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# CAPACITY DEVELOPMENT

## Capacity Development for achieving Groundwater Sustainability

Along the trajectories of societal and technological development, also the field of capacity development and education has evolved. Capacity development enables individuals, organizations, and societies to obtain, strengthen and maintain capabilities for understanding their development issues and for setting and achieving their own development targets. Successful capacity development acknowledges the socio-cultural, legal and political environment in which it takes place, is gender sensitive, and adjusts to the specific capacity needs of the target group or organization. Beyond cultivating capacities, it serves as a framework for peace-building and the fostering of international solidarity.

Water is at the heart of almost all societal development. Similarly, capacity development lies at the heart of the UN-Water SDG 6 Global Acceleration Framework. This is because improved capacities trickle down to and benefit all of the other four SDG 6 accelerators, namely improved data and information, innovation, optimized financing, and governance. Capacity development empowers our skills to engage, align and drive progress towards ensuring the availability and sustainable management of water.

Groundwater represents 99% of the world's liquid freshwater resources. Achieving groundwater sustainability marks therefore a cornerstone for achieving sustainable development. Yet, groundwater is a hidden, invisible resource which means that groundwater stakeholders and beneficiaries frequently lack an adequate understanding of groundwater fluxes, groundwater-surface interactions, and groundwater vulnerability. The resulting mismanagement of groundwater can have adverse effects on human health and well-being, water supply and food security, groundwater-reliant ecosystems and can even negatively impact local and regional climates.



In this framework, groundwater sustainability can be defined as the development and exploitation of groundwater resources to meet current and future beneficial uses, without causing unacceptable environmental or socio-economic impacts, while involving inclusive participatory and adaptive governance processes.

### The capacity development cycle

In line with the 2030 Agenda for Sustainable Development of the United Nations (UN), the ideal capacity development process involves an iterative and inclusive cycle that starts with stakeholder engagement, followed by the joint assessment of capacity assets and gaps, the joint elaboration of a capacity development program as well as its implementation, and finally, a success evaluation and sustainability monitoring (Figure 1).

Capacity development programs follow the rationale that groundwater degradation is in many cases driven by inadequate behavior and management of relevant stakeholders or responsible institutions (Figure 1). More fundamentally, those drivers can often be traced back to (1) a lack of knowledge and groundwater system understanding, (2) unfavorable attitudes and roles towards groundwater, (3) a lack of experience and skill in groundwater monitoring and assessment, (4) missing leadership, or (5) inappropriate institutional arrangements and policies.

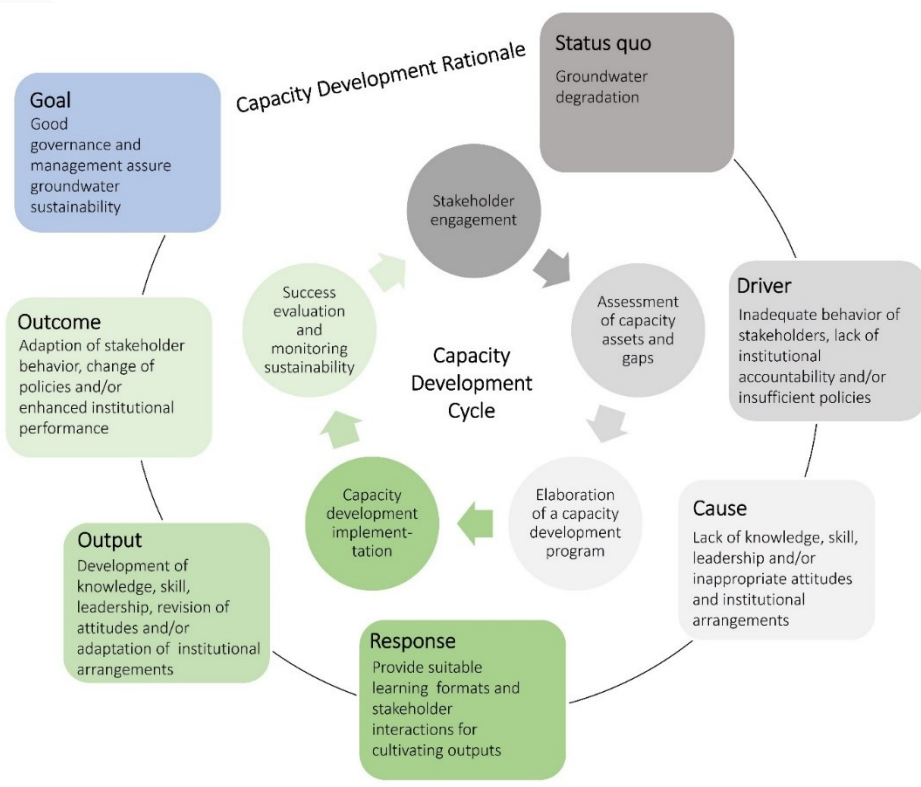


Figure 1 Interdependence of the capacity development cycle and its underlying rationale

Capacity development responses are therefore intended to provide a nourishing environment that makes use of suitable learning formats and stakeholder interactions for cultivating required capacities. In many cases they will also need to bridge an inherent digital divide which limits access to knowledge and resources. In this manner, groundwater capacity development fundamentally intends to inform and change the behavior of involved actors, lead to expedient institutional performance, and endorse policies that foster groundwater sustainability and the implementation of SDG 6. For achieving that it links results from success monitoring and evaluation activities to a theory of change and strives for cyclic practice improvement, leaving no one behind.

### Lack of groundwater-related capacity undermines development targets

A recurring thread among the capacity gaps of groundwater-related institutions and professionals concern knowledge, skills and attitudes regarding data collection, data management and data processing. This lack of data stewardship is aggravated by closed data philosophies. Missing institutionalized groundwater-related capacities have four principle consequences: (1) groundwater is not made use of at its full potential to foster development, (2) well-drilling programs are ineffective resulting in low yields, poor quality of well water and loss of financial resources, (3) undetected adverse impacts on groundwater by heavy users and polluters like industry and agriculture, and (4) a low adaptation capacity concerning changing environmental or societal conditions. The latter point particularly burdens the management of transboundary aquifers that underly differing national interests. A lack of groundwater-related capacity, thus, poses a risk to economic branches that rely on groundwater supplies, weakens the enforcement of governance frameworks, and undermines development targets. A lack of groundwater visibility due to missing data and information was also observed to contribute to the undervaluing of the importance of groundwater for development on the decision-making level. A condition that not seldomly leads to insufficient systematic investments into groundwater. In turn, well informed investments into groundwater trickle down into and benefit every aspect of society.

### Capacity development implementation – case-dependent tailoring needed

The saying “If your only tool is a hammer, every problem looks like a nail” does also apply to the field of groundwater capacity development. The hammer is usually represented by power-point lectures, and the nail is considered the capacity gap of the target group. However, generic groundwater capacity development interventions run the risk of being ineffective. Successful capacity development is a dynamic learning process that considers capacity assets and gaps of the target group and is adjusted to their socio-environmental context. Thus, capacity development measures require case-dependent tailoring and should make conscious use of suited learning formats for addressing actor-specific capacity needs. Examples of alternative capacity development tools and formats are field campaigns, on-the-job training, serious games, developing media content, drawing exercises, or citizen science programs, to name a few. Composing capacity development measures of different formats and tools potentially increases intervention success by diversifying learning pathways and endorsing different cycles of experimentation, experience-building, reflection, and conceptualization. Some free resources for groundwater capacity development can be found via UNESCO

(<https://en.unesco.org/themes/water-security/hydrology/water-education>) or the groundwater project (<https://gw-project.org/>).

### Levels of capacity development success evaluation

Capacity development success verification is an indispensable part of the capacity development cycle. There are different levels for assessing capacity development success, namely the level of descriptive and disaggregated data, the output level, the outcome level as well as their final target; the degree of enhancement of the state of groundwater resources.

Descriptive data of a capacity development intervention could involve, for example, the types of participants, numbers of graduations and involved thesis, among others. The output level of success evaluation, in turn, refers to the level of acquired capacities such as knowledge, skills, changed attitudes or leadership, and how these are transferred. Further, measuring success on the outcome level involves the assessment of changes in professional behavior and performance and the degree of adoption of new workflows, reporting systems or data management systems. Finally, also the change in the state of groundwater resources could be used to evaluate capacity development success if causal relationships can be established. In the best case all the four mentioned evaluation levels should be respected for success verification. Each capacity development cycle requires strong measurable indicators and targets for sound monitoring, evaluation and learning, for tracking progress, and enhancing accountability. Repeating success verification mechanisms over time can provide a suitable measure of capacity development intervention sustainability.

### Best practice – cyclic learning, upscaling and process ownership

Exemplary frameworks that foster institutional capacity development include binational communal partnerships or governmental cooperation agreements involving relevant specialist agencies. Other fruitful formats are hosted by international capacity development networks. The UN-Water SDG 6 Capacity Development Initiative, for example, is an inter-agency coordination platform supporting countries to develop capacities to accelerate progress towards SDG 6. Also, regional river basin organizations have been beneficial drivers for reinforcing groundwater capacity development.

A best practice for capacity development programs lies in planning them cyclically while systematically increasing funds for upscaling, perpetuation and sustainability (Figure 2). Instructors will then be enabled to consistently use lessons learned from each capacity development cycle to improve practice and impact in the following turn; a turn that will be set to reach larger scales than the previous one. Another success factor for assuring longer term impact and upscaling is the training of suited individual participants for becoming change agents and capacity multipliers in their specific socio-cultural and political environment. The development of such individual groundwater champions should be complemented by development programs that allow for emerging local groundwater champions to bring their expertise to bear. By this means, groundwater capacity development spans from individual to institutional levels and has a chance to finally manifest in the enabling environment by translating into concrete policy proposals, fostering sustainable groundwater management and

governance. Governance frameworks and policies should streamline public investments for assuring best practice in capacity development.

Overall, if instructors achieve to demonstrate how participants can maximize personal benefits from applying acquired capacities while contributing to groundwater sustainability, there is a higher chance for process ownership and long-term behavioural change among learners. Depending on the societal context, possible incentives for involved actors could be societal recognition and increased self-esteem, avoidance of health risks and water scarcity, thematically suited career and job opportunities or financial compensations for, for example, adjusted agricultural practices and water conservation. Likewise, self-organized local water management rules between competing users can provide an incentivizing framework for sustaining collective action and behavioral change.

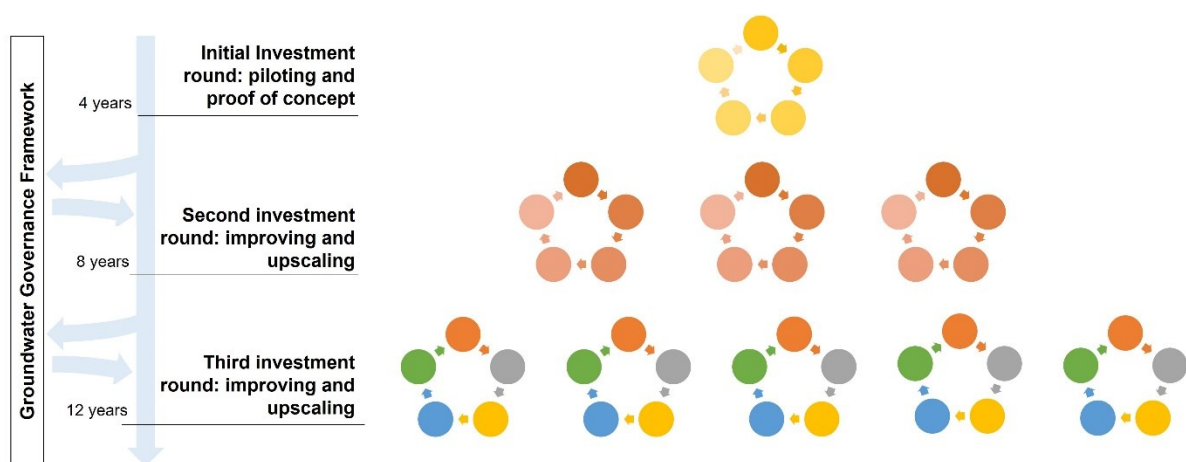


Figure 2 Cyclic learning and upscaling of capacity development activities that interact with groundwater governance frameworks

### Key messages

- Capacity development lies at the heart of the UN-Water SDG 6 Global Acceleration Framework. It encompasses the other SDG 6 accelerators while empowering skills, engagement, alignment and action towards ensuring the availability and sustainable management of groundwater.
- Lack of groundwater-related capacity undermines societal development targets.
- Diversifying learning pathways increases impacts of capacity development measures.
- Best practice lies in planning capacity development programs cyclically while systematically increasing funds for upscaling, perpetuation and sustainability.
- Capacity Development links results from success monitoring and evaluation activities to a theory of change and strives for cyclic practice improvement, leaving no one behind.
- Governance frameworks and policies should streamline public investments for assuring best practices in capacity development.