



EUROPEAN POLICY BRIEF



DESAFIO

Democratisation of Water
and Sanitation Governance by
Means of Socio-Technical Innovation

DEMOCRATISATION OF WATER AND SANITATION GOVERNANCE BY MEANS OF SOCIO-TECHNICAL INNOVATION

Second Policy Brief

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This policy brief addresses one of the central questions of our research: **what conditions, factors and processes facilitate the emergence of socio-technical innovations in the water and sanitation sector?** It draws on the empirical evidence and lessons learned from two experiences of socio-technical innovations implemented in Brazil and Colombia. The brief also presents some policy implications and recommendations derived from the key findings of these two cases.

INTRODUCTION

The main challenges facing the international community regarding the provision of essential Water and Sanitation Services (WSS) are not merely technical or environmental, but are rather **grounded on and conditioned by** economic, socio-political, cultural and policy-institutional processes. Therefore, what is required is the development of appropriate and innovative socio-technical interventions, grounded on the **principles of substantive democracy and citizenship**, to **facilitate the involvement of users** in the identification of their problems and **in the design, implementation and monitoring of socio-technical solutions**. This is needed to enable the relevant actors, and most particularly local communities and governments, to achieve efficacy and effectiveness, as well as efficiency, in the organisation of universally available and safe essential WSS.

DESAFIO examined [ten cases](#) that cover a wide range of socio-technical innovations. These include innovations to supply safe water to small rural communities in Colombia and Brazil and the provision of sewerage in Brazilian favelas located at the heart of large metropolitan areas. Some of our cases have **strong public-sector intervention** while in others **local communities** have much of the **responsibility for managing and operating the systems**. In this brief, we draw lessons from two case studies: the [Condominial Sanitation system implemented in Recife, Brazil](#), and the [community-managed Multi-stage Filtration water system introduced in Mondomo, Colombia](#).

The evidence suggests that significant international debates and arguments that prevailed in the 1980s and 1990s had an influence in the emergence of the socio-technical innovations considered in this brief.

In the **international domain**, the debate was characterized by a combination of economic, political, and technical arguments that fitted the emergence of socio-technical innovations to deliver basic services to poor, vulnerable communities. Overall, these arguments were strongly marked by the notion that governments should transfer most if not all responsibilities for the provision of basic services to other actors, including the vulnerable communities themselves. In particular, since the 1980s there was an increasing influence of:

- **neoconservative arguments for the transference of responsibility from the state to its citizens**, placing greater emphasis on the “responsibilities” of citizenship and tending to restrict, if not even eliminate, pre-existing notions of “rights”, particularly social rights to such goods and services like basic health, education, housing, or water and sanitation;
- **neoliberal positions**, largely compatible with the neoconservative creed, **arguing that the provision of basic services should be transferred from the state to other actors**, ideally transforming these services into commercial goods delivered by private companies. Where this was not feasible (for example, because of lack of business interest), it was argued that these services should be transferred to NGOs, religious organisations, end users, or a combination of these, among other alternatives;
- **powerful arguments for the adoption of simplified and low-cost technologies and solutions**, especially for the extension of services infrastructure to the unserved poor.

The experience of Condominial Sanitation in Recife, Brazil

The Condominial Sanitation (CS) system was invented in Brazil in the 1980s and was introduced in Recife in 1993, seeking to provide an urgent solution to the lack of sewerage collection and treatment that affected around 70% of the city’s households. This intervention was focused on low-income neighbourhoods known as Special Zones of Social Interest (SZSI). SZSIs are areas designated by municipal law as priority targets for public policies seeking to eliminate extreme poverty and destitution. [Our case study](#) examined the experience of the Mustardinha SZSI during the period 1993-2000. The Mustardinha SZSI was one of two SZSIs in the city to be given top priority in the implementation of the CS, among other issues owing to the high rates of water-related infections, particularly lymphatic filariasis, recorded there. The SZSI had a population of 13,000 people in 1991, which increased to just under 19,000 by the end of the period of the study (2000).

The CS system as an emergent socio-technical innovation

Regarding technical aspects, the CS model **departed from the conventional approach of large-scale networked systems**, as it is based on small networks where **the unit is a block of houses rather than whole neighbourhoods**. The small-block-bound networks are in turn interconnected, and the sewage collected is pumped to treatment plants. The smaller dimension of the network allows a closer control of potential problems, like blockages, thus reducing the scale and impact of potential failures of the system. Moreover, the small scale of the system is also related to the diameter of the pipes (100mm instead of 150mm of the conventional systems), which also reduces significantly the depth of the digging. Finally, in contrast with conventional systems where the pipelines are located in the street, in the CS system the pipes could be also located within the private property of the users, at either the front or the back of the houses, **which allows discounts of up to 80% of the tariff**.

From a social and political perspective, the CS system also constituted an important innovation, **challenging established practices** and **introducing active user involvement** in the management of the system. In the words of Eng. José Carlos Melo, designer of the system, CS was a fundamentally political project.

The evidence suggests that the international environment considered earlier combined with the particularities of the local and national socio-political context in ways that fostered the emergence of the CS system in Brazil in the early 1980s. At the **national level**, Brazil was emerging from a long dictatorship that lasted from 1964 to 1985 and the return to democratic rule was strongly marked by **widespread popular participation** to deepen the democratic process and efforts to **strengthen local authorities**. In this context,

- A new Constitution passed in 1988 became a landmark, among other things by vesting **responsibility for basic services on municipalities** and;
- This was also a time of **financial crisis** in the country, and according to official government estimates, the CS system would allow savings of up to 70% of the costs of conventional sanitation systems. This became the **major reason** behind the decision to introduce the CS system in Brazil.

At the **municipal level** in Recife, the confluence of political processes and the system's innovative social and technical aspects help to explain the introduction of CS. In particular:

- Eng. Melo became Vice-mayor of Recife in 1993, and his system was adopted as a **municipal public policy** the same year.
- This was a time of high social mobilisation in the country, and Recife was one of the key centres of this mobilisation. **The community of the Mustardinha SZSI had a long-tradition of social and political mobilization for the improvement of living conditions**, and was very active at the time.



Figure 1. Mobilization for basic sanitation in Mustardinha SZSI, 1991.
Source: Mustardinha Community Archives.

In addition, a main feature of the CS system connected readily with the social and political environment of the time, as it entailed a **very active participation of the beneficiary population in some aspects of the implementation and maintenance** of the system, especially

- a “Condominial Agreement” that had to be signed by each member of the beneficiary group (a condominium composed normally of a block or blocks of houses) and the municipality, whereby the beneficiaries accepted to contribute

towards the cost of the construction (the contribution would be monetary or through the provision of materials, labour, etc.); and maintain the system over time (e.g. cleaning pipe blockages, etc.);

- Thus, **formally**, the concept of “community participation” in the CS system **was restricted to these aspects of self-help and voluntary work** expected from the users.
- In practice, from our interviews with officers who were in charge of the system’s implementation, we know that **much more meaningful forms of engagement and participation took place** during the implementation of the CS in Recife. However, this **depended largely on the local situation** and on the **particular configuration of the team** in charge of the implementation locally. **Substantive citizen participation was not an intrinsic component and much less a requirement of the CS system.**

The CS system has been introduced in many Brazilian cities, including the capital Brasilia, and has been replicated worldwide. To read more about the experience of Recife you can request copies of our research reports (contact the [Project Secretariat](#)).

The experience of the community-based water association of Mondomo, Colombia

Mondomo is a rural community of 3,400 people in the municipality of Santander de Quilichao in the Cauca Valley, Colombia. Historically, there has been a **marked inequality** in the provision of basic WSS between urban and rural and peri-urban areas in Colombia. In 1997, around the time of the intervention studied in our project, the average national coverage for water supply and sanitation was 98% in urban areas but only **65%** and **15%**, respectively, for rural areas. This inequality was evident in Mondomo where in the early 1990s the water supply system presented serious deficiencies. Although the official coverage was 96.3%, **the service was intermittent** and the **quality of the water was compromised** by faecal contamination. In addition, there was a high level of **leakage owing to the bad condition of the water network**, there was **no culture of efficient water use** and the **rate of non-payment was around 45%**. The system lacked adequate administration, was poorly operated, and did not receive institutional support from the municipal utility company, EMQUILICHAO. In addition, tariffs were inadequate and the revenue was insufficient for the financial sustainability of the system, which was in **permanent deficit**. In 1994, a defining event took place: Mondomo suffered an **earthquake that measured 6.4 in the Richter scale** on 6 June. The earthquake caused structural damage to 20% of the town’s houses and destroyed the water supply infrastructure. **The disaster would trigger significant changes** to this situation.

The community-managed Multi-Stage Filtration System as an emergent socio-technical innovation

The evidence suggests that a combination of political, socio-cultural, and economic factors, catalysed by a natural disaster, set the stage for the emergence of Mondomo’s socio-technical innovation in the supply and treatment of drinking water. This happened within the **framework set by an international environment** that favoured **the retreat of the public sector** in the provision of goods and services and the **transfer of responsibility to the communities themselves**. As part of a general trend promoted by the international financial institutions, in 1987 Colombia introduced the decentralization of WSS. This was reinforced by the new National Constitution passed in 1991, which promoted citizen participation in the monitoring of public management. These processes provided an **enabling environment for the emergence of autonomous, community-based organisations for the management of essential basic services**.

Simultaneously, scientists at the CINARA Institute of the University of the Valley (UNIVALLE) in Cali (DESAFIO’s partner in Colombia), were working on the Multi-Stage Filtration System (MSFS), a technological innovation developed with support from the Dutch government. Among its key

characteristics, the MSFS can deliver high quality drinking water with a minimum cost, thanks to the use of local materials and very low consumption of chemicals and energy. Members of the user community are trained to manage the system, which is relatively simple to maintain. The MSFS became the basis of a public programme introduced in 1991: the Technology Transfer Programme for Water Supply Systems in the Republic of Colombia (TRANSCOL). The implementation of TRANSCOL involved local, regional and national authorities with the active participation of beneficiary communities in all stages of the process. This emphasis on community participation was based on the premise that the success of the innovation depended on the **communities' appropriation of the technology**, thus the programme aimed to boost citizens' capabilities to make concerted decisions, and to monitor and control the activities.

After the 1994 earthquake, a **partnership between local, regional, national and international actors from the private, public, and civil society sectors** was established to channel economic resources to the affected zones. Mondomo, which had a long-standing tradition of participation in local development projects and strong leaders, was one of the last communities to receive funding to rebuild its infrastructure after the earthquake. When the offer of help arrived, the community **unanimously decided that the priority should be to rebuild the water supply system**. The public sector provided 85% of the funding needed to build the water system and the treatment plant. The treatment plant was based on the MSFS and the CINARA Institute was trusted with the role of process facilitator.



Figure 2. The community-managed water treatment plant in Mondomo.
Source: DESAFIO's team in UNIVALLE, Colombia.

The plant was finally built and has supplied potable water 24 hours a day for the past 20 years. The management of the system is the responsibility of Mondomo's Association of Water Users. In 1998, the Inter-American Development Bank (IADB) awarded the community with the "Partnerships for Overcoming Poverty" Prize for these efforts.

This brief is not concerned with the long-term results of the innovations studied, which will be considered in forthcoming editions of the DESAFIO Brief Series (interested readers can get access to the full project reports by contacting the [Project Secretariat](#)). Here we **focused on some of the lessons learned about the conditions, factors and processes that facilitate the emergence of socio-technical innovations in the WSS sector.**

Providing safe, sustainable basic WSS to vulnerable communities continues to be largely overdue in most developing countries. To deliver these basic services within a democratic framework that prioritizes social efficacy and equality, accountability, and meaningful citizen involvement and participation in monitoring policy decision-making and implementation is more daunting and remains a largely elusive target.

In recent decades, a diversity of socio-technical innovations have been tried to find suitable solutions to these problems. What are the key conditions, factors and processes that facilitate the emergence of the socio-technical innovations identified in the research?

The **contextual conditions**. In both cases studied, the context is a fundamental aspect to explain the emergence of the innovations.

- The **international context**. The 1980s, when these innovations emerged, was a period of acute international financial crisis, which gave rise to embittered debates about the capacity of the state to live up to its responsibilities in providing essential goods and services. The period was heavily influenced by **three lines of argumentation** about the delivery of basic public services:
 - The **neoconservative strategy** adopted in the 1980s in the US and Great Britain **cancelling the notion of social rights** to goods and services like basic health, education, housing, or water and sanitation. This implied a **significantly reduced role of governments** and **increasing responsibilities for common people** in the provision of basic public services;
 - The **neoliberal policies** that pushed de- and re-regulation, liberalization, and privatization of essential services in areas that were attractive to private investors. These policies were supplemented, sometimes preceded, by decentralization of essential services, **transferring responsibility from central to regional and local governments without a corresponding decentralization of adequate funding to deliver the services**. In the case of poor, vulnerable communities, unattractive to private investors, these policies promoted a greater involvement of NGOs, religious organisations, end users, or a combination of these, in the organization and running of essential services;
 - Calls for the adoption of **low-cost technologies and solutions**, especially to achieve the extension of services infrastructure to the unserved poor.
- The **national and local context**. Despite significant differences, the context of the emergence of the innovations in Brazil and Colombia had significant, comparable characteristics.
 - **Very high inequality in the access to safe essential WSS**, both between and within urban and rural areas. Despite officially high rates of coverage in urban areas, the quality of the services was poor.
 - **Prevalence of water-related diseases** in vulnerable communities affected by unsafe or inexistent WSS.
 - **Ground-breaking institutional changes** resulting from the political process that provided new avenues for meaningful citizen participation and fostered the democratisation process, in particular
 - **The 1988 National Constitution in Brazil**, passed shortly after the country's return to democratic rule in 1985 after two decades of dictatorship. The Constitution strengthened the role of local authorities in the provision of basic services.
 - **The 1987 decentralization policies and the 1991 National Constitution in Colombia**, which fostered citizen participation in monitoring public management.

- In the case of Brazil, this was a period of **high social mobilization** at all levels in the aftermath of the return to democratic rule in 1985. The improvement of living conditions was a core demand of the mobilizations, and the CS model offered a fitting alternative to solve the lack of WSS in vulnerable communities.
- **A strong record of pre-existing community organization and leadership.** In the two communities studied, there was a long track record of community organization, with strong, legitimate leaders. This aspect was crucial for the introduction of policy interventions that required committed and sustained user involvement in developing and running the systems.

Specific factors and triggers. In addition to the crucial contextual factors, the emergence of socio-technical innovations was marked by specific factors and triggers, often particular to the individual cases. These included a range of social, political, natural, and other factors and drivers.

- **In the Mustardinha SZSI**, a strong tradition of social and political engagement of the community with a broad range of political parties and progressive sectors of the Catholic Church helped to develop a broad alliance that became fundamental for the implementation of CS in the community.
- The election of Eng. Melo, the designer of the CS system, to the post of Vice-Mayor of Recife in 1993 became a key trigger for the adoption of CS as a citywide policy targeted primarily to tackle the lack of WSS in poor areas. The implementation of the CS system became the responsibility of the municipal authority.
- The municipal team in charge of the intervention was composed by experts who had a track record of implementing participatory policies in poor communities in the context of the post-dictatorship democratisation process.
- **In the case of Mondomo**, an international collaboration between the university (UNIVALLE) and the Dutch government led to the development of the low-cost technology for water treatment suitable for the social and environmental conditions of the region, which became a key component of the intervention.
- The 1994 earthquake that destroyed the water supply infrastructure in the town eventually became a key factor, as it helped the community to attract the attention of a broad alliance of public, private and social actors.
- Despite the prevailing framework of the time that supported a retreat of the state from the provision of WSS, there was strong government support that provided 85% of the funding needed to build the water system and the treatment plant.

Community participation was an essential factor in the emergence of these innovative experiences. However,

- “Participation” was often **restricted to self-help or to the provision of funding, materials, and labour**, without much if any involvement in decision making or monitoring of the services.
- For example, the concept of “social participation” adopted by the Condominial Sanitation system was restricted to aspects of self-help and voluntary work expected from the users. Therefore, **substantive participation was not an intrinsic component** and much less a requirement of CS.
- In Mondomo, “participation” seemed to be more meaningful, **involving decision-making, monitoring, and other important functions for the community**, but there are questions about its sustainability in the mid and long term.
- From the available evidence in the international literature, we know that **“participation” tends to weaken over time** for a number of reasons, including changes in the political system that restrict opportunities for participation, lack of support from the relevant authorities, decay and stagnation of the systems leading to people’s distrust and loss of incentives for participation, etc.
- Also, a legitimate question posed by many is why **the wealthier population is not required to “participate”** (they get networked WSS fully managed by utilities), while the

poor are asked to “participate” if they want to have access to these basic services. This poses an unsolved ethical and political dilemma.

- Substantive democratisation in the access, government and management of essential public services such as WSS requires social participation and control over the decision-making process by common citizens and users. This includes the scrutiny and democratic control of decisions about how water and essential services such as WSS **are governed, managed, and distributed, by whom, for whose benefit**, etc. This is **seldom available to local communities and common citizens**.
- The extension of safe essential WSS to the unserved population must rely on **heavy state involvement, and particularly on heavy public funding**. The state must provide strong and continued support to make these innovations possible, and more importantly, sustainable and replicable. It is unfeasible and undemocratic to require poor, vulnerable communities to become self-sufficient in taking responsibility for the provision of safe WSS. There must be a **balance between the promotion of autonomy and substantive citizenship** in the communities and the **exercise of state responsibility** for guaranteeing the provision of essential services.

DESAFIO's guiding concept is to contribute towards tackling what is arguably one of the major challenges facing Latin American countries in the twenty-first century: **eradicating structural social inequality** in the access to essential water and sanitation services (WSS). Our main tenet is that achieving the development goals set by the international community in relation to the reduction of poverty levels and enhancing environmental sustainability, crucially depends on **harnessing existing and developing new appropriate and innovative socio-technical solutions** for the provision of safe WSS.

DESAFIO aims to respond to the following questions: **How** can we harness existing and develop new socio-technical innovations in order to **change policies**, to **develop strategies and practical interventions**, and to **enhance policy learning** for tackling unacceptable inequalities and injustice in the access to essential WSS? What **conditions, factors and processes** facilitate the **emergence** of socio-technical innovations in this sector? What are the **critical requirements** to make successful socio-technical innovations **sustainable and replicable**? What are the **obstacles** to their sustainability and replication?

We argue that the main challenges facing the international community in this area are not merely technical or environmental, but are rather **grounded on and conditioned by** economic, socio-political, cultural and policy-institutional processes. Therefore, what is required is the development of appropriate and innovative socio-technical interventions, grounded on the **principles of substantive democracy and citizenship**, to facilitate the involvement of users in the identification of their problems and in the design, implementation and monitoring of socio-technical solutions. This is needed to enable the relevant actors, and most particularly local communities and governments, to achieve **efficacy and effectiveness, as well as efficiency**, in the organisation of universally available and safe essential WSS.

The overarching objective of our project is **assessing existing experiences and developing new strategies** that bring about sustainable, appropriate, and innovative socio-technical solutions to foster economic and social development through **social transformation in vulnerable communities**, particularly with reference to access to safe WSS. We seek to achieve this through **research and networking that actively engages** beneficiary communities, practitioners, local authorities, and other relevant actors in their planning, design, assessment, implementation, monitoring, validation, and diffusion.

For this reason, DESAFIO's methodological approach is based on the **interdisciplinary coordination** between natural, social and technical scientists. It also adopts a **transdisciplinary approach**, developing a close interaction with non-academic actors who participate as research partners and collaborators in the production and validation of knowledge. Our project assesses recent and current experiences, and develops new interventions, in the design and implementation of innovative socio-technical solutions for the provision of WSS in **urban, peri-urban, and rural areas** of Argentina, Brazil and Colombia, with a particular emphasis on Brazil. Our core research work is focused on **ten case studies** that cover a range of situations and characteristics, from informal settlements in the urban periphery of world megacities (Rio de Janeiro, Brazil) and in peri-urban areas of provincial capitals (Cali, Colombia), favelas located in the heart of booming mid-range urban centres (Recife, Brazil), to small rural villages (Mondomo, Colombia) and communities in semi-arid areas (Ceará and Minas Gerais, Brazil and Santa Fe, Argentina).

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FURTHER READING	<p>José Esteban Castro and Léo Heller (eds.), Water and Sanitation Services: Public Policy and Management, London: Routledge, 2012. Also available as e-book.</p> <p>José Esteban Castro and Hermelinda Maria Rocha Ferreira, The Condominial Sanitation System in Zones of Special Social Interest (ZSSI) in Recife, Brazil. Case Study Report, DESAFIO Project, Newcastle upon Tyne and Recife, Brazil, 2014.</p> <p>José Carlos Melo, The Experience of Condominial Water and Sewerage Systems in Brazil: case studies from Brasília, Salvador and Parauapebas, Washington DC: World Bank, 2005.</p> <p>José Esteban Castro, Léo Heller and María da Piedade Moraes (Eds.), The Right to Water as Public Policy: a Theoretical and Empirical Exploration (in Portuguese), Brasília: Institute of Applied Economic Research (IPEA), 2015.</p> <p>Miguel Peña, Mariela García, Andres Fernando Toro, Julieth Vargas, Victor Alfonso Ceron, Eidenober Mena, and Viviana Orjuela, Community-Based Water Associations in Colombia's Rural Areas, Case Study Report, DESAFIO Project, Cali, Colombia, 2014.</p>