Water in urban areas: ensuring services, managing risks and retributing to nature

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Editorial

Dear colleagues,

It is with great pleasure that we present the eighth edition of the RésEAU Brief series, a medium to share SDC's learnings from water-related projects and programmes at the global level. This edition focuses on the **water challenges and opportunities in urban areas**.

The world's population is becoming increasingly urban, with 68% projected to live in cities by 2050, and nearly 90% of the 2.5 billion growth in urban populations occurring in Asia and Africa (UN DESA, 2019). Rapid urbanization has significantly increased the demand for water and sanitation services, but a limited capacity to keep up leaves a growing vulnerable population underserved. Between 2000 and 2017, urban population growth exceeded the number of people gaining basic water services in more than 50 countries, and basic sanitation services in over 70 countries (UNICEF, 2020). As a consequence, the number of city dwellers without safely managed drinking water has nearly doubled since 2000 (UN Water, 2021). Wastewater and faecal sludge infrastructure has also lagged far behind the rising demand (UN-Habitat, 2023). In many urban areas, key challenges include insufficient access to basic services in informal settlements, high prices and poor quality of water provided by private vendors (UN Water, n.d.).

Urban populations are especially vulnerable to climate change impacts due to their size and density, while the impermeable surfaces heighten the risks of flash floods and landslides (UN-Habitat, 2023). Concentrated populations and industries also contribute to water pollution. Coordinated efforts with other water users and sustainable water management solutions are thus needed to meet cities' diverse water needs.

Global targets under SDG 11 for inclusive, safe, resilient and sustainable cities and human settlements intersect here with SDG 6 on access to safe water and sanitation for all, as well as SDG 13, on reducing climate risks for urban water supply and sanitation systems. With the New Urban Agenda, cities committed to implementing these SDGs, including access to water and sanitation, sustainable water management, and resilience to water-related hazards in cities, emphasizing equity and multi-stakeholder governance (UN, 2017; UN-Habitat, 2023).

This RésEAU Brief highlights some of SDC's initiatives that support more sustainable urban water services and resource management relevant for the urban poor.

We wish you a good read and welcome your feedback and comments!

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Your ideas matter!

We are committed to addressing the topics that matter most to you. If there's a subject you would like to see covered in future briefs or if you have insights to contribute, please reach out to us!

1. Introduction

In urban areas, particularly in developing countries, the population living in extreme poverty is significantly rising. Globally, over 1 billion urban poor live and work in slums and informal settlements, where they face severe deprivation of basic services and marginalization (UN-Habitat, 2022). Addressing urbanization, and especially the water challenges faced by inhabitants and governments of these rapidly growing areas, is thus relevant for SDC's mandate of poverty reduction.

But what does intervening in urban or urbanizing spaces entail? Globally, there is no uniform definition of what constitutes a city or urban area, as each country applies its own criteria based on administrative, demographic, economic, or physical parameters[1]. Urban areas are generally classified as formal or informal settlements, peri-urban zones, or small towns (UNICEF, 2019). Urbanization refers to the increasing diversification and concentration of people, practices and facilities in dense spaces (Jansen, 2020). The boundaries between rural and urban spaces are increasingly blurred due to the diversity of territorial patterns and rural-urban linkages, giving way to the concept of a continuum. The **rural-urban continuum** highlights the deep interdependence of urban and rural spaces, particularly in areas like water and watershed management. Rather than a rigid urban-rural categorization, understanding this continuum and the diversity of local contexts, can help identify local needs and improve water access in urban slums (Chenal et al., 2023).

Urbanization poses **challenges**, such as strains on resources and infrastructure, but also offers **opportunities** to address poverty and enhance resilience to crises. Within Switzerland's international development cooperation, urban areas are a specific priority in SECO's mandate on urban development and (water and energy) infrastructure (cf. International Cooperation Strategy 2025-2028). The strategy also calls for low-carbon urban development under objective 3 on environmental friendly and climate resilient development (SDC, 2024). SDC's guidelines on water mention urbanization for its impact on water supply and management, and emphasize cross-sectoral approaches and integrating water considerations into urban planning (SDC, 2022).

Given growing urbanization, in 2022 SDC commissioned the Swiss Federal Technology Institute of Lausanne (EPFL) to explore its value-add in urbanising contexts and provide recommendations for integrating urbanization in its strategic and programmatic orientation. The study shows SDC has many projects addressing urbanisation by promoting inclusive, resilient cities with quality public water services, enhancing living conditions and resilience for vulnerable populations (Chenal et al., 2023).

This study suggests that SDC's added value in urbanizing contexts precisely resides in viewing urbanization as a dynamic **process along the rural-urban continuum** and multiscale governance. Complementing SECO's focus on infrastructure and private sector development, SDC enhances sub-national governance and addresses the ecological and social dimensions of urban systems (Chenal et al., 2023).

This RésEAU Brief highlights some of the experiences of SDC and its partners in tackling urban water challenges, offering insights into effective water management in rapidly growing urban areas.

1 Population thresholds for defining urban areas vary widely, ranging from 200 to 50,000 inhabitants (UN-Habitat, n.d). A list of different countries' definition of "urban" can be found here.

2. Keeping up water services in growing urban areas

Urbanization is synonymous with growing population, and consequently, accelerating needs for **basic service delivery**. While it can provide socio-economic opportunities, it also generates vulnerability, especially in **unplanned and informal settlements** (IPCC, 2022). These are characterized by overcrowding, poor housing conditions, and **limited access to basic services** such as clean water, sanitation and healthcare (Chenal et al., 2023).

Refugee camps face similar challenges. Although initially designed as temporary spaces, in practice, they can become a long-term residence, evolving into city-like environments. As informal settlements, they receive population influx and become points of concentration of people living in precarity and uncertainty, and requiring long term access to basic services (Jansen, 2020).

The informal nature of these two types of settlements means they are often overlooked in planning and decision-making processes, as they are often not recognized as legitimate communities. This exacerbates the lack of access to basic services in these spaces (Chenal et al., 2023). This section explores projects that address this **gap between demand and provision of basic services** to such vulnerable urban communities.

2.1 Drinking water services

The **Potable Water Management Programme** (PWMP, 2017-ongoing) focuses on improving access to safely managed water in **poor informal settlements** in Aswan, **Egypt**. The city's water supply and wastewater treatment infrastructure are in poor condition, causing heavy leakage, inefficient pumping and the degradation of water quality. The local Aswan Water and Sanitation Company (AWSC)'s revenues from fees are insufficient to cover the running costs, let alone any investment costs (SDC, 2024).

In addition to extending and rehabilitating the water **infrastructure**, SDC's EBP-implemented project improved the governance and **performance** of AWSC (SDC, 2024; SDC, 2024). Through tracking the physical losses, and comparing bills with household consumption, AWSC was able to increase its collection rate by 2%. Technical analysis combined with **awareness raising** campaigns with 2700 households helped to convince 37% of them to end illegal connections, install water meters and formalise water use with AWSC. The project also included awareness raising campaigns on water-related and environmental issues, disease prevention and hygiene promotion within communities and schools. This approach, combining capacity strengthening of the water utility, infrastructure improvement and community engagement, can serve as a model for nationwide replication (SDC, 2024).

Figure 1: Training session within a local community on how to fix the water tap to reduce water losses (**PWMP in Upper Egypt**, 2022) ©Mohanad Diab.

Figure 2. Refugee camp in the Bekaa Valley (**SDC**, n.d.). ©Diego Ibarra

The water supply operators in North **Lebanon's Bekaa Valley**, located at the border with Syria, face similar challenges, with poor infrastructure, unaccounted-for water use, and a demand surpassing system capacity due to the high refugee influx (SDC, n.d.). Displaced populations have accelerated urbanization in a city with a population of 1.5 million, including one-third Syrian refugees and 8,000 Palestinian (SDC, 2024).

SDC supported local authorities through the **Improved Water Resources Monitoring and Integrated Water Resources Management** project (2017-2022). This included the rehabilitation and metering at pumping stations, provision of tools and trainings for chlorination, and awareness raising campaigns on infrastructure maintenance and best practices for water consumption. The 50 largest water stations were digitally connected to a data centre enabling monitoring, strategic decision-making on infrastructure maintenance, and remote operation of pumps (SDC, n.d.; SDC, 2024). Some pumping stations are now solar powered, securing electricity supply from one to seven hours a day (SDC, 2024).

Beyond meeting the growing demand driven by urbanization, water systems must be **resilient** to ensure water supply in case of disasters. This is particularly vital for the city of **Lima** in **Peru**, facing risks of a major earthquake, which threatens water supply to 12 million people. SDC's **Emergency Water Supply in Lima** initiative (2023-ongoing) supports SEDAPAL, the city's water service provider, in strengthening its preparedness capacities and operationalizing of the Disaster Risk Management Plan. Through partnerships with government, academia and the private sector, the project improves technical, financial and logistical capacities, knowledge exchange and inter-sectoral coordination to effectively respond to and mitigate impacts in case of a major earthquake (SDC, n.d.).

Figure 3. Technicians from municipalities, SEDAPAL, **MINSA** and **INDECI** identify shelter locations, surroundings, routes, contingency resources and post-disaster systems to develop a district action plan (**Helvetas**, 2024). ©Aguas en Emergencias.

2.2 Sanitation services

Sanitation and hygiene are crucial for healthy cities and economic development, but achieving sustainable urban sanitation for all, particularly the vulnerable, remains challenging (Schertenleib et al., 2021). This section highlights innovative projects and tools addressing the complexities of urban sanitation.

In **Cox's Bazar, Bangladesh**, home to the world's largest refugee camp, the massive influx of refugees has placed considerable strain on basic services. While Rohingya refugee camps benefit from many large-scale WASH projects, host communities have faced reduced access to these services (Johannessen & Panday, 2020; SDC, 2021). Complementing the existing humanitarian engagement focused on the refugee population, SDC's **WASH support for Rohingya refugees and vulnerable local communities in Cox's Bazar district** (2018-2023) concentrated on helping host communities better manage the refugee crisis. It did so by strengthening Local Government Institutions and improving state-citizen and refugee-host relations. Key efforts included providing sanitation facilities like latrines and introducing participatory planning tools to local governments to ensure inclusive, people-centred WASH services (SDC, 2021). This approach demonstrates the **humanitarian-development nexus** in action, promoting long-term urban development.

Another vital aspect of sustainable urban sanitation for all is **rethinking waste management**. Rapid urbanization is increasing the demand for food, energy, and water, straining traditional resource flows. Many emerging countries and their capital cities, such as Lima (Peru) and Kampala (Uganda), struggle with managing household waste. Thus, promoting alternatives to classic waste disposal and recovering water, nutrients, and energy from waste in sanitation systems is becoming increasingly vital (Eawag, 2024).

In response, SDC launched the **Resource Recovery & and Safe Reuse (RR&R) project in Kampala and Lima** (2015-2020) to rethink sanitation systems and turn waste streams into physical and financial resource streams by ensuring and promoting their safe reuse (Eawag, 2024). This initiative aimed to make RR&R a viable business, while reducing public health and environmental risks, and paving the way for scaling up Sanitation Safety Planning globally (SDC, 2021). The project build capacity for RR&R businesses, strengthened legal and institutional frameworks, and fostered public-private collaboration to support the adoption of safe reuse practices. Both cities also undertook policy integration, training, and dissemination to encourage replication and sustainability (SDC, n.d; SDC, n.d.). The project succeeded in promoting faecal sludge management and composting market waste for example, and strengthening legal and institutional frameworks, thereby supporting the scaling of safe sanitation management. The remaining challenge was establishing financial mechanisms and incentives to engage small and medium enterprises in sanitation (Ecopsis, 2020).

Figure 4: Charles Kyamanywa, founder of SEACO, holds a faecal sludge briquette. SEACO (Sustainable Energy Answers Company Limited), supported by RRR Phase II, produces briquettes from biomass waste providing a compact, smokeless, long burning and low-cost source of energy suitable for households and enterprises. (**GIZ, Water for People, cewas**, n.d.) ©Water for People.

To address the challenges of sanitation in urban contexts, SDC has also contributed to the development of **tools for sanitation planning** in those specific environments. One such tool is SaniCHOICE, an open source webtool developed by Eawag, the Swiss Federal Institute of Aquatic Science and Technology. It helps select locally suitable sanitation technologies and systems. The tool can be used for both capacity development (e.g. in trainings and workshops) and as a decision support tool. It presents data on 90 technologies across 28 criteria, including geo-physical, technical, socio-cultural, legal, financial, capacity and management aspects. Users can then identify the most appropriate combination of technologies along the sanitation value chain and compare entire systems based on factors like resource recovery, investment level requirements, or system complexity (Spuhler et al., 2023).

SaniCHOICE helps in implementing the Citywide Inclusive Sanitation principles, which prioritize equity, public and environmental health, and coexistence of combinations of centralized and decentralized sanitation systems over merely building infrastructure (Spuhler et al., 2023; Eawag, n.d.; World Bank Group, n.d.).

SaniCHOICE can also be applied within participatory planning frameworks like **Community-Led Urban Environmental Sanitation Planning** (CLUES). CLUES is a multi-sector and multi-actor approach emphasizing the participation of all stakeholders from an early stage of the planning process. CLUES addresses planning for the entire sanitation value chain (toilet, storage, transport, treatment and disposal or re-use) and focuses on offering technology solutions for people living in poor and unplanned urban areas (Lüthi et al., 2011).

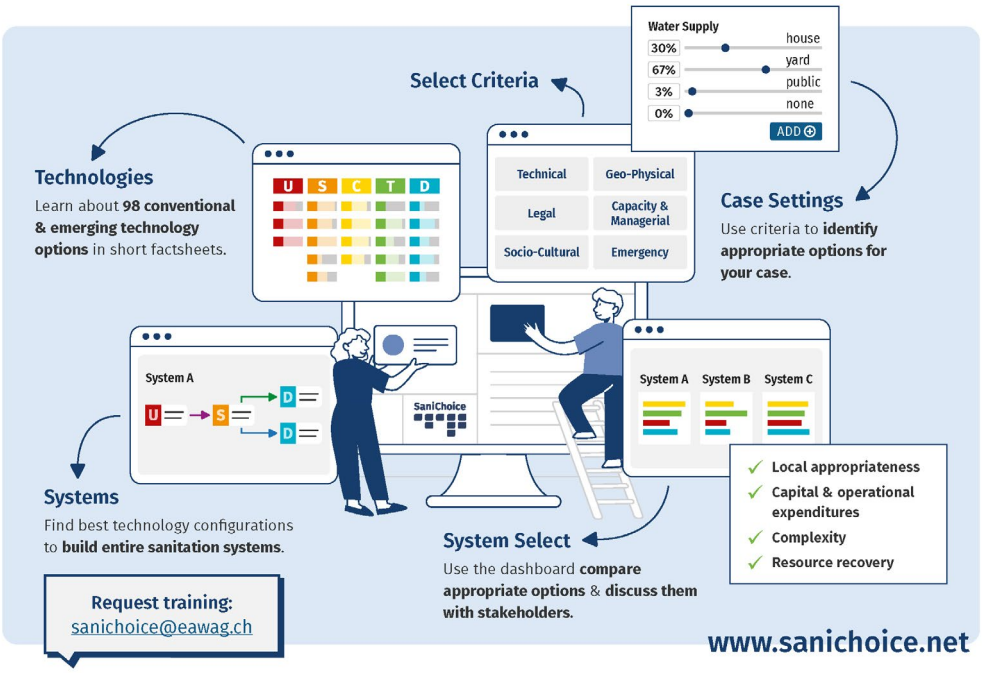

Figure 5: Overview of the functionalities of sanichoice.net (Spuhler et al., 2023).

2.3 Capacity strengthening at municipal level for improved services

As urbanization accelerates, the **role of local government actors** and the enhancement of **their management capacities** become increasingly critical to improving essential water and sanitation services.

The SDC supported **Gaza Vulnerable Communities Development Programme** (2017-2024) aimed to improve essential services in vulnerable Gaza Strip communities by enhancing **citizen participation** in decision making on local services. Through infrastructure projects like road rehabilitation and sewage network expansion, the program improved service delivery in seven municipalities. Local committees of citizens worked with municipal authorities to prioritize and fund projects based on community needs.

Citizens were trained in social accountability, leadership, human rights, and gender, while **local authorities** received training in good governance and civic participation (SDC, 2021). The program not only enhanced community participation but also fostered a culture of social accountability. As citizens actively participated in selecting and implementing projects that addressed their needs, they became more proactive in monitoring and maintaining local infrastructure, based on a greater sense of responsibility and ownership. Municipalities became more open to community involvement, strengthening the relationship between citizens and local authorities. Enhanced dialogue helped build trust and close communication gaps, ultimately leading to better service delivery and **more responsive** local governments (SDC, 2021).

In **Bolivia**, SDC's **municipal environmental management project** (2013-2023) aimed to improve solid waste management and wastewater treatment in small and intermediate fast-growing cities facing institutional and financial challenges (Helvetas, n.d.; SDC, 2021). Municipal governments, water and sanitation service providers and urban sanitation entities received support to align their functioning with local and national policies. In **wastewater**, 10 municipalities have constructed or rehabilitated treatment plants, which are now fully operational, including water quality monitoring and operation and maintenance (O&M) manuals. As a result, 75% of wastewater from sewage systems is now treated to quality standards. Ingredients for success included establishing regulations and planning systems, enhancing institutional procedures, leading to a working model for wastewater treatment tailored to small and intermediate cities (Helvetas, 2023). Additionally, municipal workers received training to assess needs, implement technical solutions, and initiate sustainable planning processes with a circular economy approach. The project also engaged in behaviour change, empowering residents to voice needs, adopt solid waste separation practices that allow recycling and contribute financially to the services (Helvetas, n.d.; Helvetas, 2023).

At regional level, the project supported the **twinning of the cities of Sucre (Bolivia) and Cuenca (Ecuador)**, to facilitate knowledge and experience exchange in water and environmental management among multiple stakeholders of each city, for mutual benefit. Lessons from this collaboration can guide future city twinning on municipal environmental management (Saldías, 2023).

Beyond the Sucre-Cuenca partnership, other **city-to-city partnerships** have emerged to foster knowledge and technology exchange, notably involving Swiss cities. Indeed, SDC supports the exploration of such collaborations, as the role of municipalities becomes more important in the context of growing urbanization. One of these involves the cities of **Lugano (Switzerland)** and **Hawassa (Ethiopia)**, which have engaged in a double twinning partnership (2022-2026) between their respective water services as well as universities. The city of Hawassa is experiencing exponential growth (4% per year) and its drinking water infrastructures lack the capacity to meet the rising demand. Thus, the stakeholders are working together to achieve SDG 6 in Hawassa, by promoting horizontal and mutual learning, the exchange of knowledge and technology, and the improvement of water management capacities (Solidarit'Eau Suisse, n.d.). A short video presenting the first activities of this partnership can be seen here.

This partnership was inspired by the successful collaboration between **Lausanne (Switzerland)** and **Nouakchott (Mauritania)**, which was launched in 2009 and involves now around 120 municipalities supporting both financially and technically (Ville de Lausanne, n.d.). These **public-public partnerships** started with an initial support from SDC of 0.5 million CHF over 5 years and are then supported through the Solidarit'Eau Suisse platform, which connects projects in the Global South with Swiss municipalities under the coordination of Blue Communities.

Figure 6. A delegation from the city of Cuenca (Ecuador) visiting the facilities of the local water utility ELAPAS in Sucre (Bolivia) to exchange experiences. (Helvetas, 2023)

3. From urban areas to water sources: how can urban areas contribute to resource sustainability?

While the previous section focused on ensuring essential water and sanitation services within urban areas, urban areas also have a crucial role in sustaining the natural resources they depend on. By playing their part in watershed governance and contributing to financial mechanisms for watershed conservation, urban water users can actively contribute to long-term availability of water and the resilience of services to climate change.

3.1 Considering the climate in water service delivery

Cities use 66% of global energy and emit 70% of global greenhouse gases (GHG). India is the fourth-largest emitter globally, and its rapid urbanization in more than 4000 cities, makes climate action essential. Indian cities are under pressure by rapidly growing urban demands for energy, infrastructure, services, and the growing need to adapt to the effects of climate change.

Through the **Capacity Building for Low Carbon and Climate Resilient City Development in India (CapaCITIES)** project (2014-2026), SDC supports sustainable urbanization efforts (SDC, 2025; CapaCITIES, n.d.).

During its first phase, the project focused on reducing GHG emissions and improving climate resilience in in eight partner cities and two states. Building on this, the second phase integrated climate action in **urban planning** processes, fostering innovative financing mechanisms and climate-resilient infrastructure, and scaling through capacity building and knowledge-sharing at the city, state, and national levels (CapaCITIES, 2025). In the current exit phase, the project seeks to institutionalize Net-Zero Climate Resilient City Action Plans (SDC, 2025).

Thematically, CapaCITIES targets six key sectors, one of which is **water and wastewater management**. Water resources in Indian cities are under severe strain due to high demand from dense populations. Moreover, about 80% of the water supply returns to the ecosystem as untreated wastewater (CapaCITIES, 2025). The project addressed these issues through two water management initiatives in the cities of Rajkot and Siliguri.

In **Siliguri**, leaks in the water distribution system were traditionally detected by surface puddles, that formed after underground leaks saturated the soil. This detection method led to water and energy losses and inefficient trial-and-error repairs. Through CapaCITIES, the Siliguri Municipal Corporation received two **acoustic leak detection** machines, allowing precise identification of leaks before surface puddles form, reducing water and energy losses, and associated GHG emissions. Respective trainings for engineers and officials further strengthened local capacity to manage water more efficiently (CapaCITIES, n.d.; CapaCITIES, 2025).

In the arid city of **Rajkot**, reliance on water sources as distant as 700 km away results in high energy use and GHG emissions. Water supply alone consumes 60% of municipal electricity and accounts for 57% of emissions. The project installed **groundwater recharge structures** at five locations, to safely recharge groundwater draining off excess rainwater. They enhance local water availability, reduce the energy needed to pump water over long distances, and limit urban flooding. These initiatives have demonstrated potential for citywide scaling, addressing both water shortages and climate goals (CapaCITIES, n.d.).

These efforts in Rajkot highlight the importance of integrating urban climate resilience in water supply enhancement. Approaches such as **sponge cities** and **water-wise urban development for aquifer recharge**, discussed in SDC's Trend Observatory on Water (Trend Sheets #3 and #6), are innovative ways to increase water availability, reduce pressures on municipal systems, and mitigate flooding risks in urban areas (Kramer, 2022; Kramer & Kreutzmann, 2021). These strategies align with the broader goals of sustainable and climate-resilient water management.

3.2 Integrated water and watershed management for water security and climate resilience

In **Bolivia**, extreme weather events like droughts and floods are becoming more frequent due to rising temperatures and irregular rainfall, while mining discharges heavily pollute water sources. Limited water availability also drives social conflicts, given its critical role in agriculture, domestic use, and industrial-mining activities (Helvetas, 2025).

Since 2006, Bolivia's National Watershed Plan guides the country's integrated watershed and water resource management (SDC, 2021). The **Gestion Integral del Agua** project (2010-2022) aims to strengthen this **public policy**, ensuring water security and climate resilience. It seeks to develop institutional synergies for more public investment in the sector; and equip public, private and social actors with knowledge and tools to manage water resources effectively (SDC, 2024). Ultimately, the project seeks to improve living conditions of the vulnerable populations in rural areas and **small urban centres** of the valleys and Altiplano, while enhancing their climate resilience (SDC, 2021).

The project focusses on two strategic basins: the **Suches** River in La Paz and the Cotagaita River in Potosí, both heavily impacted by mining activities. Actions in the Suches basin align with binational agreements between Bolivia and Peru to reduce pollution affecting Lake Titicaca, while efforts in Cotagaita influence the Pilcomayo basin, which spans Bolivia, Paraguay, and Argentina (SDC, 2022; Helvetas, 2025).

In these basins, the project benefits over 8'000 families through **practices** such as water harvesting, environmental control, hydro-meteorological risk management, and improved drinking water quality (Zubieta & Portugal, 2022). Coordinated action with various donors allows the consolidation of **public policy** on water and watershed management, reflecting these local practices and positioning water management as a state priority.

The project promotes **territorial planning with a basin approach**, involving participatory diagnostics to address local watershed issues and design action plans. **Inter-institutional platforms** connect authorities, technicians, and local actors, facilitating collaborative decision-making and knowledge exchange. These platforms and planning tools guide municipal planning, specifically through the development of Integrated Territorial Development Plans for (peri-) urban spaces. By integrating **diverse perspectives**, these platforms enhance watershed management and support sustainable territorial development.

The project also uses creative mediums like theatre, community radio, and school programs to raise **awareness**, share information and highlight successful practices to integrate water management into public agendas. It tackles **tensions between mining activities and water use** with conflict-sensitive management, creating dialogue spaces, and with measures such as acid mine drainage treatment, water quality monitoring, and closed-circuit water systems to mitigate environmental harm (Zubieta & Portugal, 2022).

Figure 7. Blanco River, Cotagaita, Potosí. (Helvetas, 2025) ©Mauricio Panozo.

3.3 Safeguarding water and ecosystems through financial compensation

Andean forests are critical to the water security of millions of people. They regulate water supplies for over 70 million people, offering essential ecosystem services such as water production, regulation, and sedimentation control (SDC, 2021). However, these ecosystems face increasing pressures from deforestation and climate change, which threaten their ability to regulate water flows. Future changes in rainfall patterns, land use changes and loss of glacier volumes will disrupt seasonal hydrology, intensifying flow variability and water scarcity in downstream regions. Andean forests also store carbon in both the trees and soil, and the pressures diminish their capacity to provide these critical climate regulation services (Bosques Andinos, 2015).

The Andean Forest and Climate Change Programme (2011-2022) addresses the need for urgent conservation and restoration efforts. These include innovative **financing mechanisms** that incentivize forest conservation and restoration, such as those developed in Antioquia (Colombia), Apurimac (Peru), and Pichincha (Ecuador). The program shows that urban areas can play a key role in supporting resource sustainability through urban investments in ecosystem protection.

For instance, in **Colombia**, the $BanCO_2$ mechanism facilitates compensation and payments for environmental services to families, farmers, and communities in peri-urban and rural areas. These actors receive economic incentives and technical support for implementing conservation practices and sustainable production methods. Resources come from both public and private sources, including the Metropolitan area of the Aburrá Valley.
In **Ecuador**, the Metropolitan Municipality of Quito received support to design a payment mechanism aimed at mitigating the carbon footprint of the city's airport. This initiative creates incentives for the sustainable management of farms in the northwest of Pichincha, linking urban emission reduction with rural land use practices.

In **Peru**, the Regenera platform collects national and international funds from individuals and companies to support community-led conservation and restoration initiatives, particularly focused on carbon capture. Since 2020, the rural community of Kiuñalla in Apurímac has used this mechanism to continue restoration activities that enhance water-related ecosystem services, guided by a communal life plan.

The project also supports a compensation scheme under the Peruvian government's MERESE policy (Compensation Mechanism for Ecosystem Services) targeting water-related ecosystem services in a watershed of the Mariño river, which supplies water to the city of Abancay. It is implemented with active community participation, with the project providing technical support for hydrological monitoring (Ruiz, Contreras & Briceño, 2021).

Such initiatives illustrate how urban entities can foster conservation and restoration of ecosystems that directly impact the long-term availability of water for the water services they provide.

Figure 8. Usphaq'ocha Lake in the Ampay National Sanctuary, in Apurimac, north of the city of Abancay, Peru (**Andean Forests Peru**, n.d.) ©Nicolas Villaume

3.4 Understanding urban water flows with the Water Flow Diagram

Managing urban water effectively requires a clear **understanding by all stakeholders** of how water enters, moves through, and exits a system. The **Water Flow Diagram** (WFD) is a tool to visualize urban water flows, quantifying sources, uses, losses and discharge pathways within a city, especially relevant for advocacy and communication purposes. The flows are represented using Sankey diagrams, in which the width of each arrow is proportional to the water volume, distinguishing between appropriate and problematic water flows (Bouman et al., 2024).

The WFD visualizes data from multiple sources to provide a comprehensive overview of a **city's water balance**. This visual approach illustrates the circularity of water and helps highlight key issues linked to surface and groundwater withdrawals, water losses, and untreated wastewater discharge, making complex water management challenges easier to interpret and compare across cities.

A WFD is based on participatory processes which trigger a **dialogue** around water management and facilitate concerted negotiations toward solutions, providing a basis for improving water management strategies (Bouman et al., 2024).

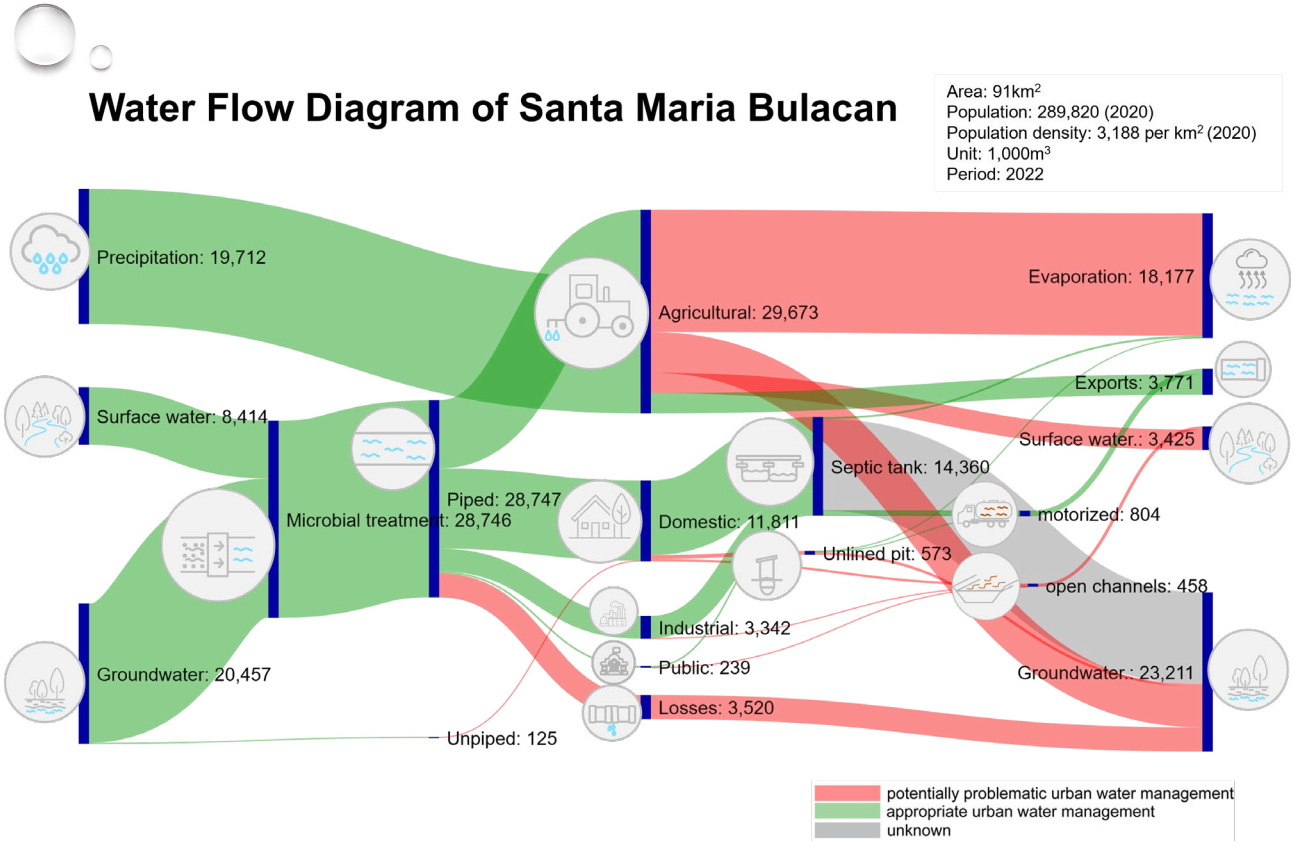

Figure 9. Water Flow Diagram of Santa Maria Bulacan, Philippines: the flows show the origin of the water supply of the municipality, the distribution in different uses, and the destination after use in human activities (**Bouman et al.**, 2024).

4. Lessons in a nutshell

Urbanization is intensifying water challenges, and SDC's urban water-related projects offer valuable lessons for more sustainable water management in urban areas facing pressures from population growth and climate change.

For **drinking water services**, ensuring their **financial sustainability** requires community engagement, consumption optimization, and infrastructure improvements. Raising **awareness** about consumption and maintenance, combined with **technological innovation** for data collection, monitoring, and resource management, drives improved efficiency. Effective planning for **disaster risk management** is also vital to safeguard populations during emergencies.

In **urban sanitation**, addressing inequalities, such as in refugee contexts, involves strengthening institutions and **balancing access for all**. Innovations like turning waste streams into physical and financial resources through **safe reuse** shows the potential of rethinking waste management. **Tools** for selecting appropriate technologies and participatory planning, like SaniCHOICE and CLUES, help navigate urban complexities effectively.

Strengthening **governance** and **management capacities** is essential as cities grow. Capacity building on participatory governance improves dialogue, service delivery, and responsiveness. Enhancing institutional capacities for **regulating and planning**, of wastewater and solid waste management leads to better urban services. **Collaborations between cities**, such as those between Sucre and Cuenca or Lugano and Hawassa, further amplify these efforts by sharing **best practices**.

Beyond urban service delivery, **urban areas can also support the ecosystems and water sources they rely on** by incorporating climate resilience, watershed management, and conservation financing into their urban strategies.

Climate considerations in urban water management are essential, as seen in India's CapaCITIES project, where groundwater is recharged and leak detection technologies reduce water loss, energy consumption, and GHG emissions. Focusing on policy implementation, **watershed-based territorial planning**, and **participatory governance** strengthens water security, as demonstrated in Bolivia. **Financial mechanisms for ecosystem conservation** illustrate how urban investment can incentivize rural communities to protect water-regulating forest areas.

Finally, data-driven water management tools, like the Water Flow Diagram, enable cities to **visualize** and address inefficiencies, facilitating **informed decision-making** and stakeholder engagement.

These lessons reinforce the importance of viewing urbanization as a **dynamic** process along the **rural-urban continuum**, where cities and their surrounding landscapes must be managed as interconnected systems. By integrating these approaches, cities can not only secure their **water supplies** but also **contribute to the resilience of the ecosystems** that sustain them.

Resources

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Further reading

Get an overview of approaches and implementation tools in urban sanitation and hygiene that have evolved over time and tested in practice with A Sanitation Journey – Principles, Approaches & Tools for Urban Sanitation, by SuSanA and Eawag.

Learn how to effectively engage communities in planning and decision-making processes for water and sanitation projects with the CLUES Guidelines. Comprehensive guidelines for decision-makers and a toolbox are available on this page.

Explore the SaniCHOICE webtool to identify and select the most suitable sanitation technologies for various contexts. The SaniCHOICE practitioners' guide on applying the tool in strategic planning process is available here. A user manual on how to use the tool as well as training packages are available on https://www.sanichoice.net/.

Download the water flow diagram templates and guide on this page to make your own water flow diagram (WFD) and gain insights into your city's water flows and their implications for sustainable water management. Videos presenting the application of the WFD in Rio Pardo de Minas can be seen here and here.

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View over the city of Quito, Ecuador
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