

Capacity development for SDG 6 in Costa Rica

Basis for the national capacity development plan

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Costa
Rica

1 Introduction

This report is the result of a joint effort between multiple actors, reflects Costa Rica's commitment to advance towards the targets of Sustainable Development Goal (SDG) 6, related to clean water and sanitation for all. This document was made possible by the active collaboration of national ministries and institutions, as well as international organizations-thanks to all. We are also grateful for the valuable input of local communities, academia, non-governmental organizations and the private sector, who participated in the Integrated High-Level Workshop held in San Jose, during 2-3 December 2024.

This report not only identifies critical gaps that limit progress towards SDG 6, but also proposes concrete strategies and activities to address these constraints through capacity building. These actions are essential to ensure sustainable management of water resources, improve the coverage and quality of water and sanitation services, and promote sustainable equitable, and inclusive governance and management of water and related natural resources.

The current context demands innovative, sustainable solutions to be adapted to the particularities of Costa Rica. For this reason, this document also emphasizes the need for intersectoral alliances, resource mobilization, and adoption of advanced technologies, aligned with national regulatory frameworks such as the National Policy on Wastewater Sanitation (PNSAR) and the international commitments of the 2030 Agenda.

We are confident that this report will be a strategic tool to guide future decisions in the water sector and lay the groundwork for the implementation of a robust and sustainable national capacity development plan. We express our deep gratitude to all the individuals and institutions that contributed to this effort, recognizing that their active participation and shared vision are essential for building a resilient and equitable future in water management in Costa Rica. Special thanks to the CDI Team and workgroup facilitators: Mauricio Chicas Romero (SDG 6 Capacity Development Initiative Consultant), Vivian González (Water Directorate - MINAE), Carlos Alonso von Marschall Murillo (MIDEPLAN), Jose Pablo Céspedes Rodríguez (MIDEPLAN), Juan Criado (UNESCO), Stephanie Rambler (UN DESA), Rahmah Elfithri (UNESCO), Sarah Breslin (UN-Water), Ilyas Masih (IHE Delft), Gaetano Casale (IHE Delft), Karol Murillo (UN Country Team in Costa Rica), Luis Carlos Martínez Solano (Water Directorate – MINAE), Alicia Fonseca (UNA), Katty López Campos (UNIDO), Helga Ruiz Álvarez (AyA), Lilliana Arrieta Quesada (REDICA), and Anny Chaves (UNESCO).

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3 Context of the Report

This report is part of the **UN-Water SDG 6 Capacity development Initiative (CDI)**, an effort co-coordinated by UNESCO and UN-DESA to address gaps in institutional, technical, human and financial capacities that limit the effective implementation of the Sustainable Development Goals (SDGs) related to water and sanitation. The CDI is part of the **SDG 6 Global Acceleration Framework**, which identifies five accelerators that have been found to catalyze progress towards water-related goals and targets: governance, data and information, innovation, financing, and capacity development.

The implementation of the CDI involves several key steps. First, a Member State submits a request for support, followed by the identification of priorities and stakeholders through a capacity gaps assessment. Next, a high-level integrated workshop is organized to raise awareness, secure political commitment, and initiate collaboration. Based on the workshop outcomes, a tailored national capacity development plan is designed, including specific Key Performance Indicators (KPIs). The plan is then implemented through coordinated activities by UN agencies and national institutions, and progress is monitored through periodic evaluations and follow-up meetings to address remaining gaps and ensure sustainability.

3.1 Global and regional context

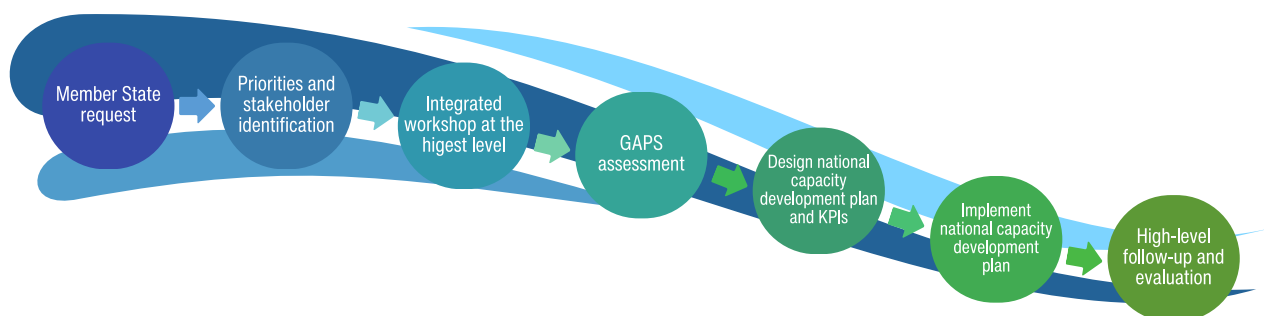


Figure 1. Process steps for the CDI implementation.

Since 2016, UN Member States have annually reported their progress towards the SDGs and challenges to achieving SDG 6 - which seeks to ensure the availability and sustainable management of water and sanitation for all – have become apparent. These include insufficient institutional capacities, inadequate human and financial resources, and a lack of efficient technologies¹². Costa Rica is no stranger to these challenges, which are manifested in key aspects such as access to safe drinking water, wastewater treatment, and the implementation of Integrated Water Resources Management (IWRM).

To address these constraints, the **UN General Assembly** proposes a decade of action aimed at generating significant progress through three main approaches. First, it seeks to mobilize leadership and resources at the global level, promoting a coordinated and priority response to address water and sanitation-related goals. Second, it encourages the integration of these goals into policies, budgets, and regulatory frameworks at the local level, ensuring that national efforts are aligned with global strategies. Finally, it promotes collaboration among multiple actors, including governments, international organizations, academia, the private sector, and communities, to generate sustainable and inclusive transformations.

In this context, Costa Rica through the Ministry of Environment and Energy is one of the Pilot Countries for CDI. The High-Level Integrated (HLI) workshop represents the third step of the CDI process (see figure 1) and aims at engaging national stakeholders

¹ UN-Water, "UN-Water Annual Report 2023," UN-Water, Geneva, Switzerland, 2024. [Online]. Available: <https://www.unwater.org>

² United Nations Environment Programme, "Progress on Implementation of Integrated Water Resources Management. Mid-term status of SDG Indicator 6.5.1 and acceleration needs, with a special focus on climate change," UNEP, Nairobi, Kenya, 2024. [Online]. Available: https://www.unwater.org/publication_categories/sdg6-progress-reports/

at the highest levels involving various ministries and sectors in Costa Rica. This step is crucial for securing political buy-in, fostering national ownership, and ensuring commitment to the capacity development necessary for sustainable water and sanitation management. By bringing together representatives from various sectors, the workshop will identify gaps and interlinkages in water management, thus enabling integrated decision-making. Following this workshop, further steps will focus on gaps assessment and developing a comprehensive SDG 6 capacity development plan. This plan will tailor capacity-building initiatives to the specific needs and priorities identified during the workshop, paving the way for long-term, sustainable water and sanitation solutions.

These actions represent a fundamental step in addressing current challenges and laying the foundations for sustainable and resilient water management in the country.

3.2 Role of the UN-Water SDG 6 Capacity Development Initiative

For the implementation of the CDI, a team is established to coordinate efforts and address capacity gaps in achieving water and sanitation-related goals. This commission is composed of UN agencies and national institutions, working collaboratively to ensure integrated and sustainable approaches to water resources management and sanitation. The Commission, as part of the Acceleration Framework, has been instrumental in facilitating effective collaboration between national institutions, international agencies, academia, civil society and the private sector. This report arises from the work carried out during the **High-Level Integrated Workshop**, organized in December 2024 in San José, Costa Rica. In this workshop, activities were carried out such as:

- Identification of critical gaps in institutional, technical, and community capacities.
- Development of strategic proposals to overcome the identified limitations.
- Promotion of cross-cutting approaches to gender equality, climate change, sustainability, interculturality and water valuation.

This report seeks to synthesize the findings of the workshop, document input from stakeholder consultations and propose a set of specific recommendations that will serve as the basis for the **National Plan for Capacity Development** in Costa Rica. This plan will contribute to achieving SDG 6 and the consolidation of a sustainable and resilient water systems in Costa Rica.

4 Purpose of the report

The main purpose of this report is to assess the capacity gaps that limit Costa Rica's progress towards the SDG 6 targets related to water, sanitation and hygiene. It also seeks to formulate strategic recommendations that serve as a basis for the design of a National Capacity Development Plan, aligned with national priorities and the country's international commitments within the framework of the 2030 Agenda.

4.1 Justification

Sustainable water management is a fundamental pillar to ensure human well-being, economic development and environmental protection. However, significant challenges persist in Costa Rica, such as fragmented water governance, inadequate financial resources, lack of innovative technologies, uncoordinated information, and limited technical capacity in the monitoring and treatment of water resources. These constraints affect not only the fulfillment of SDG 6, but also progress on other interrelated goals, such as food security, public health, and climate action.

This report responds to the need to identify and address these capacity gaps in a comprehensive and structured manner. In addition, it seeks to align national actions with the strategies of the SDG 6 Global Acceleration Framework, which promotes governance, innovation, information management, financing and capacity development as key accelerators to achieve water and sanitation targets.

4.2 Objectives

The report presents the most critical gaps in institutional, technical, and community capacities identified during the High-Level Integrated workshop and how they relate to water resource governance, project financing, technological innovation and effective information management. It proposes concrete and evidence-based measures to overcome these identified limitations, prioritizing sustainable and inclusive solutions that promote equity, climate resilience and the cultural appreciation of water and environment.

An additional objective is to establish a robust basis for a capacity development plan for achieving SDG 6 in Costa Rica. This plan will include a roadmap with specific actions in the short-, medium- and long-term.

4.3 Scope

The scope of this report includes a comprehensive analysis of current capacities in Costa Rica, based on the results of a desk review, the findings of the Integrated High-Level Workshop held in December 2024, and consultations with key stakeholders from various sectors. This approach ensures a multisectoral and inclusive perspective, considering the technical challenges as well as the social, economic, institutional and cultural factors that affect water management in the country.

The report aims to serve as a strategic tool to guide decision-making at the national level. Its content is aimed at supporting Costa Rican authorities and international partners in identifying gaps, priorities, planning actions, and mobilizing the resources needed to build a resilient and sustainable water system.



5 Methodology

The development of this report was based on a comprehensive methodology that combines various sources of information and a participatory and multisectoral approach. This approach allowed for a broad and detailed view of the capacity gaps in Costa Rica's water sector, as well as proposing practical and actionable recommendations to address them.

5.1 Sources of information used

5.1.1 Desktop Reviews

A detailed analysis of technical documents and reports related to the state of the water sector in Costa Rica was carried out. These included national and international benchmarks on the country's progress towards SDG 6 targets, water quality monitoring reports, studies on sanitation and water management policies, as well as the accelerators of the SDG 6 Global Acceleration Framework. This review provided a robust conceptual framework and an up-to-date database for analysis. The main documents analyzed include the **National Policy for Sanitation in Wastewater Management 2016-2045** (PNSAR), is central to the analysis, offering strategic insights into long-term planning for wastewater treatment and sanitation infrastructure. The **2023 AyA Management Report** supplies critical updates on operational challenges and achievements in water provision and sanitation services. Additional important references include the **National SDG Strategy** by MIDEPLAN, which highlights Costa Rica's overarching goals and gaps for SDG 6, and the **Instituto Nacional de Estadística y Censo (INEC) SDG Indicator Database**, which offers quantitative data on progress and areas needing improvement.

Interviews and consultations were conducted with **key stakeholders in the water sector** in Costa Rica, including representatives of government institutions, community leaders, academic experts, and utility operators. These consultations helped identify specific challenges, validate findings, and enrich inputs.

5.1.2 Workshops

The key information for this report was obtained from the **High-Level Integrated Workshop**, held in San Jose 2-3 December 2024. A total of **54 participants** attended, **representing 37 different entities** from sectors including academia, government institutions, private groups, NGOs, and international cooperation agencies. **55.6% of participants were women**, reflecting a commendable gender balance. Additionally, high-level representation from entities such as UNESCO, AyA, UNDESA, IHE Delft, and MINAE underscored the workshop's strategic significance and collaborative spirit. This diversity highlights the inclusive and multi-sectoral nature of the event, fostering a holistic discussion on water-related issues in Costa Rica.

During the workshop, key capacity gaps were identified, and strategic proposals were made to overcome these constraints. The preparation phase involved designing work dynamics, tailoring questions, forms, and presentation templates, ensuring alignment with SDG 6 targets. **Facilitators, selected as national experts**, were trained to guide discussions effectively. Participants were divided into seven groups, **organized by sector** (public institutions, civil society, private entities, academia, and international cooperation). Groups were assigned specific SDG 6 targets, promoting focused discussions on capacity gaps and necessary actions. Data collection was conducted using standardized digital forms, allowing for a preliminary synthesis and analysis to be identified and discussed during the workshop.

The analysis phase (after the workshop) integrated workshop results with national data, aligning findings with existing strategies and policies. The methodology emphasized inclusivity and intersectoral collaboration, producing a comprehensive view of Costa Rica's water management challenges and opportunities. This approach is detailed in the **Workshop Guide for the Capacity Development Initiative SDG 6**, which served as the foundational document for planning and implementation.



6 SDG 6 Status Assessment

6.1 6.1.1 – Proportion of population using safely managed drinking water services

Indicator 6.1.1 measures the proportion of the population that uses safely managed drinking water services, covering systems that provide contaminant-free water, continuously available, and accessible within homes. For purposes of measuring safe water coverage in Costa Rica, safe water is defined as water delivered by a pipeline inside the dwelling and provided by a service provider. Costa Rica’s national target for 2030 is to achieve 100% coverage of the population with water in the dwelling from managed aqueducts (Ministerio de Planificación Nacional y Política Económica, 2023).

National coverage of drinking water reached 94.93% by 2023, showing progress toward the 100% target. The main service provider, AyA, covers almost 50% of the population, followed by ASADAS, which covers 25% of the population. The ASADAS are community associations that have an agreement with AyA, which grants them the authority to provide water and sanitation services.

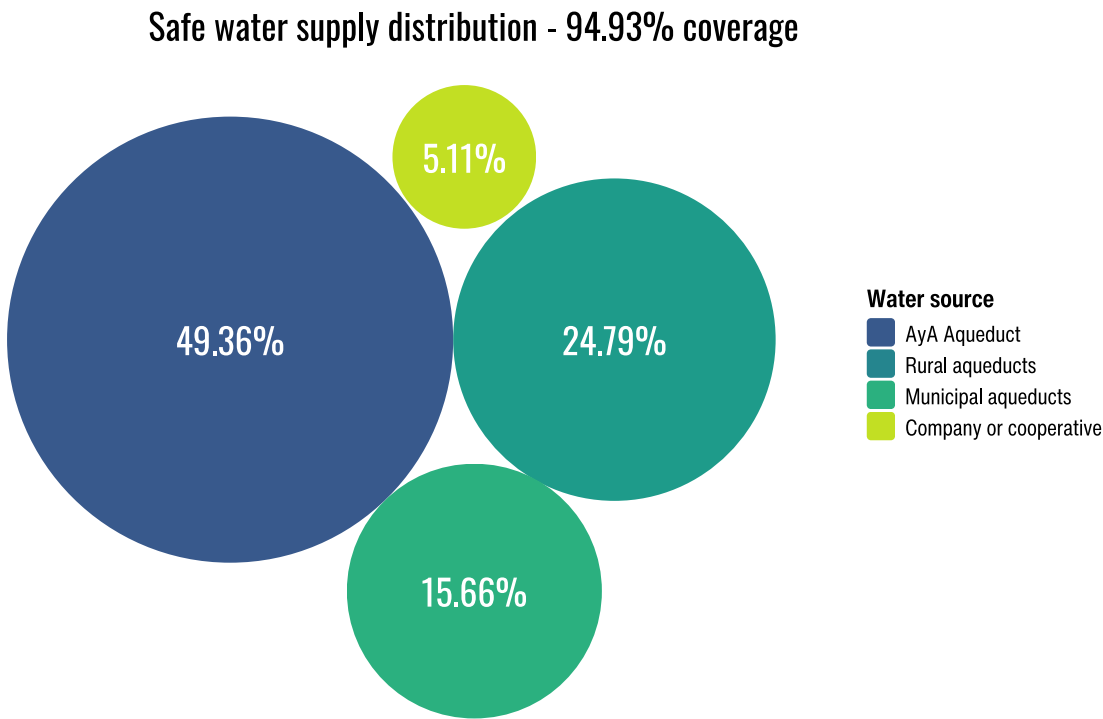


Figure 1. Safe Water Coverage in Costa Rica. Source INEC (Instituto Nacional de Estadística y Censos, 2024)

The remaining 5.07% of the population is considered to lack safe water access and is characterized by self-supply for their water needs, where water sources include wells, rivers, springs, streams, or rain.

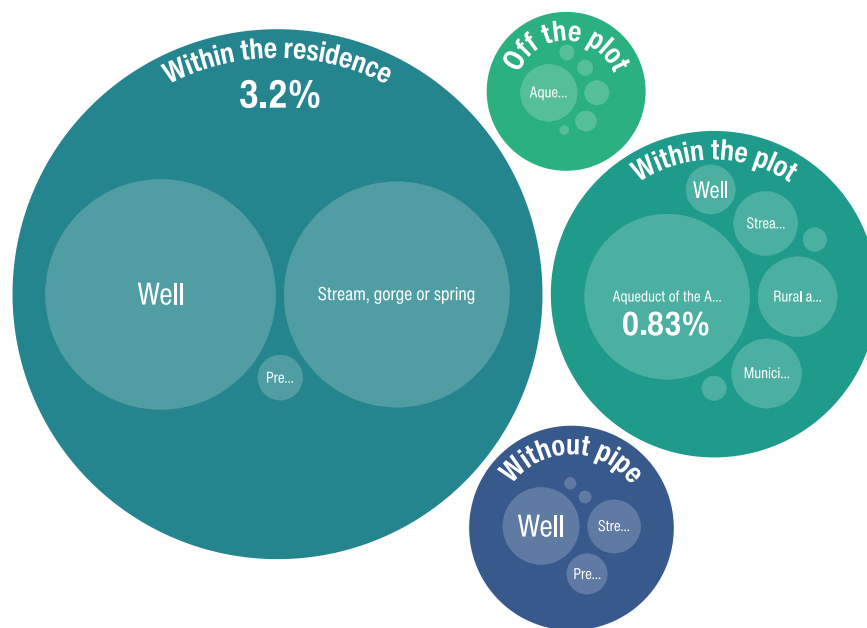


Figure 2. Distribution of Unsafe Water in Costa Rica by Source and Type of Supply. Source INEC (Instituto Nacional de Estadística y Censos, 2024)

Most people without safe water receive water within the dwelling but from a well, river, or rain (3.2%). Additionally, 0.83% are people receiving water from AyA on the property but not piped inside the home. The remaining 1% of the population faces various circumstances, so the actions necessary to close this gap must be further analyzed in detail.

Upon examining whether unsafe water coverage correlates with poverty, it was found that self-supply is not necessarily associated with poverty.

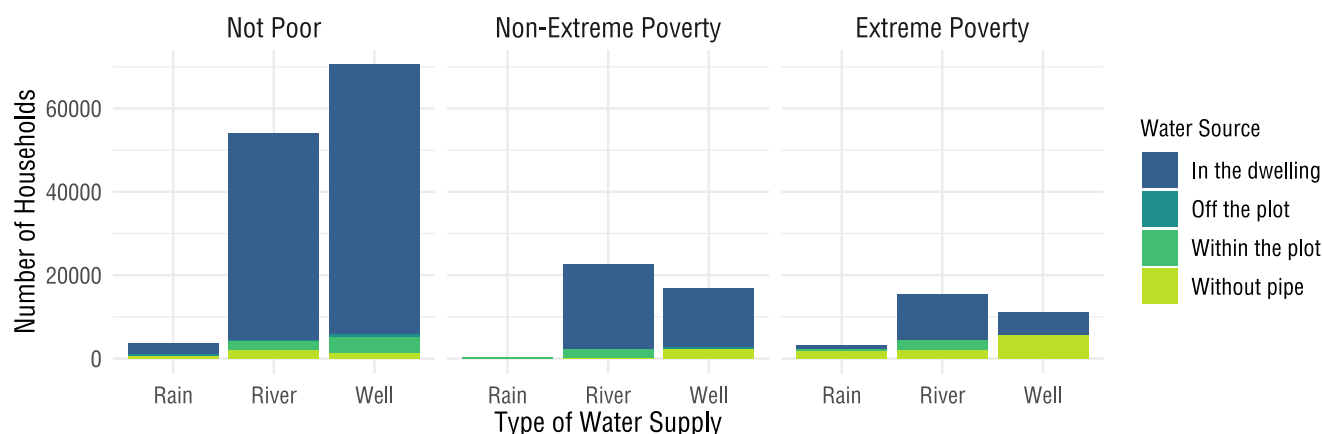


Figure 3. Relationship Between Poverty and Self-Supplied Water for Consumption in Costa Rica. Source INEC (Instituto Nacional de Estadística y Censos, 2024)

Although self-supply does not seem to be a poverty-related issue, general trends indicate that higher per capita income deciles have fewer households using self-supply. However, the use of wells persists even in high-income percentiles.

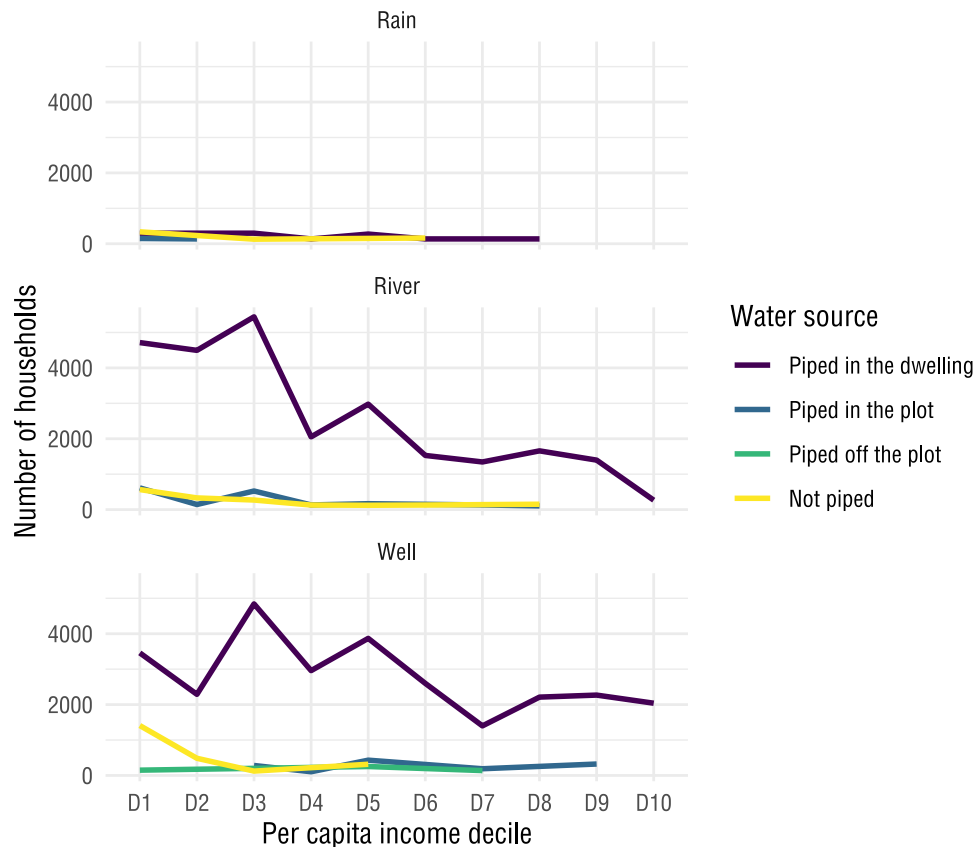


Figure 4. Level of Self-Supply by Household Per Capita Income Decile in Costa Rica. D10 is the highest decile of income. Source INEC.

Self-supply is characteristic of rural areas, presenting a significant challenge for highly dispersed households, where supply by an operator may not be viable.

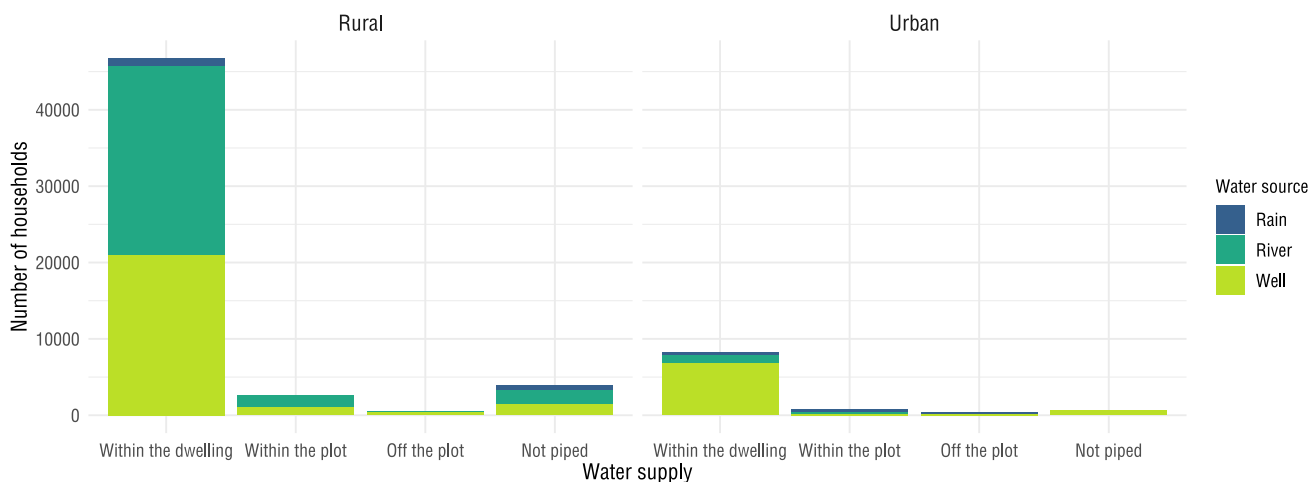


Figure 5. Primary water source of self-supplied households, urban and rural, in Costa Rica. Source INEC (Instituto Nacional de Estadística y Censos, 2024)

The 2023 AyA report by the Deputy Management of Delegated Systems reveals significant progress and persistent challenges in several key areas. Regarding drinking water coverage, 83.5% of the population served by ASADAS receives chlorinated water,

surpassing the 82% national target. However, some essential projects, particularly in indigenous communities, experienced delays due to legal and social issues that hindered timely implementation. The National Plan for Vulnerable Communities, which aims to improve conditions for disadvantaged populations, was also delayed in its implementation. This program, essential for reducing gaps in access to basic water and sanitation services, will require greater inter-institutional coordination to meet its 2024 objectives. (Instituto Costarricense de Acueductos y Alcantarillados, 2024)

The report "Water for Human Consumption and Sanitation in Costa Rica by 2020: Gaps in Pandemic Times" provides a detailed analysis of the gaps and challenges Costa Rica faces in achieving SDG 6 targets, particularly in access to safe drinking water. The document highlights that as of 2020, significant gaps persist, with 25% of cantons requiring immediate attention in terms of purification, chlorination, and water quality evaluation. The report also emphasizes that although Costa Rica has achieved notable targets in pipeline water coverage (99.8%), it still faces challenges in ensuring water is managed safely and consistently upholding high-quality standards across the country, especially for the most vulnerable populations. (Mora Alvarado & Portuguese, 2021)

The report "Laboratory Analysis of Chlorothalonil Metabolites in Water from Northern Cartago" offers a detailed examination of the presence of chlorothalonil fungicide metabolites in various water sources in northern Cartago. The results indicate the presence of chlorothalonil metabolites in all sampled sources, suggesting potential contamination affecting both ASADAS-managed systems and municipal aqueducts in the area. The involved laboratories, CICA-UCR and IRET-UNA, conducted analyses that mostly aligned, validating the consistency of the measurements. (Instituto Costarricense de Acueductos y Alcantarillados (AyA), 2024)

ASADAS and other local entities play a key role in the management of safe water in Costa Rica, especially in rural areas. However, issues related to continuous monitoring and ensuring adequate chlorination have highlighted the need for institutional strengthening. AyA has an office to provide support to ASADAS, and a National ASADAS Policy is in place, indicating that measures are already being taken. However, there is a need to improve capabilities to reach the most dispersed and vulnerable areas. (AyA, 2015)

Insufficient financing has been identified as a limitation for infrastructure expansion and system modernization. The most notable gaps are found in rural areas, where coverage is below the national average, and where investments in aqueduct networks are crucial to close these disparities. To address these limitations, the focus could be on mobilizing resources through the integration of national and international funding sources. (AyA, 2015)

6.2 6.2.1a – Proportion of the population using safely managed sanitation services

Indicator 6.2.1a measures the proportion of the population using safely managed sanitation services, which includes access to improved facilities that are not shared with other households and allows for the safe handling of excreta through proper treatment or disposal. Costa Rica has made progress toward 100% coverage of improved sanitation services; however, significant challenges remain in the safe management of fecal sludge and connection to sewerage systems.

Safe sanitation coverage is at 99.1% as of 2023, but the country largely bases its sanitation on the use of septic tanks, even in densely populated urban and coastal areas. (AyA, MINAE y MS, 2016)

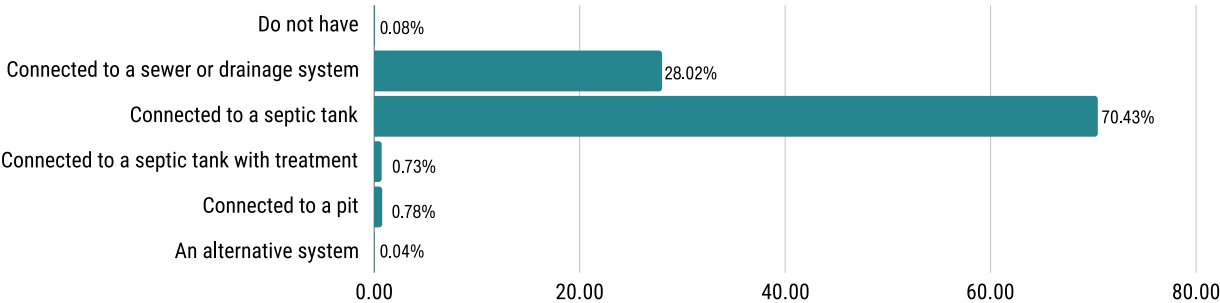


Figure 6. Excreta Management in Costa Rica. Source INEC (Instituto Nacional de Estadística y Censos, 2024)

40% of Costa Rica’s population is considered as residing in rural areas, hence the use of septic tanks for these households may be appropriate in most cases. However, a survey conducted in 2022 in the urban cantons of San Pablo de Heredia and Liberia shows that a substantial portion of septic tanks have construction defects and that sludge management is inadequate. Although the survey was conducted using appropriate design criteria, it was clear that there is a significant lack of public knowledge regarding domestic wastewater management. In the case of San Pablo de Heredia, 16.6% of respondents reported that they had never cleaned their septic tank, and of those who had (66.4%), 28% indicated that it had been over three years since their last cleaning (Borge y Asociados & GIZ, 2022).

When examining whether coverage issues are associated with poverty, there is no clear difference by poverty level, except in cases of extreme poverty in urban areas, where fewer cases are observed. It is also notable that some non-poor respondents report using latrines or having no toilet, possibly reflecting uncertainties within the survey, given that unsafe sanitation coverage is only 1% of the population.

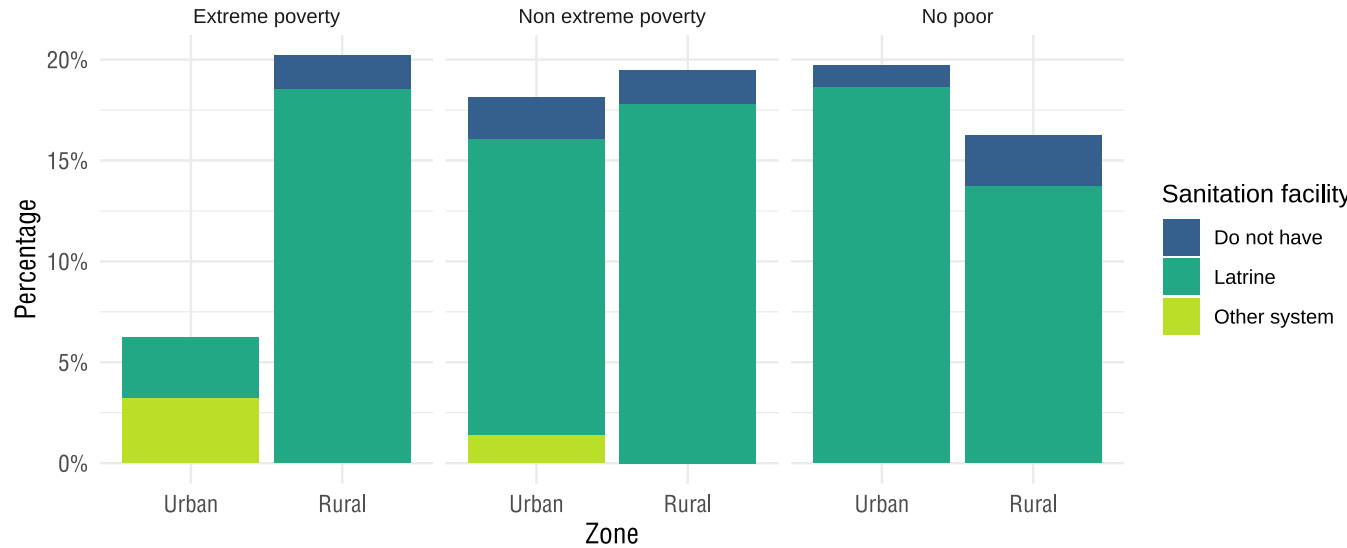


Figure 7. Unsafe Sanitation Related to Poverty in Costa Rica. Source INEC (Instituto Nacional de Estadística y Censos, 2024)

6.3 6.2.1b – Proportion of the population with basic handwashing facilities

Indicator 6.2.1b measures the proportion of the population with access to basic handwashing facilities, meaning those that have soap and water available at home. This indicator is crucial for personal hygiene and disease prevention, especially in the context of health emergencies and pandemics. Costa Rica reported a 88.3% coverage rate in 2018.

Analyzing the 17.7% of the population without coverage, in terms of poverty and area, shows that the issue is related to vulnerability, encompassing both poverty and low education levels. These findings are supported by results from a 2022 Survey which found that 12.5% of households in peripheral urban areas of Liberia and 2.7% in San Pablo de Heredia lacked adequate handwashing facilities. (Borge y Asociados & GIZ, 2022)

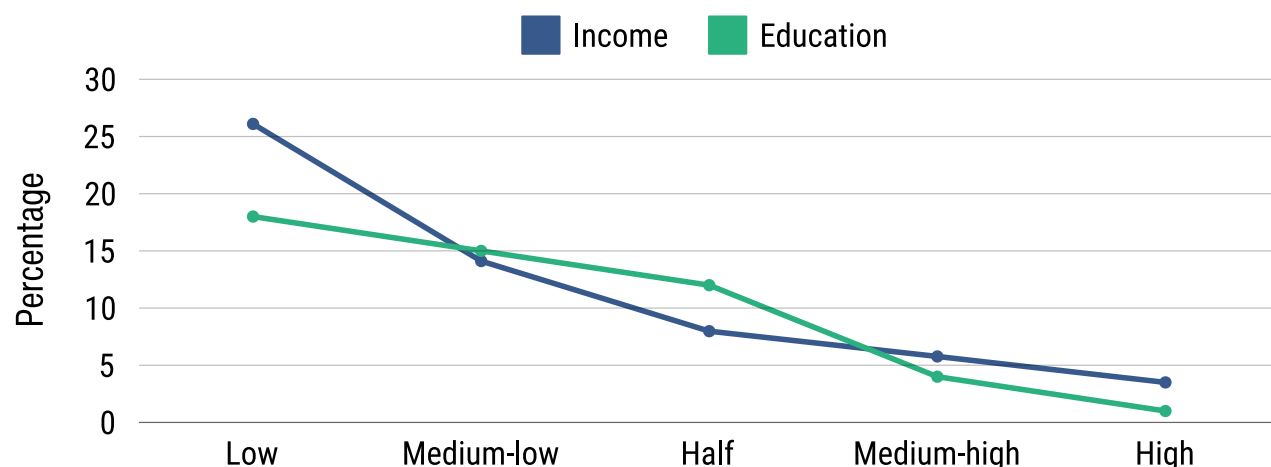


Figure 8. Absence of handwashing facilities by household income and education level in Costa Rica. Source INEC (Instituto Nacional de Estadística y Censos, 2024)

6.4 6.3.1 – Proportion of domestic and industrial wastewater flows safely treated

Indicator 6.3.1 measures the proportion of generated wastewater that receives safe treatment before being discharged into the environment. The national target is to achieve 55% wastewater treatment coverage by 2030 and the baseline is 43.16%.

To differentiate treatment rates according to stakeholder groups, domestic wastewater generation was separated from industrial, agricultural, and commercial wastewater. Of the total domestic wastewater discharged into sewer systems, 61.6% currently receives treatment. For individually managed systems, 93.7% receive treatment, primarily through septic tanks and soil infiltration. The industrial, commercial, and agricultural sectors show the largest gaps, with only 27.5% of the wastewater generated in this sector receiving treatment. This sector also generates the most wastewater, according to an official report.

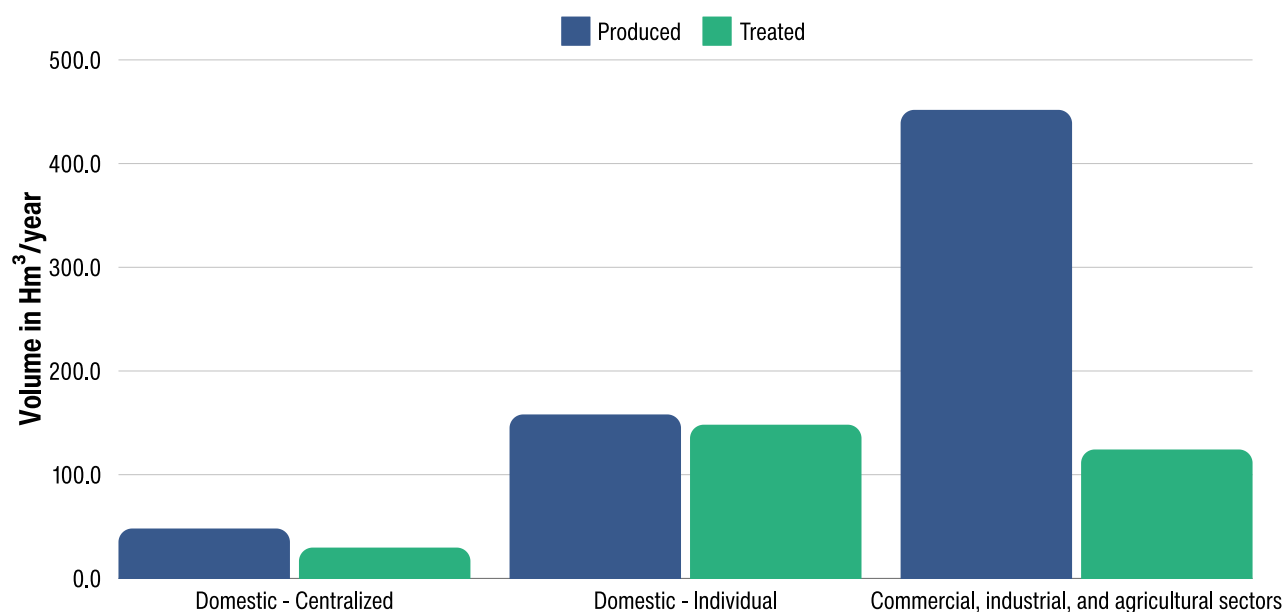


Figure 9. Wastewater Generation and Treatment in Costa Rica. Source INEC (Instituto Nacional de Estadística y Censos, 2024)

It is important to note that Costa Rica's commercial, industrial, and service sectors are subject to various levels of regulation:

- Prior to obtaining a construction permit, a wastewater treatment system must be approved.
- To receive an operating permit from the Ministry of Health, wastewater treatment details must be provided.
- To renew an operating permit, operational wastewater reports must be submitted.

Given these regulations, there may be inaccuracies in estimating the amount of wastewater generated, as treatment levels in industry, commerce, and agriculture are low for a sector that is subject to multiple controls. On the other hand, the estimation of domestic wastewater is quite accurate since generation is calculated based on billing reports from service providers, applying a return factor of 0.7. However, this return factor does not match AyA's Technical Standard, which sets it at 0.8.

The main issue lies in estimating the generated wastewater, as it is based on coefficients. To illustrate this, the following table presents information from 2020 from two official sources, with data in hm³/year:

Wastewater source	CTIE-Treaty	CTIE-Generated	INEC-Treaty	INEC-Generated
Domestic wastewater treated in treatment plants	29.7	206.2	29.7	658.7
Domestic wastewater treated by individual solution (septic tank)	208.8		148.2	
Agricultural wastewater treated in treatment plants	84.7	251.1	42.3	
Industrial wastewater treated in treatment plants		128.1	81.9	
Manufacturing				
Services				
Unclassified				
Total	323.2	658.0	302.1	658.7

The INEC is the official entity responsible for reporting on SDG indicators, but it relies on information from AyA, the Ministry of Health, MINAE, and others. The estimate for treated wastewater is based on operational wastewater reports coordinated by the Ministry of Health, providing a good approximation of total treated wastewater, which can even be broken down according to CIU codes. Meanwhile, CTIE-Agua records and maintains information on water usage and water balances in Costa Rica.

The estimation of domestic wastewater generation is calculated by multiplying the consumption reported by service providers by a factor of 0.7, according to INEC's Methodological Guide, which states that this is the return factor from AyA's Technical Standard; however, the actual return factor from the Technical Standard is 0.8. In CTIE's case, the estimate is based on population data, multiplied by a generation rate of 146 liters of wastewater per person per day, resulting in a return rate slightly higher than 0.8.

In the case of domestic wastewater, there is a significant difference in the volume of treated water estimated by the two entities and the methods used, complicating the determination of the treatment gap for domestic wastewater. Nevertheless, the lack of treatment and sewerage in urban areas is well-identified, meaning that gap-bridging plans by institutions and government are primarily focused on addressing the deficiencies in urban treatment, both in major and peripheral cities.

Significant differences also appear in the calculation of wastewater generation and treatment in productive sectors. Official data from INEC is not disaggregated, making it difficult to act. According to CTIE-Agua data, agricultural wastewater generation in 2020 was 251.1 hm³/year; however, 244.1 hm³ of this volume represents irrigation losses and should not be included in untreated wastewater estimates, as treatment is not expected for this volume of wastewater. Excluding this volume significantly impacts

the calculation of treated wastewater, as illustrated in a balance of generated and treated wastewater across sectors based on available data.

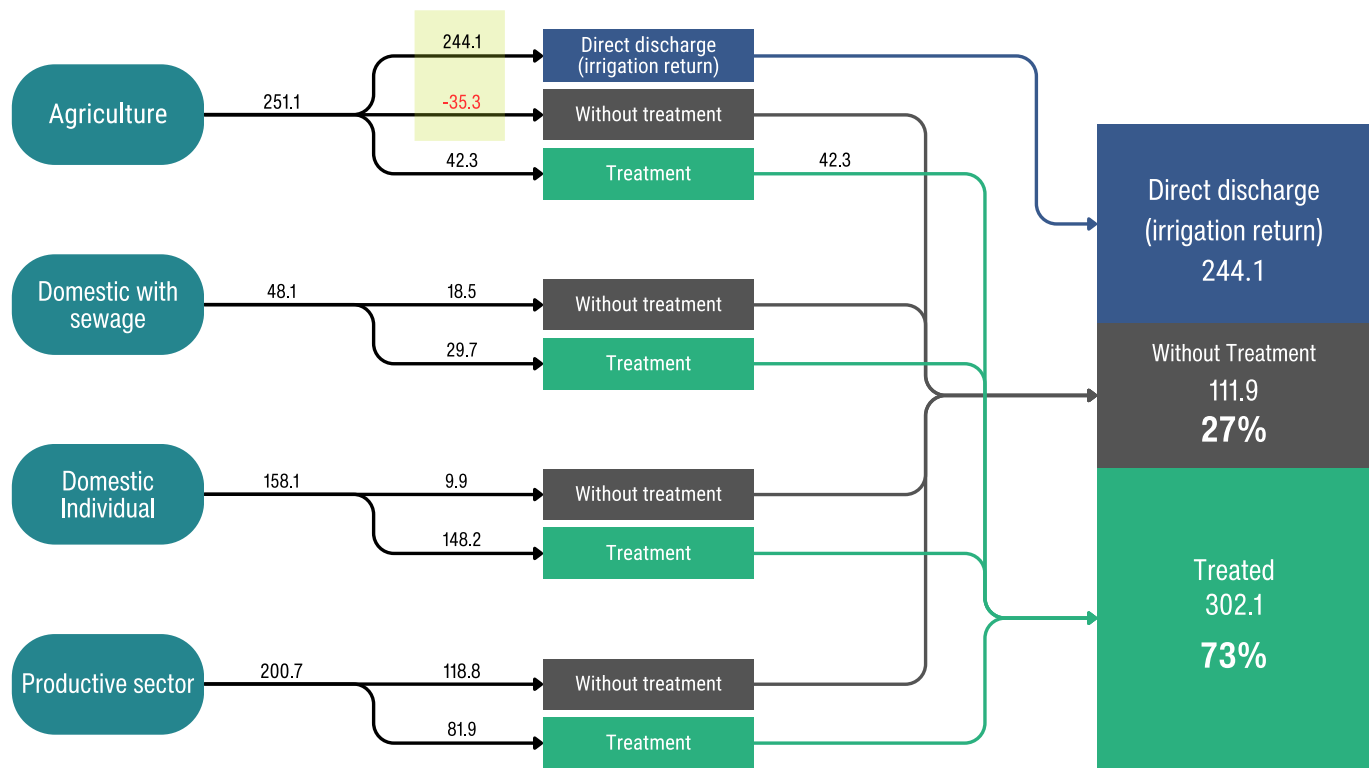


Figure 10. Generated and Treated Wastewater Balance in Hm³ for 2020

According to the balance, it was observed that the volume of treated wastewater in the agricultural sector was higher than expected according to the theoretical estimate. Despite inconsistencies, the treated-to-untreated water calculation achieved a higher value than the national target, suggesting that more information is essential to define targets and priority sectors.

6.5 6.3.2 – Proportion of bodies of water with good ambient water quality

Indicator 6.3.2 measures the proportion of water bodies, such as rivers, lakes, and aquifers, which meet good quality standards according to physicochemical and microbiological parameters. This indicator is essential for assessing the effectiveness of environmental management policies and the protection of water resources from pollution. In Costa Rica, the target for 2030 is to maintain at least 82% of monitored water bodies annually at good quality levels. (Ministerio de Planificación Nacional y Política Económica, 2023)

In Costa Rica, the original SDG indicator is not measured; instead, a modified indicator is used, which refers to the proportion of surface water monitoring sites that meet the established good quality standard for a set of chemical parameters. Monitoring sites are the geographic control points where samples are taken for chemical, physical and biological analysis, as defined in the National Monitoring Plan for Surface Water Quality in the country.

During the regional water forum, the significant impact of pineapple farming on the pollution of the Térraba River watershed was highlighted, with direct consequences on marine ecosystems, particularly the coral reefs of Marino Ballena National Park. This finding underscores the need to strengthen regulatory mechanisms, monitoring, and pollution control in agricultural sources, as well as the implementation of integrated watershed management strategies to prevent downstream ecosystem degradation.

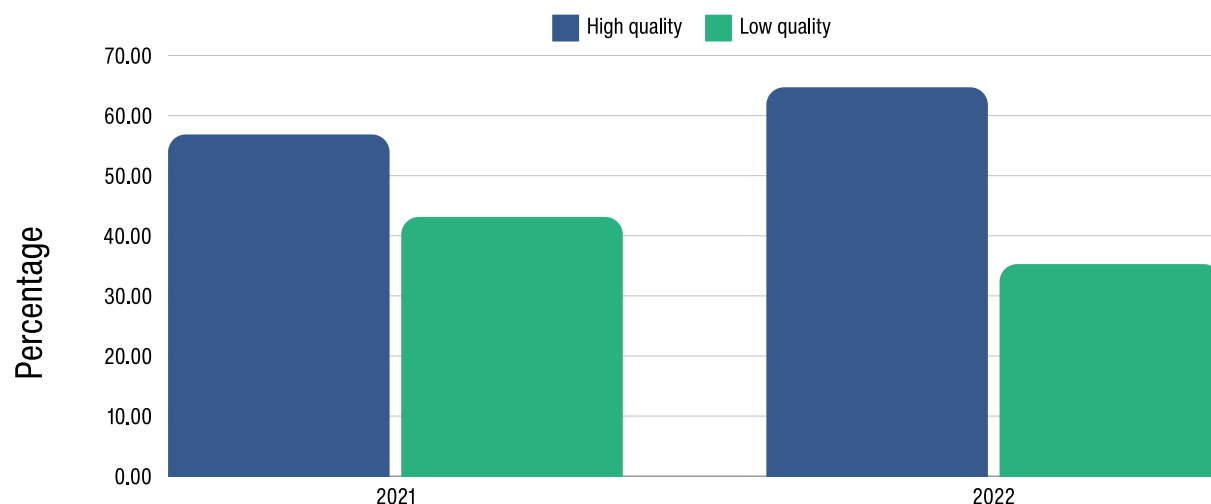


Figure 11. Percentage of Bodies of Water with Good Quality in Costa Rica. Source INEC (Instituto Nacional de Estadística y Censos, 2024)

In Costa Rica, water quality monitoring in drinking water sources and water bodies is primarily managed by the National Water Laboratory and the Water Directorate of MINAE, the latter being responsible for the National Monitoring Plan for Surface Water Quality. However, these entities face limitations in geographic coverage and sampling frequency. In 2022, it was estimated that approximately 70% of monitored rivers had at least one parameter outside the established limits, with fecal coliforms and nutrients like nitrogen and phosphorus being the key issues identified (8).

6.6 6.4.1 – Change in water-use efficiency over time

Indicator 6.4.1 measures the variation in water resource use efficiency across different productive sectors. The global goal is to increase water use efficiency to reduce water stress and ensure the sustainability of water resources across all sectors, including agriculture, industry, and domestic consumption. Costa Rica does not have a defined target for this indicator.

Water use efficiency in Costa Rica follows patterns similar to global trends, where the agricultural sector uses the largest amount of water with lower efficiency values. Conversely, the industrial and service sectors show higher efficiency levels. The trend between 2012 and 2021 has been of decreasing efficiency, except in the service sector, where efficiency has been increasing.

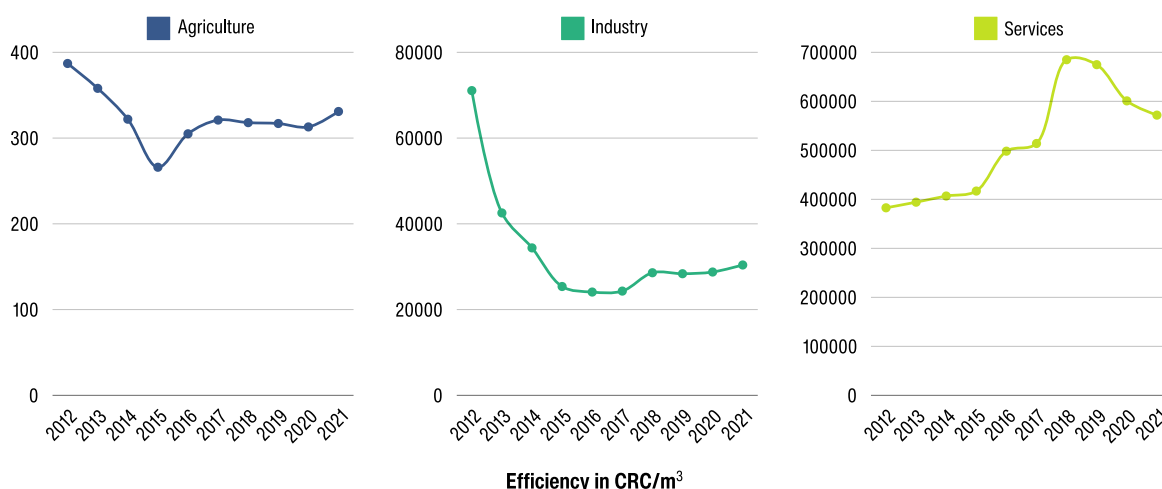


Figure 12. Water use efficiency. Source INEC (Instituto Nacional de Estadística y Censos, 2024)

As in the rest of the world, efforts are needed to increase water use efficiency, especially in agriculture. The institutional framework and inter-institutional coordination are key aspects for improving water use efficiency. The implementation of Integrated Water Resources Management policies has enabled coordination among institutions such as SENARA, AyA, and MINAE, though challenges remain in aligning priorities and executing programs at the local level. (Ministerio de Planificación Nacional y Política Económica, 2023)

6.7 6.4.2 – Level of water stress: freshwater withdrawal as a proportion of available freshwater resources

Indicator 6.4.2 measures the water stress level as the proportion of freshwater withdrawn relative to the total amount of renewable water resources available. Its goal is to assess the sustainability of water withdrawal practices and ensure that available resources are managed efficiently and equitably to reduce water stress and its environmental impacts.

Costa Rica has not set a defined target for this indicator, given the country's low level of water stress, with a national average of 2.6% between 2008 and 2022, compared to a global average above 18%.

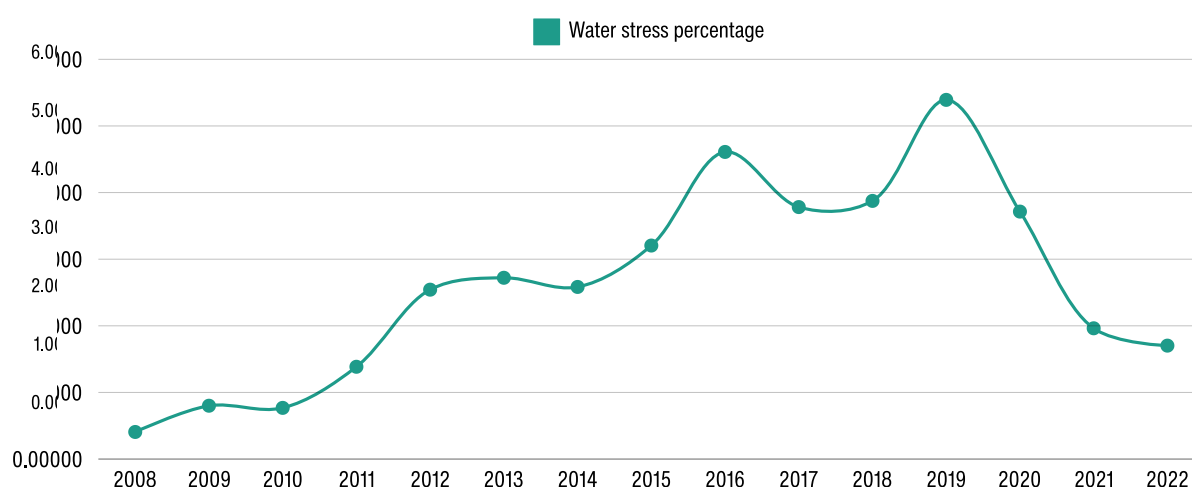


Figure 13. Water Stress in Costa Rica from 2008 to 2022. Source INEC (Instituto Nacional de Estadística y Censos, 2024)

Water resource governance in Costa Rica has advanced through the implementation of Integrated Water Resource Management plans in critical watersheds. However, allocation and oversight of water use still face challenges, particularly in areas like the Tempisque Watershed, which is a dry region with extensive agricultural cultivation. Strengthening inter-institutional coordination among MINAE, AyA, and SENARA is essential to improve water use planning and control.

6.8 6.5.1 – Degree of Integrated Water Resources Management

Indicator 6.5.1 measures the degree of implementation of integrated water resources management, assessing the coordination and management of water resources at basin and national levels. The SDG 6 target is to achieve effective integrated management to ensure the sustainability and equitable use of water resources.

Costa Rica does not have a defined target for this indicator, but generally, there has been an upward trend in the enabling environment, institutions and participation, and management instruments. However, financing has shown a consistent downward trend.

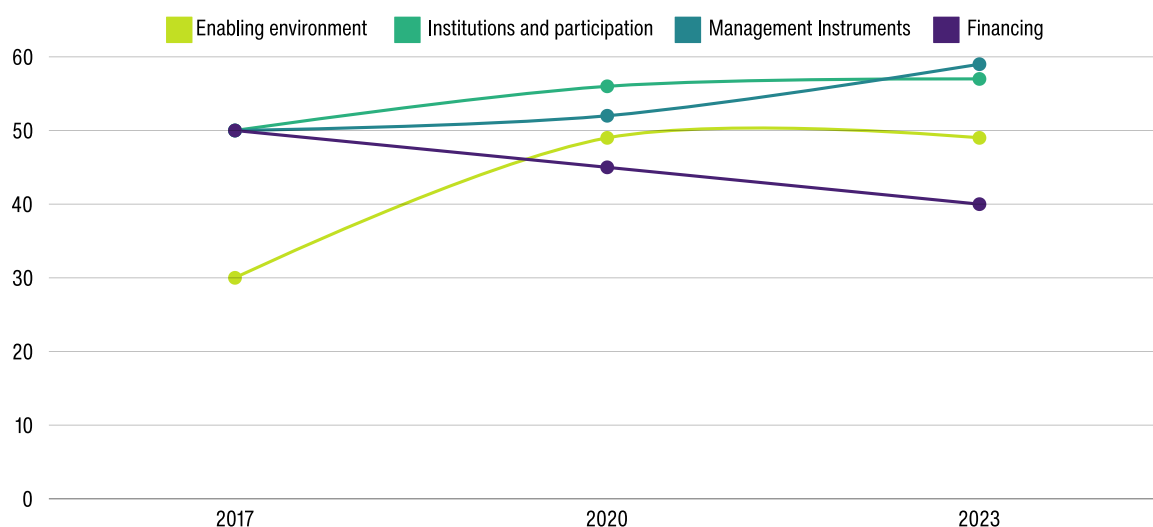


Figure 14. Breakdown of IWRM indicators in Costa Rica – Percentage. Source INEC (Instituto Nacional de Estadística y Censos, 2024)

There has been a significant commitment to IWRM, with advances in establishing institutions and participatory frameworks. A solid institutional foundation for water management has been set, allowing the participation of various stakeholders, from local governments to communities and NGOs. This is essential in a country where water resources are under pressure from climate change and economic and urban development.

Additionally, some management instruments, such as planning and public policies addressing water distribution and efficient use, have been implemented. However, these efforts, though notable, remain insufficient to adequately address current and future challenges.

A major barrier to effective IWRM implementation is the regulatory environment. Costa Rica needs to update and strengthen its water-related laws, ensuring coherence and enforceability across all government levels, from national to local. Furthermore, greater clarity regarding water ownership and usage rights, which remains a contentious issue in some regions, is essential.

Insufficient financing remains a significant limitation; although there is recognition of the need to invest in water infrastructure and management technologies, available resources are inadequate. The country needs to develop sustainable financing mechanisms that include both public and private funds, as well as incentives for investing in more efficient water technologies. Moreover, it is crucial to ensure that available funds are allocated equitably, prioritizing the most vulnerable areas with the greatest need for intervention.

There is still a need for better coordination among the various entities responsible for water management. Often, roles and responsibilities between agencies are not clearly defined, leading to duplicated efforts.

Climate change presents an increasing threat to Costa Rica's water resources. Extreme events, such as droughts and floods, are expected to become more frequent and intense, affecting both water availability and quality. The country needs to integrate climate adaptation strategies at all levels of water planning and management, prioritizing the most vulnerable areas and ensuring that existing infrastructure is prepared to face these challenges.

6.9 6.5.2 – Proportion of transboundary basin area with an operational arrangement for water cooperation

Indicator 6.5.2 measures the proportion of transboundary basin area covered by cooperation agreements for water management. These agreements are essential for the sustainable management of shared water resources, reducing conflict risks, and promoting equitable and efficient water use. The country's target for this indicator is to achieve 20% agreement coverage by 2030.

As of 2023, Costa Rica reported the same values as in 2020, with only 13.6% of the total area of transboundary water bodies under operational agreements. Only 138 km² of transboundary aquifers are recorded, none of which have operational agreements, while out of 16,719 km² of watersheds, only 2,300 km² have an operational agreement.

Costa Rica shares watersheds with Nicaragua and Panamá, with the San Juan River Watershed and the Sixaola Watershed being the main transboundary watersheds. Only the Sixaola Watershed has an operational agreement, which has enabled the implementation of a joint management program that includes water quality monitoring and reforestation projects in critical areas (Asociación ANAI, 2023). In the San Juan River Basin, information exchange between Costa Rica and Nicaragua is limited.

Transboundary watershed management requires sustained funding to ensure the implementation of agreements and conservation project execution. In the case of the Sixaola Watershed, binational cooperation has received financial support from multilateral organizations such as the Inter-American Development Bank (Banco Interamericano de Desarrollo, 2017). However, projects have faced difficulties in achieving long-term sustainability due to reliance on international funding and the lack of national resources dedicated to transboundary management.

National funding needs to be increased, and joint investment mechanisms with neighboring countries should be sought to ensure the sustainability of cooperation programs and the implementation of monitoring infrastructure.

6.10 6.6.1 – Change in the extent of water-related ecosystems over time

Indicator 6.6.1 measures changes in the extent of water-related ecosystems, such as wetlands, water bodies, and aquifer recharge areas. These ecosystems play a crucial role in water sustainability and biodiversity, so the global goal is to protect and restore these ecosystems to ensure long-term water availability and preserve associated ecosystem services.

In Costa Rica, there has been no formal reporting on the change in the extent of aquatic ecosystems, limiting the direct assessment of Indicator 6.6.1. However, progress in protected land wild areas provides an indirect reference for the protection of water-related ecosystems. Since 2010, Costa Rica has increased its protected wildland area coverage by 8.2%, reaching 28.4% of the national territory under some form of protection (Benavides Vindas, 2020).

These areas include national parks, biological reserves, and wildlife refuges that protect critical wetlands and water bodies necessary for the country's water sustainability. However, the lack of specific monitoring of water-related ecosystems and their integration into conservation policies indicates an opportunity to improve governance in the management of these resources.

The lack of specific data on water-related ecosystems highlights the need to adopt innovative technologies for monitoring these ecosystems. In other regions, the use of remote sensing and satellite technology has proven effective in mapping and assessing changes in wetland, river, and recharge area coverage. Adopting these technologies in Costa Rica would allow for precise, up-to-date data collection on water ecosystems, and integrating them with Geographic Information Systems would enhance analytical and planning capacity.

Pilot projects conducted in Palo Verde National Park and the Térraba-Sierpe Wetland have used drones and remote sensing systems to identify critical areas of vegetation loss in recent years, linked to wetland degradation and reduced aquifer recharge capacity (Cordero Hernández & Mora Mora, 2017).

The expansion of protected areas has been possible thanks to a combination of national and international financing. However, investment specifically in the protection and restoration of aquatic ecosystems remains insufficient.

To ensure the sustainability of these areas, it is recommended to increase funding for conservation projects specifically focused on aquatic ecosystems, using both national resources and international funds. Additionally, developing public-private partnerships could contribute to financing monitoring and restoration technologies.

6.11 6.a.1 – Amount of water- and sanitation-related official development assistance that is part of a government-coordinated spending plan

Indicator 6.a.1 measures the amount of Official Development Assistance related to water and sanitation received as part of a government-coordinated plan. Its goal is to ensure that international financial assistance effectively contributes to developing water and sanitation projects, aligning with national plans and priorities.

Costa Rica is a recipient, not a donor, of international assistance and has received financing from multilateral organizations such as the Inter-American Development Bank, the World Bank, and German Cooperation, among others. Between 2015 and 2023, Costa Rica received international funding for water infrastructure and sanitation projects (May Grosser, 2024). However, few water and sanitation infrastructure projects financed over the last decade have adopted advanced technologies, highlighting an opportunity to improve the integration of innovative approaches.

Despite receiving substantial international funding, Costa Rica faces funding gaps for water and sanitation projects in the most vulnerable regions. Rural and indigenous areas continue to be underserved, with limited access to basic drinking water and safe sanitation services.

Moreover, reliance on external financing exposes the long-term sustainability of projects, especially in times of climate crises or fluctuations in international support. Costa Rica should diversify its funding sources, strengthen planning, and resource allocation mechanisms to ensure the continuity of water and sanitation programs.

6.12 6.b.1 – Proportion of local administrative units with established and operational policies and procedures for participation of local communities in water and sanitation management

Indicator 6.b.1 measures the proportion of local authorities that have implemented effective community participation mechanisms in water and sanitation management. This indicator assesses the inclusion and empowerment of communities to actively contribute to decisions related to water resources and sanitation services.

In Costa Rica, this indicator is measured by the relative number of Rural Water and Sanitation Associations that manage and operate drinking water and sanitation systems, with a signed and valid delegation agreement with AyA. From 2019 to 2022, the establishment of agreements has increased, with a national average of 88% in 2022. In the Central Pacific region, 100% of ASADAS have agreements.

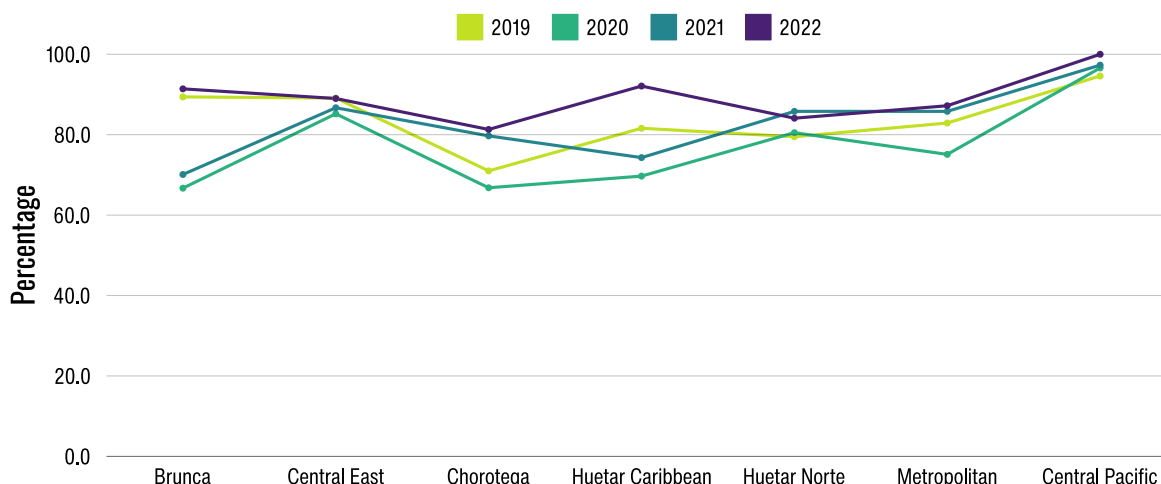


Figure 15. Percentage of ASADAS with Delegation Agreements. Source INEC (Instituto Nacional de Estadística y Censos, 2024)

Between 2017 and 2020, a comprehensive survey of the operation of community water and sanitation operators was conducted nationwide. This process identified significant differences in the quality of management, infrastructure, and service continuity among operators, particularly in rural and Indigenous regions. Deficiencies in administrative and financial management, as well as in technical and operational capacity, affect the sustainability of services. Challenges were also highlighted in water source protection and management, with contamination and scarcity issues in certain areas. The main recommendations included improving training and technical support to community organizations, strengthening financial and administrative management, and prioritizing investments in critical infrastructure, particularly in vulnerable and hard-to-reach areas. (AyA, 2020)

In 2023, significant efforts were made to support ASADAS in implementing sanitation projects in wastewater management. Despite these efforts, some projects faced difficulties due to material procurement issues and lack of human resources, which negatively impacted project progress. Significant delays were identified in infrastructure projects related to Hurricane Otto, as the expiration of emergency decrees affected the continuity of investments. This context has slowed the development of critical infrastructure needed to ensure water supply and wastewater management in affected communities (Instituto Costarricense de Acueductos y Alcantarillados, 2024). Additionally, according to current legislation, the appointment of the board members of the ASADAS is made for terms not shorter than 3 years and not longer than 4 years, which complicates continuity in training.



7 Gaps identified

This section presents the key gaps identified during the workshop, categorized according to the SDG 6 Global Acceleration Framework accelerators: governance, data and information, capacity development, innovation, and financing. These gaps reflect the challenges faced in advancing integrated water resource management and sustainable water and sanitation services in Costa Rica. The findings result from collaborative discussions among stakeholders, providing a comprehensive overview of the priority areas requiring action to achieve SDG 6 targets.

7.1 Governance gaps

7.1.1 Fragmented governance

In Costa Rica, fragmented governance is a significant challenge in the water sector. Various institutions, including MINAE, AyA, ASADAs, municipalities, and other stakeholders, operate independently with overlapping responsibilities and often conflicting objectives. This fragmentation hinders the development and implementation of unified strategies to address critical issues such as access to safe drinking water, wastewater treatment, and water ecosystem protection. The lack of a comprehensive governance structure complicates inter-institutional coordination and reduces the overall effectiveness of water resource management.

This fragmentation particularly affects rural areas, where decentralized systems managed by ASADAs face operational challenges due to limited technical and financial support. While AyA provides oversight and some assistance, the absence of integrated frameworks and mechanisms for regular communication between local and national actors exacerbates inefficiencies and delays in addressing urgent water issues.

The deficit of inter-institutional coordination is a direct consequence of governance fragmentation. Institutions involved in water management operate in isolation, often without mechanisms to align their activities or share critical data. For example, while AyA manages major urban systems, ASADAs handle rural water services, and municipalities oversee local infrastructure, these entities rarely collaborate effectively. This lack of coordination leads to duplication of efforts, cost overruns, and delays in implementing essential projects.

A key barrier is the absence of formal communication and planning platforms that integrate the activities of national, regional, and local entities. Moreover, community-level actors, such as ASADAs, are often excluded from decision-making processes despite their vital role in water supply and management in rural areas. Addressing this gap requires establishing mechanisms for inter-institutional dialogue and collaboration, ensuring that local knowledge and expertise inform national policies and strategies.

7.1.2 Absence of an approved Framework Law for Integrated Water Resources Management

The lack of an approved Framework Law for Integrated Management of Water Resources (Legislative File 23.511) is a critical governance gap in Costa Rica. This legislative proposal aims to provide a comprehensive legal and institutional framework for water resource management, addressing many of the issues caused by fragmented governance and poor coordination.

If enacted, the law would establish the National Water Directorate (DINA) as the governing body responsible for planning, quality monitoring, and concession management. The framework would also integrate hydrological and social considerations into decision-making, promote community participation, and create a centralized National Water Information System to improve data sharing and policy formulation.

The absence of this law leaves critical gaps in governance and limits the country's ability to address challenges such as pollution control, equitable water distribution, and climate resilience. Implementing the law would significantly improve institutional coordination and response capacity, enabling a more effective and sustainable approach to water resource management.

7.1.3 Limited community participation in decision-making

Although ASADAs play a central role in rural water management, their involvement in national-level planning and decision-making remains limited. Communities often lack the resources and institutional support to engage effectively in governance processes,

resulting in decisions that do not fully reflect local needs and priorities. Strengthening community participation through capacity-building initiatives and more inclusive governance frameworks is essential to ensuring that all stakeholders contribute to and benefit from water resource management.

7.1.4 Weak Regulatory and Policy Frameworks

Existing regulatory frameworks do not adequately address the complexities of modern water resource management. For instance, the current legal provisions for water quality monitoring, pollution control, and infrastructure maintenance are outdated and insufficient to address emerging challenges such as climate change, urbanization, and industrial pollution. Developing and enforcing comprehensive regulations that reflect current needs and international best practices is critical to strengthening governance in Costa Rica's water sector.

7.1.5 Lack of Strategic Planning and Long-Term Vision

Governance in Costa Rica's water sector is further weakened by a lack of strategic and long-term planning. While individual institutions may have their own plans and priorities, there is no overarching strategy that aligns these efforts with national and global goals, such as the SDG 6 targets. This lack of strategic alignment results in fragmented initiatives that fail to address systemic issues comprehensively.

7.2 Innovation gaps

7.2.1 Limitations in monitoring and treatment technologies

Costa Rica's water sector suffers from a lack of advanced technologies for monitoring and treating water resources. Current monitoring systems do not provide real-time data, hindering the timely identification of issues such as pollution events or resource shortages. Accessing such technologies could have significant impacts if able to detect contaminants such as industrial waste, agricultural runoff, and emerging pollutants like microplastics. In rural areas, ASADAs often lack the necessary tools and technologies to monitor and manage their water systems effectively, leaving them vulnerable to contamination and inefficiencies.

Treatment technologies are often basic and unable to address complex contaminants, not meeting international standards. Many rural areas rely on inadequate septic systems or poorly maintained small-scale treatment units. This gap is further exacerbated by the absence of tertiary treatment systems capable of managing more challenging pollutants.

7.2.2 Insufficient integration of nature-based solutions

The integration of nature-based solutions in water management is minimal, despite Costa Rica's ecological potential. Wetland restoration, reforestation, and sustainable agricultural practices remain underutilized, limiting their impact for improving water quality and availability. These gaps highlight a disconnect between environmental conservation initiatives and water resource management strategies.

7.2.3 Limited adoption of innovative technologies

Innovation uptake in Costa Rica's water sector is hindered by financial and institutional constraints. For example, practices like rainwater harvesting, greywater reuse, and advanced irrigation technologies are rarely implemented, even in areas where water stress is significant. The absence of incentives or frameworks to support the adoption of these technologies has left many potential solutions unexploited.

7.2.4 Weak Research and Development (R&D) capacity

Research and development efforts in Costa Rica's water sector are insufficient, with limited collaboration between government institutions, academia, and the private sector. This results in a lack of locally tailored technologies and innovations, particularly for decentralized and small-scale systems. Financial constraints and fragmented governance further inhibit progress in R&D.

7.2.5 Lack of technological integration and data management

Technological systems for water management are not integrated across institutions, leading to inefficiencies in data sharing and decision-making. For example, while some urban water operators have implemented digital systems, these are often incompatible

with those used by rural operators like ASADAs. This lack of interoperability creates gaps in monitoring, planning, and the execution of water resource management projects.

7.2.6 Financial barriers to innovation

The high cost of advanced technologies and lack of targeted funding mechanisms significantly limit innovation in the water sector. Many local operators and communities cannot afford to invest in modern systems, resulting in continued reliance on outdated and inefficient technologies. The financial barriers are particularly acute in rural and underserved areas, where resources for upgrading infrastructure and adopting innovative solutions are scarce.

7.3 Gaps in data management

7.3.1 Lack of Real-Time Data

One of the most significant data management gaps in Costa Rica's water sector is the absence enough data to take accurate decisions. Most data collection processes rely on periodic sampling and manual reporting, which are often delayed and do not capture dynamic changes in water quality or quantity. This gap limits the ability to respond quickly to events such as contamination incidents, water scarcity, or infrastructure failures. The lack of real-time data is particularly detrimental in rural areas managed by ASADAs, where monitoring systems are often non-existent or outdated.

7.3.2 Fragmented and non-integrated monitoring systems

The monitoring of water resources in Costa Rica is carried out by multiple institutions, including AyA, ASADAs, municipalities, and the Ministry of Environment and Energy (MINAEC). However, these entities operate independently, using disparate systems that are not interoperable. This fragmentation results in duplication of efforts, inconsistencies in the data collected, and gaps in critical information. The absence of a centralized data repository exacerbates these issues, making it difficult to compile a comprehensive and accurate view of the country's water resources.

7.3.3 Limited accessibility and transparency of data

The general population and local actors, such as ASADAs, often lack access to up-to-date and user-friendly platforms for water-related data. Without transparent and accessible information, communities and local water operators are unable to participate effectively in water management or advocate for necessary improvements. This gap also limits the ability of stakeholders to make evidence-based decisions and monitor the effectiveness of public policies.

7.3.4 Insufficient data for policy and planning

Data gaps also impact the design, implementation, and evaluation of public policies. The lack of comprehensive and standardized data on water availability, quality, and usage hinders the development of effective water resource management strategies. For example, there are insufficient data to assess the impacts of climate change on water resources or to prioritize investments in infrastructure development.

7.3.5 Gaps in data for emerging challenges

Emerging challenges, such as pollution from microplastics, pharmaceuticals, and agricultural runoff, are not adequately monitored due to technological and resource constraints. Existing systems are primarily designed for traditional parameters and are unable to detect or analyze these newer threats effectively. This creates blind spots in understanding and addressing emerging risks to water quality and public health.

7.3.6 Limited data sharing mechanisms

There is no formal mechanism for sharing water-related data between institutions or with local operators. This lack of data sharing reduces coordination and collaboration across sectors, hindering integrated water resource management. It also limits the ability to track progress toward SDG 6 targets, as institutions do not consistently share or align their monitoring data.

7.3.7 Financial and technical constraints

The financial and technical resources required to upgrade monitoring systems and data platforms are often lacking. Many rural operators and municipalities cannot afford to invest in modern technologies, while national institutions face budgetary constraints that limit their ability to implement large-scale improvements. This results in a persistent reliance on outdated systems that do not meet current needs.

7.4 Financial gaps

7.4.1 Insufficient financial resources for water management

Costa Rica faces significant financial shortfalls that limit the capacity to address critical needs in the water sector. Key areas such as infrastructure development, wastewater treatment, water quality monitoring, and capacity building remain underfunded. Rural areas, managed primarily by ASADAs, are particularly affected, as these community-based organizations often lack the revenue and external support to maintain and expand their systems. Municipalities also face budgetary limitations, further constraining their ability to invest in water infrastructure. Workshop participants highlighted that inadequate funding directly impacts the maintenance of distribution systems, many of which suffer from significant water losses due to leakage.

7.4.2 Poor infrastructure due to funding constraints

The financial gaps are reflected in outdated and inadequate infrastructure, particularly in rural and underserved areas. Existing systems often fail to meet growing demand or adhere to international standards for water and wastewater treatment. In urban areas, treatment plants lack tertiary treatment capabilities, while rural areas primarily rely on poorly maintained septic systems and small-scale solutions that are insufficient to manage complex contaminants. Participants in the workshop noted that these deficiencies result from the absence of sustained investments in infrastructure rehabilitation and expansion.

7.4.3 Overdependence on public budgets

The water sector's heavy reliance on public funding creates additional challenges, as these resources are constrained by fiscal policies such as the national fiscal rule. For example, the Costa Rican Water and Sewer Institute (AyA) has faced difficulties in securing sufficient budget allocations to meet its operational and development needs. Furthermore, changing government priorities often result in the reallocation of resources, disrupting the continuity of water sector projects. Stakeholders observed that the lack of reliable public funding has delayed critical initiatives, particularly in rural and vulnerable communities.

Another identified gap is the inadequate financial management and limited capacities for the efficient administration of water sector resources. The absence of strategic financing plans, lack of training in project formulation, and low budget execution rates in certain programs hinder the optimization of available funds, affecting the sustainability of investments in water and sanitation infrastructure.

7.4.4 Limited access to international funding

Although Costa Rica has secured financial support from international organizations like the Central American Bank for Economic Integration (BCIE) and the Inter-American Development Bank (IADB), access to these funds is limited by the lack of well-structured and technically sound project proposals. This issue stems from insufficient institutional capacity to prepare funding applications that align with donor requirements. Workshop discussions revealed that this gap often results in missed opportunities to secure external financing for large-scale infrastructure improvements and innovative projects.

7.4.5 Gaps in cost recovery mechanisms

The country's cost recovery mechanisms for water services are insufficient to cover operational expenses, maintenance, and infrastructure investments. Rural areas managed by ASADAs face challenges in implementing adequate tariffs due to socioeconomic constraints and limited technical support. Additionally, a tariff freeze implemented in recent years has further constrained revenue streams for water service providers, including AyA. This has led to a dependence on external funding and public subsidies, which are often insufficient to meet long-term needs.

7.4.6 Inequity in financial allocation

A clear disparity exists in the distribution of financial resources between urban and rural areas. Urban regions receive the bulk of investments due to their larger populations and centralized infrastructure, while rural and marginalized areas are left with inadequate resources. This inequity perpetuates inequalities in access to safe drinking water and sanitation services, with rural communities often relying on outdated or inadequate systems. Workshop participants emphasized that this disparity hinders efforts to achieve SDG 6 targets equitably across the country.

7.4.7 Lack of strategic financial planning

The absence of a comprehensive financial strategy for the water sector exacerbates existing funding gaps. Institutions lack a unified plan to prioritize critical investments, mobilize resources, and coordinate funding efforts across sectors. This fragmented approach leads to reactive and ad hoc financing, rather than addressing systemic issues. Participants noted that a lack of strategic planning prevents institutions from effectively leveraging domestic and international resources to meet long-term goals.

7.4.8 Dependence on external assistance without sustainable alternatives

Costa Rica's water sector remains heavily dependent on external financial assistance for significant projects, such as infrastructure development and capacity building. However, this reliance is not accompanied by efforts to establish sustainable funding mechanisms, leaving progress vulnerable to fluctuations in international support. Participants highlighted the need for a more balanced approach that integrates external aid with domestic resource mobilization to ensure financial sustainability.

7.5 Gaps in capacity

7.5.1 Insufficient technical and operational training

One of the most critical capacity development gaps in Costa Rica is the insufficient technical and operational training for personnel involved in water management. While larger entities like AyA and (Empresa de Servicios Públicos de Heredia) have some highly trained professionals, their resources are stretched thin, leading to work overload and reduced operational efficiency. Smaller operators, such as ASADAs, face even greater challenges, as they often rely on community volunteers with limited training in essential areas like infrastructure maintenance, water quality monitoring, and financial management.

7.5.2 Limited capacity in rural and decentralized systems

Rural areas and decentralized systems managed by ASADAs are disproportionately affected by capacity gaps. These community-managed systems often lack the expertise needed to operate and maintain water supply and wastewater treatment infrastructure effectively. For instance, many ASADAs struggle to implement basic maintenance practices, which increases the likelihood of system failures and water quality issues. Workshop participants highlighted that the lack of consistent training opportunities leaves these communities dependent on external support, which is often unavailable or insufficient.

7.5.3 Gaps in knowledge of modern technologies

Across the sector, there is limited familiarity with modern water management technologies, such as automated monitoring systems, advanced treatment methods, and nature-based solutions. This gap is particularly pronounced in smaller operators and rural communities, where technical staff often lack exposure to innovative practices. The absence of training programs focused on emerging technologies hinders their adoption and integration into water management practices.

7.5.4 Weak integration of social and technical approaches

Another key gap identified is the limited capacity of decision-makers to integrate technical, social, and economic approaches in planning and executing water projects. Public officials and institutional leaders often lack training in holistic water resource management, which is essential for addressing the complex and interconnected challenges of SDG 6. For example, workshop discussions revealed that many officials do not have the tools to incorporate community needs, environmental considerations, and financial sustainability into their decision-making processes.

7.5.5 Inadequate training for emergency and climate resilience

The water sector in Costa Rica is increasingly vulnerable to the impacts of climate change, including extreme weather events such as droughts and floods. However, there is limited training for technical personnel and community operators on building resilience to these challenges. This includes gaps in knowledge about water resource conservation, disaster risk management, and adaptive

infrastructure planning. Workshop participants emphasized the urgent need for capacity-building initiatives that address these vulnerabilities and enhance the sector's resilience.

7.5.6 Lack of training materials and educational tools

The absence of standardized training materials and educational tools tailored to Costa Rica's specific needs is another barrier to capacity development. Existing resources are often outdated or generic, failing to address local challenges or incorporate regional best practices. This gap limits the effectiveness of training programs and leaves many stakeholders without the knowledge they need to improve water management systems.

7.5.7 Uneven distribution of capacity-building efforts

Capacity development initiatives are often concentrated in urban areas or larger institutions, leaving rural and marginalized communities with limited access to training opportunities. This uneven distribution perpetuates disparities in water management capacity, particularly in underserved regions where ASADAs play a crucial role in providing water services.

7.5.8 Limited community engagement and capacity

Workshop participants noted that community members, particularly in rural areas, are not sufficiently involved in capacity-building efforts. This gap reduces local ownership and the sustainability of water management projects. For example, while ASADAs are responsible for water delivery in many rural areas, their operators often lack training in critical areas such as governance, financial planning, and conflict resolution.

7.5.9 Insufficient funding for capacity development

Financial constraints further exacerbate gaps in capacity development. Many institutions and community operators lack the funds to participate in training programs or hire additional staff. Limited financial resources also prevent the expansion of existing capacity-building initiatives, leaving many stakeholders without access to essential training opportunities.



8 Strategic recommendations

The following recommendations are direct outcomes of the collaborative discussions held during the High-Level Integrated Workshop on the SDG 6 Capacity Development Initiative which included key stakeholders from diverse sectors, including government institutions, community representatives, academia, and international organizations. Their contributions reflect a comprehensive understanding of the challenges and opportunities in Costa Rica's water sector, ensuring that the proposed recommendations are grounded in practical, locally informed perspectives.

8.1 Institutional Level

8.1.1 Strengthening Intersectoral Governance and Coordination

Strengthening governance and intersectoral coordination is key to overcoming institutional gaps in water and sanitation management in Costa Rica. This process must consider and align with the objectives and lines of action established in the **National Policy on Wastewater Sanitation (PNSAR)**, without being limited exclusively to it, guaranteeing an efficient and sustainable regulatory and operational framework.

8.1.2 Specific Proposals

8.1.2.1 Establishment of a national coordinating body

Creating or consolidating a governing body that articulates the actions of the various institutions involved, including MINAE, AyA, ASADAs and municipalities, the implementation of the Framework Law for the Integrated Management of Water Resources would collaborate with this. This body must ensure the integration of water and sanitation-related policies and projects and ensure the alignment of operational activities with national regulatory provisions.

8.1.2.2 Clear definition of roles and responsibilities

The legal and regulatory frameworks governing water and sanitation in Costa Rica require revision to clearly define the roles and competencies of institutions such as AyA, municipalities, MINAE, and ASADAS. This includes clarifying the operational scope of ASADAS as community-based water managers and strengthening their capacity to interact with other entities. Updated frameworks should also enhance regulatory compliance enforcement through entities like ARESEP and MINAE, equipping them with the authority and resources to monitor standards effectively. Additionally, these updates must address emerging priorities such as climate change adaptation, integrated water resources management (IWRM), and the adoption of modern technologies, fostering better coordination among all actors to ensure sustainable and equitable water governance.

8.1.2.3 Promoting multisectoral integration

Facilitate collaboration between key sectors such as water, environment, health, urban development and agriculture. Inter-institutional roundtables should ensure that sanitation and water infrastructure projects consider environmental, social, and economic impacts, and provide coordination mechanisms to maximize the impact of available resources and capacities.

8.1.2.4 Institutional capacity building

Building institutional capacity is essential to improving the efficiency and effectiveness of water and sanitation management in Costa Rica. This involves providing targeted technical and organizational training to key institutions, such as AyA, ASADAS, municipalities, and relevant ministries, to strengthen their ability to plan, execute, and monitor water-related projects. It is recommended to include specific training programs on implementation, as this has been identified as one of the sector's main limitations, according to repeated reports from the Office of the Comptroller General. These training sessions should focus on the effective application of regulations, water project management, and the optimization of operational processes within water and sanitation institutions.

The training programs should focus on:

- **Integrated water resources planning and management:** Equipping professionals with skills to apply holistic approaches that consider technical, social, and environmental factors in water management decisions.
- **Digital tools for data management:** Training in the use of modern software and systems to centralize data collection, enhance interoperability between institutions, and enable evidence-based decision-making.
- **Project monitoring and evaluation:** Strengthening the capacity of institutions to design and apply metrics for tracking project progress, identifying bottlenecks, and measuring impact.
- **Adaptive management and resilience building:** Providing training to address emerging challenges such as climate change, natural disasters, and water scarcity through adaptive and sustainable practices.

8.1.2.5 Promoting long-term planning

Developing a comprehensive national water and sanitation action plan is critical to achieving sustainable water resource management and meeting SDG 6 targets. This plan should outline specific short-, medium-, and long-term goals, prioritizing investments in infrastructure, adoption of modern technologies, and sustainable financing strategies as outlined in the financial sustainability axes of the National Policy for Sanitation in Wastewater Management (PNSAR).

The action plan should also incorporate ongoing efforts in river basin planning, which provide a crucial foundation for integrated water resource management. These efforts include:

- **Basin-specific strategies:** Designing tailored plans for priority river basins to address unique challenges such as water scarcity, pollution, and ecosystem degradation.
- **Stakeholder engagement:** Involving local actors, such as ASADAs, municipalities, and private sector stakeholders, in the development and implementation of basin-level strategies.
- **Integration with national planning:** Ensuring that river basin plans align with national objectives, creating synergies between localized and broader efforts to improve water management.

8.1.3 Expected Benefits

- **Greater effectiveness in management:** Clear and articulated institutional coordination will reduce duplication and optimize resources.
- **Improved public policy implementation:** Normative and operational alignment will enable faster progress towards SDG 6 targets.
- **Strengthening the regulatory framework:** Regulatory updates will ensure that national policies respond to the country's current and future needs.

8.2 Technical level

8.2.1 Investment in innovative technologies and infrastructure modernization

Investment in innovative technologies and the modernization of water and sanitation infrastructure are critical to closing the technical gaps identified in Costa Rica. These actions must be consistent with the objectives established in the national regulatory framework, and focus on improving operational efficiency, sustainability, and equitable access to basic water and sanitation services.

8.2.2 Specific proposals

8.2.2.1 Introduction of real-time monitoring technologies

Installing automated monitoring systems at water sources and high-volume treatment plants (including industrial ones) is essential for measuring critical parameters such as water quality, flow levels, and contaminant detection. These technologies enable real-time data collection, improving responsiveness to emerging issues and facilitating proactive management. In addition, implementing centralized digital platforms to consolidate information generated by various actors, such as AyA, ASADAs, and municipalities, enhances evidence-based decision-making and operational efficiency. To maximize their effectiveness, these systems must ensure interoperability with existing monitoring frameworks and adhere to national standards.

However, the successful adoption and operation of these advanced monitoring systems depend not only on their technical deployment but also on the capacity of the personnel involved. The introduction of such technologies must be accompanied by comprehensive capacity development programs for technicians, engineers, and decision-makers. These programs should focus on:

- **Technical training:** Ensuring that technicians and engineers are proficient in installing, operating, and maintaining the systems.
- **Data analysis skills:** Equipping personnel with the knowledge to interpret monitoring data and translate it into actionable insights.
- **Decision-making tools:** Training decision-makers on how to integrate monitoring data into planning, policy formulation, and resource allocation.

8.2.2.2 Modernization of wastewater treatment plants

The renovation of existing treatment plants should prioritize the incorporation of advanced technologies, such as biological processes involving biofilms, membranes, and anaerobic digestion. These technologies not only enhance the quality of treatment but also generate energy as a by-product and reduce the production of sludge, the management of which remains a significant challenge for Costa Rica. Expanding the capacity of treatment plants is particularly critical in densely populated urban areas and underserved rural regions.

In addition to conventional technologies, nature-based solutions like constructed wetlands were identified during the workshop as promising alternatives, especially for rural and decentralized systems. Constructed wetlands offer multiple benefits, including cost-effectiveness, minimal energy requirements, and the ability to integrate into local ecosystems. These systems are particularly well-suited for rural communities lacking access to centralized networks, as they can efficiently treat wastewater while contributing to biodiversity and ecosystem restoration.

For rural areas, introducing decentralized, compact, and low-cost systems is essential. These systems should be designed to adapt to local conditions and ensure long-term sustainability. Examples of such systems include modular treatment units and hybrid approaches that combine mechanical and natural treatment processes, enabling scalability and adaptability to varying community needs.

The modernization of wastewater treatment infrastructure must align with the principles of sustainability, ensuring that technological advancements and nature-based solutions work in synergy to address the country's wastewater challenges comprehensively.

8.2.2.3 Optimisation of drinking water distribution networks

Old, leak-prone infrastructure needs to be replaced with modern, resilient materials, with an emphasis on regions where water losses are most significant. In addition, incorporating smart technologies, such as automated valves and electronic meters, will allow for more efficient control and reduce water waste. In parallel, it is crucial to strengthen storage and distribution systems to respond to climatic variations, ensuring a constant supply, especially in times of prolonged drought.

8.2.2.4 Implementing solutions for the agricultural sector

The agricultural sector, as the main consumer of water in Costa Rica, must adopt advanced irrigation technologies, such as drip and sprinkler systems controlled by humidity sensors. These solutions will allow a more efficient use of water resources, reducing waste. In addition, the use of treated wastewater for agricultural irrigation should be encouraged, promoting sustainable practices aligned with the safe reuse provisions established in the PNSAR.

8.2.3 Expected Benefits

- **Increased efficiency and sustainability:** Modern technologies will reduce operating costs, improve service quality, and decrease the environmental impacts associated with current operations.
- **Expanded and equitable coverage:** Modernization will make it possible to reach underserved communities and improve the quality of life in rural and urban areas.

- **Compliance with international standards:** New infrastructures and technologies will align the country with global standards of quality and sustainability in water and sanitation.

8.3 Level of information

8.3.1 Implement centralized monitoring systems and databases

The implementation of centralized monitoring systems and databases is essential to overcome information gaps in water and sanitation management in Costa Rica. These systems will not only enable more efficient and evidence-based decision-making but will also support inter-agency coordination and transparency.

8.3.2 Specific proposals

8.3.2.1 Development of an integrated national water monitoring system

Creating a national system that collects, processes, and analyzes real-time data on water quality and quantity, the efficiency of sanitation systems, and the state of water bodies is a priority. This system must be supported by advanced technologies, such as automated sensors, remote monitoring stations and remote sensing analysis, thus ensuring the accuracy and coverage of the data collected. In addition, it is essential that such a system complies with technical and quality regulations, ensuring its alignment with national monitoring and control standards.

8.3.2.2 Creation of a centralized and accessible database

A key component of integrated water resources management is the consolidation of information on a centralized digital platform. This database must integrate information generated by all institutions and key actors, such as AyA, ASADAS, municipalities and MINAE. To ensure their effectiveness, data collection formats and procedures should be standardized, promoting their compatibility and usefulness for inter-institutional analysis. Likewise, the database must be accessible to decision-makers, researchers and the general public, with differentiated levels of access according to the sensitivity of the information, promoting transparency and informed participation.

8.3.2.3 Strengthening technical capacities for the use of the systems

The successful implementation and operation of advanced technologies in water and sanitation management rely heavily on the technical and operational expertise of institutional personnel. To ensure the effective use and long-term sustainability of these systems, it is essential to establish comprehensive initial and continuous technical training programs. These programs should focus on updating knowledge and skills in areas such as real-time monitoring, data analysis, and digital tools for decision-making.

The training programs should:

- **Be tailored to institutional needs:** Address the specific technological requirements and operational challenges faced by institutions like AyA, ASADAS, and municipalities.
- **Include hands-on components:** Provide practical, scenario-based learning to ensure personnel can effectively operate and troubleshoot the systems.
- **Integrate cross-disciplinary approaches:** Equip teams with an understanding of how data management tools integrate with broader water resource management frameworks.

Additionally, it is recommended to establish specialized technical teams within each institution. These teams would be responsible for:

- Overseeing the operation and maintenance of advanced technologies.
- Monitoring system performance and troubleshooting issues as they arise.
- Coordinating with decision-makers to ensure the systems are effectively integrated into planning and management processes.

Workshop participants also emphasized the importance of fostering collaboration between institutions to share technical expertise and best practices. For example, larger entities like AyA could play a mentorship role for smaller operators, such as ASADAs, in building their technical capacities. This collaborative approach would strengthen the overall resilience and capability of the water management sector.

8.3.2.4 Promoting interoperability between existing systems

To maximize the effectiveness of current efforts, it is crucial to integrate the monitoring systems already implemented by various institutions, ensuring that they can exchange data and operate in a complementary manner. Monitoring platforms should be aligned with the objectives of the PNSAR, allowing their efficient use in the monitoring of key indicators, such as water quality and sanitation coverage. This interoperability will facilitate a more complete and coordinated view of water resource management in the country.

8.3.2.5 Transparency and access to information

Ensuring transparency in water and sanitation management is critical to building public trust. This can be achieved by publishing regular reports that present progress in water monitoring and management in a clear and understandable way. In addition, it is important to establish open data portals that allow communities, non-governmental organizations and the private sector to access key information. To enhance the use of this data, educational campaigns should be promoted to help local communities understand and take advantage of the information generated for informed decision-making and action.

8.3.3 Expected Benefits

- **Evidence-based decision-making:** Centralized, reliable data will facilitate strategic planning and prioritization of projects.
- **Better monitoring and control:** Integrated systems will make it possible to detect water quality and quantity problems in a timely manner, reducing risks to public health and ecosystems.
- **Strengthening transparency:** Public access to information will foster trust in responsible institutions and allow for the active participation of society in water management.

8.4 Financial level

8.4.1 International Funding Mobilization and Co-Financing Strategies

Mobilizing financial resources and implementing co-financing strategies are crucial to closing the economic gaps that limit progress towards meeting SDG 6 targets in Costa Rica. These actions should be aligned with the needs identified in national regulatory frameworks, and prioritize investments in infrastructure, innovative technologies, and institutional strengthening.

8.4.2 Specific proposals

8.4.2.1 Design of a national resource mobilization plan

The creation of a strategic plan is essential to prioritize the financing needs in Costa Rica's water sector. This plan should identify key projects in areas such as treatment infrastructure, distribution networks, and monitoring systems, establishing clear and justified goals to attract international financing from multilateral organizations such as the World Bank, the IDB, and the UNDP. In addition, it must include cost-benefit analyses and environmental and social impact assessments that support funding requests, ensuring their technical, economic and social viability.

8.4.2.2 Expanding collaboration with international agencies

Strengthening partnerships with international donors and development banks is a key strategy to secure investments in priority water and sanitation-related projects. This implies encouraging the interest of these organizations in supporting Costa Rica by requesting technical assistance to design and implement innovative projects, aligned with international best practices. It is also essential to explore blended financing mechanisms, combining resources from loans, grants, and national funds to maximize the impact of investments.

8.4.2.3 Fostering Public-Private Partnerships (PPPs)

Private sector participation in the financing and execution of water infrastructure projects can be incentivized through co-financing schemes that distribute risks and benefits among the parties involved. PPP models should focus on areas such as wastewater treatment, treated water reuse, and the construction of modern distribution systems. To promote these partnerships, it is recommended to implement fiscal and financial incentives aimed at companies that invest in sustainable and high-tech solutions, generating a positive impact on the water sector.

8.4.2.4 Optimizing the use of national resources

A review of the budgets allocated to the water sector would identify opportunities to improve the efficiency of public spending. This includes redirecting funds towards technologies and solutions with numerous environmental and social benefits, such as climate-resilient infrastructure and low-cost technologies for rural communities. In addition, it is crucial to develop sustainable cost recovery mechanisms that guarantee the economic viability of water and sanitation systems, promoting their financial autonomy and long-term sustainability.

8.4.2.5 Creation of a national fund for water and sanitation

The creation of a specialized fund is an important tool for gathering national and international resources to finance priority water and sanitation projects. This fund must be designed with equity criteria, prioritizing vulnerable communities and projects with high social and environmental impact. To ensure its effectiveness, the fund must be managed in a transparent manner, with clear accountability mechanisms that promote trust and ensure the efficient use of resources. The implementation of the Framework Law on Water Resources Management will also collaborate with this since it establishes it, although it does not specify the system for prioritizing investments.

8.4.3 Expected Benefits

- **Increased availability of resources:** Funding mobilization and co-financing strategies will broaden the financial base for key projects, accelerating their implementation.
- **Economic sustainability:** Cost recovery mechanisms and PPP models will ensure that the systems financed are sustainable in the long term.
- **Equity in the distribution of resources:** Prioritizing vulnerable communities and rural areas will reduce regional gaps in access to water and sanitation services.

8.5 Community level

8.5.1 Training and local capacity development programmes

Local capacity development and community training are critical to ensuring sustainable water management in Costa Rica. Communities, especially those that manage decentralized water and sanitation systems such as ASADAs, play a critical role in the operation, maintenance, and protection of water resources. There is a need to implement educational and capacity strengthening programs that not only empower communities, but also promote their alignment with national regulatory frameworks and goals. While local communities play a central role in water management, it is essential to differentiate Indigenous Peoples and recognize their specific characteristics within the framework of strategic recommendations. Indigenous Peoples face higher levels of vulnerability than other communities, yet they also possess ancestral knowledge and sustainable practices that can significantly contribute to the implementation of SDG 6. It is recommended to establish mechanisms that enable them to have direct access to funding to develop conservation and water management strategies based on their own worldviews and development goals. An example of this differentiated approach is the conservation funding scheme used by SINAC and FONAFIFO, where both the State and Indigenous communities can receive funds for complementary initiatives.

8.5.2 Specific proposals

8.5.2.1 Design of technical training programs

The design of training programs aimed at community operators is essential to improve the management of drinking water and wastewater treatment systems. These programs should include specific modules focused on maintenance and operation techniques, the use and monitoring of modern technologies—including compact, low-cost systems adapted to local needs—and good practices for the management of sludge and waste associated with sanitation systems. It is also essential to include training on relevant regulations, to ensure compliance with the established quality standards.

8.5.2.2 Organizational strengthening of ASADAs and other community entities

ASADAs and other community entities require tools and resources that allow them to improve their administrative and financial management. This includes the development of sustainable water management plans, training in cost recovery and tariff management to ensure the economic sustainability of the systems, and the introduction of transparency and accountability practices that reinforce communities' trust in their local leaders. In addition, equitable representation in the decision-making bodies of the ASADAs must be promoted, ensuring the active inclusion of women, youth and indigenous groups, who bring diverse and enriching perspectives to community management.

8.5.2.3 Community education and awareness programs

It is vital to design educational campaigns that highlight the efficient use of water, the prevention of pollution and the protection of water sources, as well as the importance of adequate sanitation for public health and the environment. These campaigns should also address resilience to climate change and adaptation in community water resources management. To maximize the impact of these initiatives, it is advisable to implement participatory activities such as workshops, fairs and school projects, which promote environmental awareness and community responsibility.

8.5.2.4 Development of collaborative networks and exchange platforms

The establishment of regional and national networks connecting communities and ASADAs will facilitate the exchange of experiences and best practices in water management. These networks can be complemented by digital platforms that allow local actors to share solutions, access educational resources and receive technical support. In addition, it is advisable to develop mentoring programs, in which more advanced ASADAs support those who face greater challenges, promoting effective collaboration between communities.

8.5.2.5 Financial and technical support for local projects

Financing and technical assistance for community projects are essential to foster innovation in water and sanitation. These resources should prioritize initiatives such as rainwater harvesting and storage systems, decentralized wastewater treatment technologies, and the restoration of water recharge areas in collaboration with local communities. Likewise, it must be ensured that projects receive continuous technical assistance to ensure their sustainability and alignment with national and international objectives.

8.5.3 Expected Benefits

Community empowerment: Training and organizational strengthening programs will allow communities to manage their water and sanitation systems autonomously and efficiently.

Resource sustainability: The practices learned will promote the responsible use and protection of local water resources.

Reducing inequalities: The inclusive approach will ensure that all members of communities, especially the most vulnerable, actively participate in decision-making and benefit from interventions.



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9 Action Plan

9.1 Institutional strengthening

9.1.1 Design a national training program in integrated water resources management for decision-makers

9.1.1.1 Context

Water resource management in Costa Rica faces challenges related to coordination between institutions, the implementation of public policies, and strategic planning within an integrated governance framework. Although there are institutions such as AyA, ASADAS, municipalities and MINAE, each with specific roles, there is a fragmentation in competencies and capacities, which limits the efficiency of decisions related to water and sanitation.

9.1.1.2 Objective

Design and implement a national training program aimed at decision-makers in key institutions to strengthen their capacity for strategic planning, intersectoral coordination, and water resource governance, aligned with the National Policy on Wastewater Sanitation (PNSAR) and the SDG 6 framework.

9.1.1.3 Detailed Activities

Identification of key participants

- Carry out a mapping of the institutions related to water management (AyA, ASADAS, MINAE, municipalities, NGOs, universities) and the levels of decision-making in each one.
- Prioritize decision-makers with strategic roles in planning and execution of policies related to water and sanitation.

Training Content Development

- Design thematic modules based on identified needs, such as:
 - Principles of Integrated Water Resources Management (IWRM).
 - Normative and regulatory framework of water in Costa Rica, including the PNSAR.
 - Strategic planning for water security.
 - Monitoring and evaluation of projects in the water sector.
 - Watershed and river basin planning and management, emphasizing their role in integrated water resources management and water security strategies.
- Incorporate relevant case studies from Costa Rica and other countries with similar challenges.

Teaching methodology

- Give high preference to participatory methodologies such as workshops, scenario simulations, case study analysis, and hands-on sessions.
- Facilitate learning through hybrid platforms (face-to-face and virtual), considering the accessibility and availability of participants.

Strategic alliances for the development of the program

- Involve public universities and the INA in the development of content and its academic validation.
- Collaborate with international academic, research, and training institutes, including UN-Water members, to ensure global best practices and state-of-the-art knowledge are integrated into the program. This collaboration should leverage the expertise of CDI's members.³

³ A full list of the CDI membership can be found on the dedicated page on the UN-Water website: <https://www.unwater.org/our-work/sdg-6-capacity-development-initiative>

- Coordinate collaboration with international financing organizations such as the World Bank and the IDB, who have extensive knowledge of the sector.

Pilot plan and evaluation

- Implement a pilot program with a small group of participants from key institutions.
- Include a training-of-trainers (ToT) component within the pilot program to build a cadre of qualified trainers who can replicate the training across institutions and regions. This ensures scalability and the sustainability of capacity-building efforts.
- Evaluate the effectiveness of the content and methodology through surveys and analysis of cases solved by the participants.

Scaling and replicability

- Adjust the program based on the lessons learned during the pilot.
- Expand its reach at the national level with the participation of all regions and watersheds. The basin approach is very important.

9.1.1.4 General Term

January 2025 - December 2028

9.1.2 Establish intersectoral coordination systems between AyA, MINAE, Ministry of Health, ASADAS, and other key actors

9.1.2.1 Context

In Costa Rica, water management involves multiple institutions with specific roles, but the fragmentation and lack of effective coordination mechanisms make it difficult to implement integrated actions. An intersectoral coordination system will strengthen water governance, aligning efforts between key actors such as AyA, MINAE, Ministry of Health, ASADAS and municipalities, promoting efficient and collaborative management.

9.1.2.2 Objective

Create an intersectoral coordination system that facilitates the articulation of efforts between the institutions responsible for water resource management, ensuring that their actions are aligned with national objectives and SDG 6 targets.

9.1.2.3 Detailed Activities

Key Stakeholder Mapping and Function Analysis

- Identify the institutional actors involved in water management and their role within the current regulatory framework. The PNSAR contains an analysis of this but it needs to be updated.
- Conduct an analysis of each institution's competencies, responsibilities, and resources to identify areas of overlap or gaps or synergies.
- Include capacity development providers in the mapping process to assess their current and potential roles in addressing identified gaps. This should involve evaluating their expertise, training programs, and alignment with the needs of water management institutions.
- Establish collaborative frameworks to integrate capacity development providers into institutional plans, ensuring that their programs are tailored to the specific requirements of stakeholders and the broader regulatory framework.

Design of an integrated governance model

- Create a structured model of cross-sectoral governance that includes mechanisms for communication, conflict resolution and decision-making. The proposed Framework Law for the Integrated Management of Water Resources does not detail this.
- Incorporate principles of Integrated Water Resources Management (IWRM) to ensure a sustainable and equitable approach.

Establishment of intersectoral working groups

- Create working groups that regularly bring together key actors to discuss, plan and coordinate actions related to water and sanitation.
- Define a schedule of meetings and the specific goals that are expected to be achieved in each session.

Development of a coordination and communication protocol

- Design an official protocol that regulates the mechanisms of interaction between institutions, specifying roles, responsibilities and information flows.
- Validate the protocol through participatory workshops with representatives of all the institutions involved.

Pilot implementation of the coordination system

- Apply the coordination system in a pilot region or basin, evaluating its effectiveness in coordinating efforts and solving problems. This applies to local coordination, since institutional ones are centralized.
- Document results, lessons learned, and areas for improvement.

Expansion and formalization of the system at the national level

- Adjust the system based on the pilot's learnings and replicate it in all regions of the country.
- Formalize the coordination system through inter-institutional agreements or executive decrees.

9.1.2.4 General Term

January 2025 - December 2028

9.1.3 Develop tools for strategic water planning

9.1.3.1 Context

Strategic planning in Costa Rica's water sector is challenging due to the limited integration of practical tools that allow prioritizing actions, optimizing resources, and responding to the challenges of climate change and growing demands for water resources. The creation of specific tools for planning will facilitate more efficient decision-making for institutions aligned with the objectives of SDG 6.

9.1.3.2 Objective

Develop and implement operational tools that allow institutions responsible for water and sanitation to carry out strategic planning that integrates technical, social, economic and environmental aspects.

9.1.3.3 Detailed Activities

Identification of specific needs in planning

- Consult with key institutions (AyA, MINAE, MS, ASADAS, municipalities) to identify gaps and limitations in the current planning processes.
- Analyze previous studies and national diagnoses, such as the PNSAR, to define priority areas in strategic planning.

Specific tool design

- Develop digital tools, such as water simulation models, decision support systems, and project dashboards.
- Incorporate prioritization matrices that consider technical, financial, social, and sustainability criteria.
- Design practical guides for the use of these tools, adapted to the needs of each institution.
- Include tools to support the development and implementation of planning frameworks for integrated water resource management (IWRM).

Tool Validation and Tuning in a Pilot

- Implement the tools developed in a pilot region or in a specific basin to evaluate their functionality and usefulness in real scenarios.

- Collect feedback from users and adjust the tools according to the needs detected.

Training in the use of the tools

- Conduct practical workshops for the technical staff of the institutions, focused on the application of the tools developed.
- Include hands-on sessions on data analysis and the generation of strategic plans using the tools.

National implementation of the tools

- Expand the use of the tools at the national level, ensuring that all key institutions have access to and are trained to use them.
- Establish ongoing technical support mechanisms to resolve issues and update tools as needed.

9.1.3.4 General Term

January 2025 - December 2027

9.2 Technological innovation

9.2.1 Design technical training modules in operation and maintenance of advanced technologies

9.2.1.1 Context

Advances in water treatment and water monitoring technologies require trained operators who can use and maintain them efficiently. In Costa Rica, many of these technologies are underutilized due to a lack of technical skills in their operation and maintenance. This limits the effectiveness of infrastructure investments and the sustainability of systems. On the other hand, universities have adapted and developed technologies according to the characteristics of Costa Rica, so the knowledge generated must be used.

9.2.1.2 Objective

Design and implement technical training modules that enable operators to understand, operate and maintain advanced technologies, ensuring their efficient use and long-term sustainability.

9.2.1.3 Detailed Activities

Diagnosis of existing technologies and capacities

- Identify the advanced technologies viable to use and those available in the treatment plants, distribution systems and water monitoring in the country.
- Conduct a diagnosis of operators' current capabilities to determine specific gaps in the knowledge and skills required.

Design of thematic modules

- Develop specific training modules for each type of technology identified, including:
 - Wastewater treatment systems, such as biofilms, membranes, biodigesters, and advanced filters.
 - Real-time monitoring systems with automated sensors.
 - Solid waste management equipment associated with sanitation.
- Incorporate practices and simulations into the modules to reinforce learning.

Validation of the modules with experts and operators

- Submit modules for review by water industry experts and experienced operators to ensure that the content is relevant and practical.
- Carry out pilot tests of the modules in one or two key installations to adjust the contents according to the needs detected.

Initial deployment in priority regions

- Conduct initial training in regions with the greatest need, such as those with newly modernized infrastructure or in rural areas that have implemented some non-traditional technology.
- Ensure the involvement of ASADA operators and municipal systems to maximize impact.

Expansion of the programme at the national level

- Extend training to all regions of the country, using both face-to-face and virtual formats to facilitate access.
- Incorporate the program into the continuing education plans of institutions such as the INA and universities.

9.2.1.4 General Term

January 2025 - December 2027

9.2.2 Strengthen skills in the use of digital tools for real-time monitoring

9.2.2.1 Context

In Costa Rica, the adoption of digital tools for real-time monitoring is limited, especially in rural communities and in some municipal systems. Although there are advanced technologies that allow continuous monitoring of critical parameters such as water quality, flows, and contaminant detection, their implementation and use are hampered by the lack of technical training in the use of these tools. This reduces the effectiveness of monitoring systems and makes data-driven decision-making more difficult.

9.2.2.2 Objective

Train technicians, operators, and managers in the use of digital tools for real-time monitoring, ensuring that the systems are used efficiently, accurately, and sustainably, aligned with the needs of the national water sector.

9.2.2.3 Detailed Activities

Inventory of available digital tools and training needs

- Identify the real-time monitoring technologies used or feasible to use by institutions such as AyA, ASADAS, MINAE, MS and municipalities.
- Assess the current level of knowledge of operators and managers about these tools, identifying skills gaps.

Development of specific training programs

- Design training content that includes:
 - Basic and intermediate use of digital sensors and monitoring platforms.
 - Interpretation of data generated in real time.
 - Basic equipment configuration and maintenance.
- Create practical modules that include simulations and exercises based on real scenarios.

Pilot training in selected regions

- Implement pilot programs in regions with monitoring systems already in place, prioritizing areas with critical challenges in water quality or resource management. The aim is to mobilize the people who must be trained in these systems that will serve as a model.
- Collect feedback from participants to adjust programs according to their needs.

Nationwide implementation

- Expand training at the national level, using a combination of face-to-face and virtual methodologies to maximize participation, as not all regions have monitoring systems in place.
- Promote the participation of ASADA operators in rural communities and municipal technicians responsible for water monitoring.

Tracking and technical support

- Establish technical support teams that can assist trained regions in case of problems with digital tools.
- Conduct periodic evaluations to measure the effectiveness of the training and the impact on the use of the tools.

9.2.2.4 General Term

January 2025 - December 2028

9.2.3 Develop competencies in analysis and resolution of complex technical problems

9.2.3.1 Context

The management of water and sanitation systems in Costa Rica faces technical challenges that often require specific and advanced solutions. However, many operators and technicians of small systems lack the skills to identify, analyze, and resolve complex technical issues, resulting in service interruptions and inefficient infrastructure maintenance.

9.2.3.2 Objective

Train operators, technicians, and managers to identify and solve complex technical problems in drinking water, wastewater treatment, and water monitoring systems, using structured methodologies and advanced tools.

9.2.3.3 Detailed Activities

Diagnosing common abilities and problems

- Perform a mapping of the most common and complex technical problems faced by operators of treatment plants, distribution systems and monitoring.
- Assess the current capabilities of technicians in identifying and resolving such problems.

Development of specialized problem-solving content

- Design training modules that address:
 - Structured methodologies for root cause analysis (RCA).
 - Use of advanced diagnostic tools, such as sensors and modeling software.
 - Practical solutions for specific problems such as leaks, blockages, and failures in treatment systems.

Pilot training in real scenarios

- Implement hands-on workshops in operational facilities where participants can face and solve real technical problems under the guidance of experts.
- Evaluate the performance of participants in simulated and real scenarios.

National implementation of the programme

- Extend training at the national level, prioritizing regions with a higher incidence of complex technical problems.
- Include a follow-up component to monitor how technicians apply the skills acquired in their daily work.

Continuous program monitoring and improvement

- Conduct annual evaluations of the program's impact on reducing technical problems.
- Update training content and methodologies based on the new challenges identified.

9.2.3.4 General Term

January 2025 - December 2028

9.2.4 Promote increased water use efficiency by industries and the agricultural sector

9.2.4.1 Context

The agricultural sector and industry are the largest consumers of water in Costa Rica, with practices often resulting in inefficient use of the resource. The implementation of advanced technologies and sustainable practices in these sectors is key to optimizing water consumption, reducing waste, and ensuring the sustainability of water resources in the face of climate change and growing demands.

9.2.4.2 Objective

To promote the adoption of efficient technologies and practices in the use of water in the industrial and agricultural sectors, aligning productive activities with the principles of sustainability and integrated management of water resources.

9.2.4.3 Detailed Activities

Assessment of Current Water Use Practices in Industry and Agriculture

- Carry out sectoral diagnoses to identify the main sources of inefficiency in the use of water in agricultural and industrial activities.
- To analyze the technologies and practices currently used and to assess their impact on water consumption.

Development of technical guidelines for the efficient use of water

- Design technical guides that include recommendations on:
 - Advanced irrigation systems, such as drip irrigation and humidity sensors.
 - Water recirculation and reuse technologies in industrial processes.
 - Preventive maintenance practices to prevent leaks and losses in water infrastructure.
- Adapt the guidelines to the particularities of the different types of crops and industrial processes.

Training in sustainable technologies and practices

- Organize workshops and training aimed at agricultural producers, industrial companies and technical operators.
- Incorporate hands-on simulations and demonstrations of technologies such as automated irrigation systems and water treatment and reuse equipment. Universities have systems that can be used for practices and simulations.

Implementation of pilot projects

- Identify farms and industrial plants where pilot projects can be implemented that demonstrate the effectiveness of the proposed technologies and practices.
- Document the results obtained, such as the reduction in water consumption and the increase in productivity.
- Foster the creation of Communities of Practice to facilitate knowledge sharing, collaboration, and peer learning among industry leaders, agricultural practitioners, and water management experts. These can serve as platforms to discuss challenges, exchange experiences, and co-develop solutions tailored to Costa Rica's context.

Promoting incentives for technology adoption

- Work with institutions such as the Ministry of Agriculture and Livestock (MAG) and the Ministry of Economy, Industry and Trade (MEIC) to develop fiscal and financial incentives that promote the adoption of sustainable technologies.
- Establish cooperation agreements with development banks and international organizations to finance the implementation of these practices.

Scaling up and monitoring impact

- Extend successful technologies and practices to more regions and productive sectors, ensuring the participation of small and medium-sized enterprises and agricultural producers.
- Establish continuous monitoring systems to assess water efficiency in the agricultural and industrial sectors and adjust strategies as needed.

9.2.4.4 General Term

January 2025 - December 2029

9.3 Information management

9.3.1 Train technicians and communities in the collection, analysis, and use of water data

9.3.1.1 Context

The lack of capacities to collect, analyze, and use water data limits the efficient management of resources in Costa Rica. Technicians from some institutions, service providers, and communities, particularly in rural areas, lack the skills necessary to generate reliable information and use it in local decision-making. This makes it difficult to implement evidence-based solutions and integrate them into national plans.

9.3.1.2 Objective

Strengthen competencies in the collection, analysis, and use of water data, ensuring that they are accurate, relevant, and applicable in local and national water resources management.

9.3.1.3 Detailed Activities

Initial needs assessment and data gaps

- Identify specific data needs in different regions of the country, considering aspects such as water quality, flows, and service coverage. It is advisable to incorporate ecological criteria into quality metrics.
- Evaluate the current tools and methodologies used by technicians and communities for data collection.

Design of training modules

- Develop thematic modules that include:
 - Field data collection techniques, adapted to local conditions.
 - Use of measuring devices, such as sensors and portable equipment.
 - Basic analysis methods using accessible tools, such as spreadsheets and free software.
 - Application of data for community planning and management of water and sanitation systems.
 - Components on citizen science and community-based monitoring to empower local populations to participate actively in water resource management

Implementation of pilot workshops

- Conduct hands-on workshops in selected communities, prioritizing those with the greatest need for capacity building.
- Include practical exercises that allow participants to collect and analyze data in real time.

Training Program Scaling

- Expand the program at the national level, ensuring that technicians from institutions such as AyA, ASADAS, and municipalities actively participate.
- Include rural communities in all regions, adapting content to their specific needs.

Establishment of technical support networks

- Create support networks between trained technicians and communities to share knowledge, solve problems, and keep collection and analysis methodologies up to date.
- To facilitate digital platforms for the exchange of data and experiences.
- Establish networks of citizen scientists to foster long-term engagement and collaboration. These networks can act as platforms for sharing data, methodologies, and best practices, enhancing the overall quality and scope of water data management

9.3.1.4 General Term

January 2025 - December 2028

9.3.2 Create an awareness program on the importance of data for decision-making

9.3.2.1 Context

The underutilization of data in decision-making is a critical challenge in Costa Rica's water management. At both the technical and community levels, a lack of understanding of the value of data as a planning tool limits the ability to implement effective solutions. Raising awareness among key stakeholders about the importance of data will allow for more informed and evidence-based management.

9.3.2.2 Objective

Develop and implement a national awareness program aimed at technicians, decision-makers, and communities, focused on the relevance of data to efficiently plan and manage water resources.

9.3.2.3 Detailed Activities

Audience identification and message design

- Identify the program's target audiences, including:
 - Technicians from AyA, ASADAS, municipalities and other institutions.
 - Community leaders and local decision-makers.
 - Members of rural and urban communities.
- Design key messages that highlight the role of data in improving water management, planning, and problem solving.

Production of educational and communicative materials

- Develop accessible materials such as infographics, videos, how-to guides, and handouts that explain the importance of data in a clear and understandable way.
- Create content in digital formats for social media and online platforms, and in print formats for distribution in rural areas.

Development of awareness workshops

- Design participatory workshops for technicians and communities, where practical examples of the use of data in planning and decision-making are explained.
- Include exercises that demonstrate how data can identify problems and propose effective solutions.

Implementation of the programme in pilot regions

- Carry out awareness-raising activities in selected regions, prioritizing those with lower levels of access to data or understanding of their usefulness.
- Evaluate the initial impact of the program through surveys and feedback from participants.

Expansion of the programme at the national level

- Extend the program to all regions of the country, including sessions in communities, technical institutions, and decision-makers' forums.
- Tailor messages and materials to the specific needs of each region.

Program monitoring and adjustments

- Conduct periodic evaluations to measure changes in data perception and use among target audiences.
- Adjust program materials and approaches based on evaluation results.

9.3.2.4 General Term

January 2025 - December 2028

9.3.3 Establish standards for monitoring system interoperability

9.3.3.1 Context

In Costa Rica, various institutions and communities collect water-related data using different monitoring systems, which creates challenges in integrating and comparing information. The lack of interoperability between these systems limits the ability of institutions to make coordinated, evidence-based decisions. Establishing interoperability standards will make it possible to unify data and optimize its use at the national level.

9.3.3.2 Objective

Design and establish national standards for the interoperability of water monitoring systems, ensuring that the data generated by different actors are compatible, accessible, and useful for integrated water resource management.

9.3.3.3 Detailed Activities

Mapping existing monitoring systems

- Identify the systems used by institutions such as AyA, MINAE, MS, ASADAS, municipalities and non-governmental organizations.
- Analyze the technical characteristics of these systems, including data formats, communication protocols, and collection methodologies.

Diagnosing interoperability gaps

- Assess the technical and operational barriers that hinder interoperability between systems.
- Use IWRM international standards and guidelines from CDI members such as UN-Habitat and GWP as a reference.

Interoperability Standards Design

- Develop a standards framework that defines:
 - Common data formats.
 - Information exchange protocols.
 - Technical requirements for system integration.
 - Include specific guidelines for the participation of local communities and ASADAs.

Validation of standards in pilot regions

- Implement the standards in monitoring systems in two selected regions (they can be two small watersheds) to evaluate their functionality and effectiveness.
- Conduct workshops with technicians and operators to adjust the standards according to the needs identified during the pilot test.

Formalization and adoption of standards

- Promote the adoption of the standards by including them in national regulatory frameworks and water management plans.
- Conduct trainings to ensure that all relevant institutions and communities can implement the standards. This is of great importance due to the fragmentation of governance.

Monitoring and updating standards

- Establish an ongoing monitoring mechanism to assess compliance with and effectiveness of the standards.
- Update standards according to emerging needs and technological advances.

Preparation of the national water balance

- Based on the information collected, adjustments must be made to the calculations of the national water balance, in order to generate a model that contemplates the differences between the regions and can obtain more accurate estimates.

9.3.3.4 General Term

January 2025 - December 2028

9.4 Mobilization of financial resources

9.4.1 Design a training program in the preparation of financing proposals for institutional and community actors

9.4.1.1 Context

The limited capacity to formulate effective financing proposals makes it difficult for Costa Rican institutions and communities to access national and international financial resources. This gap reduces the opportunities to implement projects in water, sanitation and sustainable water management. A training program will allow key actors to acquire the necessary skills to attract resources to support strategic projects.

9.4.1.2 Objective

Design and implement a training program that trains community leaders and decision-makers in the development of financing proposals aligned with national priorities and the requirements of financial agencies.

9.4.1.3 Detailed Activities

Diagnosis of training needs

- To carry out an analysis of the current capacities for the elaboration of proposals in institutions such as AyA, ASADAS, MS, municipalities and NGOs.
- Identify the types of priority projects that require financing and the main financing agencies (e.g., World Bank, IDB, UNDP).

Program Content Design

- Create thematic modules that include:
 - Identification of national and international financing opportunities.
 - Drafting of technical and financial proposals.
 - Preparation of cost-benefit analyses and environmental and social impact assessments.
 - Alignment of proposals with national regulatory and normative frameworks.
- Incorporate successful case studies from Costa Rica and other similar countries.

Production of educational materials

- Develop practical guides, presentations and exercises based on real projects.

Implementation of pilot workshops

- Conduct initial workshops with technicians from national institutions and community representatives in priority regions.
- Evaluate the effectiveness of the content and adjust the program according to the needs detected.

Expansion of the programme at the national level

- Extend training at the national level, ensuring that all regions have representatives trained in the formulation of proposals.
- Offer specific workshops for rural communities, adapting the content to their needs.

Ongoing monitoring and technical support

- Establish a technical support team to advise participants in the preparation of proposals after the training.
- Monitor the quantity and quality of proposals submitted and funded.

9.4.1.4 General Term

January 2025 - December 2028

9.4.2 Host trainings in cost recovery strategies and financial sustainability for service delivery providers

9.4.2.1 Context

In Costa Rica, many drinking water and sanitation systems face significant financial challenges due to insufficient tariffs, lack of economic planning, and limited ability to recover costs. This problem particularly affects ASADAs and municipal systems, where financial sustainability is essential to ensure continuity and quality of service.

9.4.2.2 Objective

Strengthen the capacities of operators, technicians, and community leaders in the design and implementation of cost recovery strategies that guarantee the financial sustainability of water and sanitation systems.

9.4.2.3 Detailed Activities

Diagnosis of current economic conditions

- Analyze the tariff schemes and financial management models used by service providers.
- Identify the main economic and operational barriers to cost recovery in different regions.

Training Content Design

- Develop thematic modules that include:
 - Basic principles of water economics and tariff calculation.
 - Methods for assessing and covering operational, maintenance, and expansion costs.
 - Strategies to minimize economic losses due to leaks and non-payment.
 - Participatory financing models and cross-subsidies.
 - Adapt content to include differentiated approaches according to the needs of urban and rural areas.

Development of practical materials and tools

- Create practical guides and tools to calculate sustainable rates. They can be anything from spreadsheets to software developed for this purpose.
- Design case studies based on real examples of cost recovery in Costa Rica.

Implementation of pilot workshops

- Conduct workshops with ASADA operators and municipal systems in selected regions.
- Include practical exercises for participants to design tariff schemes and evaluate their economic viability.

Expansion of the training program

- Extend training to all regions of the country, ensuring the inclusion of operators from the most vulnerable communities.
- Offer continuous support through digital platforms to resolve doubts and improve strategies.

Monitoring and adjustment of implemented strategies

- Evaluate the impact of the trainings on the financial sustainability of the systems that participated.
- Update the contents and tools of the program according to the results obtained and changes in economic conditions.

9.4.2.4 General Term

January 2025 - December 2028

9.5 Community Engagement

9.5.1 Building capacity in managing public-private partnerships (PPPs)

9.5.1.1 Context

Public-Private Partnerships (PPPs) represent an opportunity to finance and implement strategic projects in the water and sanitation sector in Costa Rica. However, there is limited experience in negotiating and managing these agreements, which prevents public institutions from taking full advantage of this model. Training in PPP trading skills will maximize the benefits and minimize risks associated with these partnerships. To ensure effective citizen participation, it is recommended to create mechanisms that guarantee real and meaningful community participation, including open working groups, structured consultation processes, and accessible digital platforms for continuous feedback.

9.5.1.2 Objective

Train technicians, decision-makers, and community leaders in the necessary competencies to negotiate the terms of and manage public-private partnerships, ensuring that they contribute to the financial and operational sustainability of water systems.

9.5.1.3 Detailed Activities

Capacity Assessment and Opportunity Mapping

- Identify key institutions and actors with the potential to negotiate PPPs in the water sector.
- Conduct an analysis of the main investment opportunities and priority areas for PPPs in drinking water, sanitation and wastewater reuse.

Specialized content design in APP

- Create training modules focused on:
 - Basic concepts and benefits of PPPs in the water sector.
 - Trading strategies and risk distribution.
 - Contract models and legal structures.
 - Monitoring and evaluation of agreements.
 - Incorporate successful examples of PPPs in Costa Rica and other countries with similar conditions.

Development of negotiation simulations

- Design examples of practical cases where participants observe real PPP negotiation scenarios.
- Include exercises in conflict resolution and evaluation of proposals.

Pilot training workshops

- Implement initial workshops with key institutions, such as AyA, municipalities and NGOs working in the water sector.
- Evaluate the performance of participants in simulations and simulated negotiations.

Expansion of training at the national level

- Extend the workshops and simulations to all regions of the country, adapting the contents to the needs of each area.
- Include private sector actors to foster real interactions during the sessions.

Follow-up and technical support in real negotiations

- Establish a support team to provide technical advice on PPP negotiations.
- Document the results and learnings of the negotiated PPPs to provide feedback for future training.

9.5.1.4 General Term

January 2025 - December 2028

9.5.2 Design educational modules for community operators in technical and financial management

9.5.2.1 Context

ASADAs and other community operators play a crucial role in the management of drinking water and sanitation systems in Costa Rica, especially in rural areas. However, many lack adequate technical and financial training, limiting their ability to operate and maintain systems efficiently, sustainably, and in compliance with regulations. Since staff of the communal operators has a significant turnover, it is necessary to have modules that can be taught periodically, and self-learning schemes can even be considered.

9.5.2.2 Objective

Develop practical educational modules that allow community operators to acquire the technical, leadership and financial skills necessary to efficiently manage their water and sanitation systems, promoting their long-term sustainability.

9.5.2.3 Detailed Activities

Identification of specific training needs

- Consult with ASADAs, municipalities and communities to identify major gaps in technical, managerial and financial knowledge.
- Gather information on recurring challenges in infrastructure maintenance, resource and financial management.

Design of educational content

- Create specific modules that include:
 - Basic maintenance of water and sanitation infrastructure.
 - Efficient use of resources and management of technologies adapted to rural contexts.
 - Financial management, including budgeting, cost control, and revenue generation through fair rates.
 - Regulatory compliance, to ensure smooth operation and compliance with standards.
 - Business processes and management skills emphasizing resource allocation, human resource management, and customer service to enhance the overall capacity of water and sanitation providers

Production of pedagogical materials

- Design manuals, how-to guides, and educational videos in accessible formats for operators with different levels of literacy.
- Create interactive simulations and hands-on exercises to reinforce learning.

Pilot implementation in selected communities

- Conduct initial training with ASADA operators in regions with high levels of water vulnerability.
- Assess the understanding and applicability of the contents through practical exercises.

Expansion of the educational program

- Extend training at the national level, ensuring the inclusion of operators from all regions.
- Adapt the educational modules according to the lessons learned during the pilot phase.

Creating a continuous learning platform

- Establish a digital platform that allows operators to access educational materials, participate in online courses, and receive regular updates.
- Promote networks for the exchange of experiences between ASADAs to reinforce collaborative learning.

9.5.2.4 General Term

January 2025 - December 2028

9.5.3 Strengthen networks for the exchange of good practices between ASADAs

9.5.3.1 Context

ASADAs play a critical role in the management of drinking water in rural areas of Costa Rica. However, many face similar challenges in technical, administrative, and operational aspects. Networking will enable ASADAs to learn from each other, share practical solutions and strengthen their capacity to address common challenges.

9.5.3.2 Objective

Establish and strengthen networks for the exchange of good practices between ASADAs, fostering collaboration, mutual learning and the adoption of effective solutions for drinking water and sanitation management.

9.5.3.3 Detailed Activities

Identification of needs and opportunities for collaboration

- Conduct an initial diagnosis to identify key areas where ASADAs can benefit from the exchange of good practices.
- Identify ASADAs with successful experiences that can serve as mentors in specific areas, such as financial management, technical operation, or community engagement.

Design and establish an exchange network

- Create an organizational structure for the network that includes clear roles, such as regional facilitators or thematic moderators.
- Establish an initial calendar of activities, including workshops, meetings, and discussion forums.
- Design a digital platform that allows the continuous exchange of information, documents and resources.

Workshops and initial exchange meetings

- Organize regional workshops where ASADAs share their experiences in key areas, such as infrastructure maintenance, fare management, and community engagement.
- Document good practices identified during the meetings for subsequent dissemination.

Production of a repository of good practices

- Create an accessible repository with case studies, manuals and guides based on the experiences shared by ASADAs.
- Incorporate a system for ASADAs to update and add content collaboratively.

Nationwide network expansion

- Expand the network to include all ASADAs in the country, ensuring that also the most remote regions participate.
- Hold annual events at the national level to strengthen links between ASADAs and present advances and new challenges.

Continuous network monitoring and improvement

- Periodically assess the impact of the network on the operations and capabilities of participating ASADAs.
- Implement improvements in the digital platform and in the dynamics of the meetings according to emerging needs.

9.5.3.4 General Term

January 2025 - December 2028

9.5.4 Implement workshops for the inclusion of women, youth, and indigenous people in decision-making

9.5.4.1 Context

Water governance in Costa Rica has advanced in multiple aspects, but there remain limited representation of women, youth, and indigenous people in decision-making processes, especially in ASADAs and other community systems. This imbalance reduces the diversity of perspectives and limits the adoption of inclusive and sustainable solutions.

9.5.4.2 Objective

Promote the equitable participation of women, youth, and indigenous people in water governance through workshops that strengthen their capacities and encourage their active integration into community and institutional decision-making bodies.

9.5.4.3 Detailed Activities

Diagnosis of representation and barriers to participation

- Conduct an analysis in communities and ASADAs to identify the current representation of women, youth, and indigenous people in decision-making.
- Identify cultural, social, and structural barriers that limit their participation.

Inclusive content design and methodologies

- Create workshops focused on topics such as:
 - Rights and roles in water governance.
 - Tools for effective participation in decision-making.
 - Leadership and community empowerment.
 - Incorporate participatory methodologies that respect local traditions and cultures, especially in indigenous communities.

Implementation of pilot workshops in selected communities

- Conduct initial workshops in rural communities with high representation of ASADAs and indigenous populations.
- Include hands-on activities such as decision-making simulations and real-world case analysis.

Adaptation and expansion of workshops

- Adjust the contents and methodologies based on the learnings from the pilot workshops.
- Expand the scope of the program to include communities in all regions of the country, ensuring balanced geographic representation.

Creation of permanent spaces for inclusive dialogue

- Establish regular forums in which women, youth and indigenous people can share experiences, propose solutions and coordinate joint actions.
- Facilitate the creation of local and national networks to support the continuity of their participation.

9.5.4.4 General Term

January 2025 - December 2028



10 Next Steps

The UN-Water SDG 6 Capacity Development Initiative in Costa Rica has completed a comprehensive capacity gaps assessment and stakeholder mapping, which serve as the foundation for subsequent phases. The next steps involve a structured approach to design, implement, and monitor the National Capacity Development Plan, ensuring alignment with national priorities and the global SDG 6 targets. The following steps outline the roadmap for moving forward:

10.1 Feedback on the gap assessment

The completed gap assessment document will be shared with workshop participants and key stakeholders for final validation. This step ensures that the findings and proposed activities are supported by the stakeholders who contributed to the process. The feedback process will involve:

- **Simplified Review Mechanism:** Stakeholders will receive the document electronically with a request for concise feedback on clarity, accuracy, and alignment with their perspectives.
- **Integration of Feedback:** Minor adjustments to the document will be made based on the input received, finalizing it as the foundation for the next phases.

This process will consolidate the collaborative nature of the initiative and ensure ownership of the results.

10.2 Design of the National Capacity Development Plan

The design of the National Capacity Development Plan is the next critical phase. This step will use the findings and proposed activities from the gap assessment document to structure an actionable plan. Key components of this phase include:

- **Establishing objectives:** While this document provides a proposal, relevant government authorities in Costa Rica must validate and define clear, actionable objectives that align with SDG 6 targets and address national water and sanitation challenges.
- **Prioritization of actions:** Engage stakeholders in prioritizing activities based on urgency, feasibility, and impact, ensuring a focus on critical areas such as institutional capacity, technical training, and community engagement.
- **Defining thematic areas:** Develop thematic sections addressing the most pressing needs, such as:
 - Integrated Water Resources Management (IWRM).
 - Implementation of advanced monitoring technologies.
 - Governance and inter-institutional coordination.
 - Financial sustainability and resource mobilization.
- **Designing Key Performance Indicators (KPIs):** Develop KPIs to track progress across the plan's objectives, ensuring measurable and transparent outcomes. Examples include the percentage increase in technical personnel trained, improvements in water quality monitoring, and reductions in untreated wastewater.
- **Stakeholder engagement:** Continue active collaboration with government institutions, community organizations, academia, and international partners to ensure the plan's inclusivity and practicality.

10.3 Implementation of the National Capacity Development Plan

Once the National Capacity Development Plan is designed and approved, focus will shift to its implementation. This phase will include:

- **Pilot programs:** Initial implementation will focus on pilot projects in priority areas, testing proposed solutions such as decentralized wastewater treatment systems and community-driven monitoring initiatives. These pilots will provide valuable insights for scaling up.
- **Capacity building:** Training programs will be rolled out based on the National Capacity Development Plan's thematic areas. These programs will target technical personnel, decision-makers, and community representatives to address the identified capacity gaps comprehensively.
- **Resource mobilization:** Secure funding through national budgets, international grants, and partnerships with private sector actors to support the implementation of the plan.

10.4 High-level follow-up and evaluation

To ensure accountability and continuous improvement, a robust follow-up and evaluation framework will be established. This framework will include:

- **Regular monitoring and reporting:** Establish mechanisms for periodic progress reviews, using the KPIs defined in the National Capacity Development Plan . Reports will document achievements, challenges, and lessons learned.
- **High-Level review meetings:** Convene periodic meetings with senior government officials, international partners, and other stakeholders to review progress and address emerging challenges.
- **Adaptive management:** Incorporate feedback from monitoring and evaluation processes to refine strategies and actions, ensuring the plan remains responsive to changing conditions and priorities.

11 Bibliography

- UNESCO. (2006). *Evaluación de los recursos hídricos. Elaboración del balance hídrico integrado por cuencas hidrográficas. Documento Técnico No. 4*. UNESCO.
- AyA. (2015). *Política de Organización y Fortalecimiento de la Gestión Comunitaria de los Servicios de Agua Potable y Saneamiento*. San José: AyA.
- AyA, MINAE y MS. (2016). *Política Nacional de Saneamiento en Aguas Residuales 2016-2045*. San José: AyA-MINAE-MS.
- Borge y Asociados, & GIZ. (2022). *Gestión de lodos fecales en Liberia, Guanacaste y San Pablo, Heredia: Informe de encuesta*. San José: GIZ-Costa Rica.
- Ministerio de Planificación Nacional y Política Económica. (2023). *Estrategia de Metas Nacionales de los Objetivos de Desarrollo Sostenible*. San José, Costa Rica: MIDEPLAN-Costa Rica.
- Instituto Nacional de Estadística y Censos. (2024, Octubre 21). *Objetivos de Desarrollo Sostenible - Costa Rica*. Retrieved Octubre 21, 2024, from https://admin.inec.cr/sites/default/files/2024-05/siodsinec_2010-2023_v0_1.xlsx
- Instituto Costarricense de Acueductos y Alcantarillados. (2024, Febrero 29). *Informe de gestión 2023: Subgerencia de sistemas delegados*. Retrieved Octubre 23, 2024, from <https://www.aya.go.cr/ASADAS/Documents/Informe%20de%20Gesti%C3%B3n%202023.pdf>
- AyA. (2020, Febrero 12). *Diagnóstico Nacional de Entes Operadores (Levantamiento 2017-2020)*. Retrieved Octubre 23, 2024, from [https://www.aya.go.cr/ASADAS/Documents/Diagn%C3%B3stico%20Nacional%20de%20Entes%20Operadores%20\(Levantamiento%202017-2020\).pdf](https://www.aya.go.cr/ASADAS/Documents/Diagn%C3%B3stico%20Nacional%20de%20Entes%20Operadores%20(Levantamiento%202017-2020).pdf)
- Mora Alvarado, D., & Portuguese, C. (2021, Marzo 10). *Agua para consumo humano y saneamiento en Costa Rica al 2020*. Retrieved Octubre 23, 2024, from https://www.aya.go.cr/transparencialnst/rendicion_cuentas/PlanesEspecificosSectorial/Agua%20para%20consumo%20humano%20y%20saneamiento%20en%20Costa%20Rica%20al%202020_%20Brechas%20en%20tiempos%20de%20pandemia.pdf
- Instituto Costarricense de Acueductos y Alcantarillados (AyA). (2024, Octubre 28). *Informe de resultados de análisis de metabolitos de clorotalonil en agua de la zona norte de Cartago*. Retrieved Octubre 29, 2024, from AyA: <https://www.aya.go.cr/servicioCliente/InformeAnalisisClorotalonil/1%20Analisis%20Laboratorio%20Metabolitos%20Clorotalonil.pdf>
- Instituto Costarricense de Acueductos y Alcantarillados. (2022). *Presupuesto Ordinario 2023*. Retrieved 11 01, 2024, from https://www.aya.go.cr/transparencialnst/rendicion_cuentas/DocsPlanificacion/Presupuesto%20Ordinario%202023.pdf
- Rueda Morales, M., & Zambrano, D. (2018). *Análisis de la gestión del saneamiento en el asentamiento informal Bajo Los Anonos, San José, Costa Rica, desde una visión social, técnica e institucional*. 16(1). doi:[https://doi.org/10.15517/psm.v1i1.32031​:contentReference\[oaicite:0\]{index=0}](https://doi.org/10.15517/psm.v1i1.32031​:contentReference[oaicite:0]{index=0})
- Cordero Hernández, Y., & Mora Mora, E. (2017). *Monitoreo de la cobertura y uso de la tierra dentro de los límites del Humedal Nacional Térraba-Sierpe mediante el uso de técnicas de teledetección por la aplicación de imágenes satelitales y aéreas*. San José, Costa Rica: Universidad de Costa Rica.
- Banco Interamericano de Desarrollo. (2017). *Informe de terminación de proyecto: Programa de Desarrollo Sostenible de la Cuenca Binacional del Río Sixaola (1566/OC-CR)*. San José, Costa Rica: Banco Interamericano de Desarrollo. Retrieved from <https://www.iadb.org/document.cfm?id=EZSHARE-115719687-16>
- Benavides Vindas, S. (2020). El aporte del turismo a la economía costarricense: más de una década después. 25(57), 1-29. doi:<http://dx.doi.org/10.15359/ey.25-57.1>
- Banco Mundial aprueba crédito a Costa Rica por \$350 millones para infraestructuras y servicios resilientes al clima. (2024). *Delfino.cr*. Retrieved from <https://delfino.cr/2024/03/banco-mundial-aprueba-credito-a-costa-rica-por-350-millones-para-infraestructuras-y-servicios-resilientes-al-clima>
- Asociación ANAI. (2023). *Informe técnico de las jornadas participativas de biomonitoreo de ríos en la cuenca binacional del río Sixaola*. Retrieved November 10, 2024, from Biomonitoreo participativo de ríos con ANAI: https://www.sixaola.org/admin/documentos/archivos/Informe_jornadas_biomonitoreo_rios_Cuenca_Sixaola_2023.pdf

- Centeno Mora, Erick ; Cruz Zúñiga, Nidia; Vidal Rivera, Paola;. (2024, Junio). *Tratamiento de aguas residuales ordinarias en costa rica: perfil tecnológico y perspectivas de sostenibilidad*. Retrieved Noviembre 10, 2024, from SciELO:
https://www.scielo.sa.cr/scielo.php?script=sci_arttext&pid=S2215-26522024000100007
- May Grosser, S. (2024). Banco Mundial aprueba crédito a Costa Rica por \$350 millones para infraestructuras y servicios resilientes al clima. *Delfino.cr*. Retrieved from <https://delfino.cr/2024/03/banco-mundial-aprueba-credito-a-costa-rica-por-350-millones-para-infraestructuras-y-servicios-resilientes-al-clima>

