winners of the Stockholm Junior Water Prize, awarded to high school students for water-research projects, have later pursued their careers within the water world (SIWI, 2023).

The main outcomes of interventions at this level would be the development of skilled water professionals at all levels, together with improved gender equity in the sector. Figure 3 summarizes the aims of intervention at the different levels, activities, and outcomes expected.

## 5. CONCLUSIONS

This research has presented the main lessons from the capacity development literature in water and presents a dedicated capacity framework for water organizations in the public sector, where four interconnected levels



**Fig. 3 |** Levels of intervention, aims, types of intervention, and outcomes in capacity development for water.

are described. In addition, the definitions of the determinants of capacity development provide a clear articulation of the key elements that influence the existing capacity within each level.

The framework will enable practitioners and policymakers to acknowledge the complexity and develop more systematic work on capacity development in water through several types of interventions. The framework can be useful as a dialogue tool, within countries, with domestic and international stakeholders when discussing capacity development processes. The suite of examples and references provided aims to foster learning from previous experiences.

The next steps in this domain include further development of robust evaluation frameworks that can capture the complex interrelationships of capacity development, as well as developing and documenting long-term capacity-building processes that work toward sector-level outcomes, particularly in fragile settings.

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### DATA AVAILABILITY STATEMENT

All relevant data are included in the paper or its Supplementary Information.

## CONFLICT OF INTEREST

The authors declare there is no conflict.

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