IYUÍ

CO-DESIGNED REHABILITATION OF AN URBAN WATERCOURSE

Lessons learned from Victoria, Australia for Montevideo, Uruguay

Submitted in partial fulfilment of the degree of Master of Sustainability in Sustainable Regional Development

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November 2022

CANDIDATE DECLARATION

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This research project has received the **Ethics committee's approval** to conduct the interviews linked to this research.

Name of Ethics Committee: Faculty of Science Engineering & Built Environment Ethics Committee

Project Title: **Co-designed rehabilitation of an urban watercourse. Lessons learned from Victoria, Australia for Montevideo, Uruguay**

Principal and Co-Investigators: Beau Beza and Agustina Laino González. Adriana Piperno (ext)

Approval Number: **SEBE-2022-36**

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Beau Beza & Agustina Laino Gonzalez
School of Life & Environmental Science
Adriana Piperno (ext)

2 August 2022

Dear Beau and research team

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ACKNOWLEDGEMENTS

To begin with, I would like to express my gratitude to ANII and Deakin University for the academic and experiential learning in Australia. Likewise, I would like to thank my two supervisors, Beau Beza and Adriana Piperno, for their uninterrupted support and invaluable learning during the course of these two years. I would also like to extend my gratefulness to the Núcleo de Aguas Urbanas and the FADU for their academic support.

Additionally, a very special and deep thanks to all those people who contribute in many ways with their time, knowledge and/or affection, in a tangible or intangible way to this work. Among these special people, my deepest thanks to my partner Federico, unconditional in this adventure. As well as my parents my sister, my grandparents and the rest of my family, who are fundamental pillars of this process and allowed this grateful experience. To my in-laws, one of the main reasons why I have chosen Casavalle as a study area. To my Uruguayan family in Australia, Agus, Checha, Fede, Ipe and Mili, unconditional support and friends. To my great friends in Uruguay and those in Australia, who contributed virtually or face-to-face and/or gave me encouragement at all times.

Finally, my eternal gratitude, but above all my admiration, to all the people I met through the chosen case studies. People who daily fight for environmental and social justice. People who from their place and from where they can and from what they have (sometimes nothing and sometimes a lot) fight tirelessly behind their ideals to improve their local reality, that of their community and that of their environment. Thus, achieving changes of planetary and humanitarian significance, sometimes even without noticing it. To all of them, thank you for your time and your knowledge. All of you are a reference for me.

I conclude these acknowledgements by quoting a fragment from one people from the Casavalle community whom I interviewed during this process and whom I believe surely reflects the universe and the spirit of those I interviewed in this work:

"The impossible, it only takes a little longer"

To all of you, thank you.
I hope you enjoy reading this work as much as I enjoyed writing it.

TABLE OF CONTENTS

This work is based on the Australian Harvard style of referencing.

ABSTRACT

This research undertakes two integrated comparative case studies of two highly polluted small urban watercourses, identifying causal attributions for the successful rehabilitation of one and generating strategic recommendations for the other. The first is the Stony Creek case in Victoria, Australia. A case whose watercourse has suffered the highest levels of pollution in 30 years in Melbourne and whose ecosystem rehabilitation was largely achieved thanks to the active participation of its community. The other is the Iyuí Stream case in Casavalle's neighbourhood in Montevideo, Uruguay. A case with a highly urbanised waterway with medium and highly vulnerable populations settled on its banks. Since 2015, Iyuí has had a plan that proposes the channelling and rectification of its riverbed and banks, which has advanced very punctually yet without participation instances. However, a co-designed rehabilitation project for the Iyuí stream could be a conceivable proposal given the City Council's new proposals for ecosystemic environmental recovery with citizen participation and the precedents of high-impact community participation's successful local experiences.

This research reveals a vast gap related to the absence of literature linking urban watercourse rehabilitation and co-design in Latin American contexts of precariousness and socio-economic vulnerability. It shows that successful cases of sustainable and collaborative public policies can be achieved through laborious and gradual processes through the joint work of all citizens. Thus, organised local communities can achieve powerful local changes of planetary and humanitarian significance by acquiring both the responsibilities and the benefits that come with them.

In fact, this study makes it possible to conceive that a shift towards a co-designed rehabilitation of the Iyuí stream is admissible and suggests the transformation of the Iyuí project into a tentative prototype of a co-managed space of activist environmental education that works transversally towards sustainable development, combating the structural situation of precariousness and socio-economic vulnerability that the Casavalle's community still lives in.

1

INTRODUCTION

Chapter 1. Introduction describes the current and future challenges of urban areas and their inhabitants with a focus on urban waterways. It introduces the case of the Iyuí stream in Montevideo, Uruguay as an example of environmental degradation in a vulnerable socio-economic context. It also raises possible alternatives to such a scenario through sustainable development, addressing an example of a successful experience of co-designed rehabilitation of an urban waterway such as the case of Stony Creek in Victoria, Australia. As well, Chapter 1. Introduction presents the aim and scope of the research, as well as the significance of the study and the outline of the thesis structure, introducing the reader to Chapter 2. Study Area. Iyuí Stream, Montevideo, Uruguay

1.1 STUDY CONTEXT

1.1.1 URBANIZATION AND THE NATURAL WATER CYCLE

Urbanisation has and continues to generate alterations in the natural water cycle, negatively impacting aquatic ecosystems, leading to the degradation of water resources and increasing the likelihood of flooding in cities (IPCC, 2014a). As can be seen in Figure 1.1, urbanisation has significantly increased the impermeabilization of surfaces, which decreases the water absorption capacity of the soil and leads to groundwater depletion. Also, the intensity of surface stormwater runoff (depicted in Figure 1.2 in the blue graph) is increased, which increases the likelihood of pluvial and/or flash flooding. On the other

hand, historically, the hygienist conception of cities has tended to channel and/or pipe existing watercourses. As well as to build urban drainage facilities that unify stormwater together with grey and/or black water to be channelled as quickly as possible to the nearest existing surface water bodies, such as streams and rivers. Such solutions involve degradation and pollution of receiving watercourses and fragmentation of their ecosystems, among others. Additional factors that contribute to the contamination of urban watercourses are both the dragging of solids and polluting chemical products from impervious surfaces through urban stormwater runoff (APFM, 2017; CIRIA, 2017; Dhakal & Chevalier, 2016; Elmore & Kaushal, 2008; Göbel et al., 2007; Kaushal et al., 2008; Mallin et al., 2009; Radcliffe, 2019).

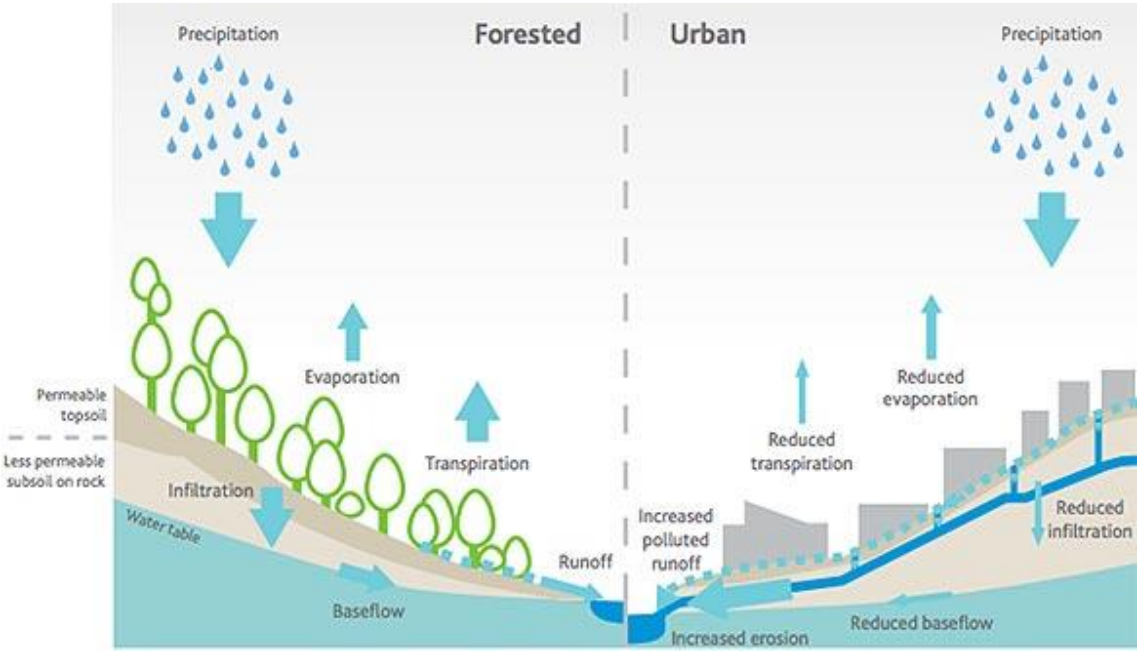


Figure 1.1: Water cycle in forest land vs. urban land

Source: Melbourne Water (2017)

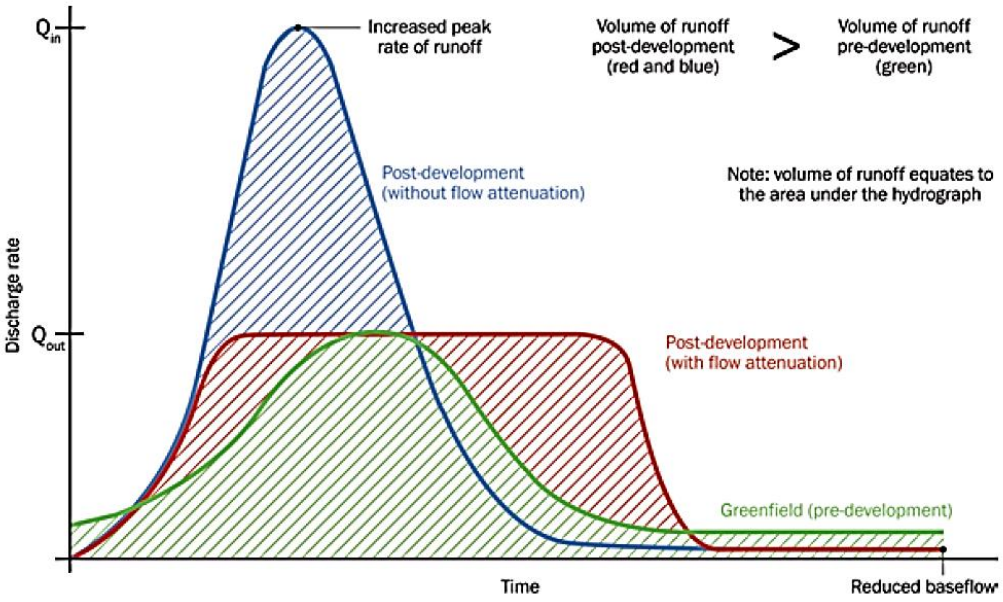


Figure 1.2: Differences in discharge flow between pre-development and post-development without and with flow attenuation

Source: CIRIA (2017:38)

Meyer et al. (2005) and Walsh et al. (2005) named the phenomenon of ecological degradation in streams that drain urbanised catchments: "urban stream syndrome". Symptoms of this syndrome include variation in stream level and flow coupled with elevated concentrations of nutrients and pollutants, reduction of biota, and changes in its morphology and stability. Depending on the urban area adjacent to the watercourse, other symptoms such as increased suspended solids and/or reduced base flow may occur. The causes are often linked to urban drainage and stormwater runoff from impervious surfaces, deforestation (especially of the riparian zone), the spatial configuration and the nearby urban land use.

1.1.2 SUSTAINABLE DEVELOPMENT

Some of the current and future challenges facing urban areas and populations described above, can be reduced or eliminated through sustainable development (IPCC, 2018a, 2018b). As Rockström (2015) and WCED (1987) state, sustainable development is one that balances economic, social and environmental concerns together, meeting the needs of people living today without overstepping social and planetary boundaries and without compromising the needs of future generations.

The sustainable development paradigm identifies both planetary and social limits. Planetary limits are those that define a safe operating space for humanity's prosperity and act as guardrails "to keep us from accidentally going over the edge" (Rockström 2015:59), preventing catastrophe (Rockström 2015). Whereas, social boundaries are what Raworth (2017) establishes as nine minimum standards that, articulated together with ecological ceilings, establish a just and safe space for humanity. These social limits are inspired by the social goals of the United Nations' 17 Sustainable Development Goals (SDGs)[1] and agreed upon internationally by 193 governments, within which are both Uruguay and Australia (UN, n.d.-d, 2015).

One of the ways to materialise sustainable development can be through the implementation of mitigation[2] and/or adaptation[3] actions in the current ecological, social and/or economic systems (IPCC, 2018;2018b).

[1] The SDGs are a set of global goals developed by the United Nations as a roadmap for global sustainable development by 2030. They are oriented towards the preservation and care of the environment, the end of poverty and global economic prosperity.(United Nations n.d., n.d.)

[2] All those human interventions aimed at reducing greenhouse gas emissions or other elements that may contribute directly or indirectly to limiting climate change IPCC (2014)

[3] All those actions aimed at adjusting to the current or projected climate and its effects, so as to reduce or avoid vulnerabilities to climate change and/or benefit from potential associated opportunities IPCC (2014)

1.1.3 ECOSYSTEM-BASED URBAN WATER MANAGEMENT

One of the current visions for achieving sustainable development through the transformation of urban areas, their inhabitants and their ecosystems is that of Water Sensitive Cities (WSC) (Brown et al., 2009). WSC is a holistic, humanitarian and ecosystem-based vision that approaches urban water management with strong climate justice, active citizen participation and human rights component (Brown et al., 2016, 2009). Cities developed under this vision have a sustainable view of the water cycle. Within the diversity of its functions linked to the use and treatment of water (Brown et al., 2016), WSC has the capability to transform the urban landscape, its public spaces and green spaces, conceiving the city as a habitable ecosystem that is resistant to climate change. They incorporate into city design infrastructures to promote the protection, restoration or rehabilitation and sustainable management of water-related ecological services, maximising co-benefits for their ecosystems, the built environment and people (see Chapter 3. Sections 3.1.1 to 3.1.3) (ADB & MU, 2021b). In addition, WSCs understand and promote water-sensitive communities that are informed and actively engaged in the adoption and implementation of sustainable, water-sensitive and human rights-based solutions (see Chapter 3. Section 3.1.4) (ADB & MU, 2021c).

Ecosystem-based Adaptations (EbA) are one of the possible actions that promote sustainable development towards becoming a WSC (IPCC, 2018a; Satterthwaite et al., 2007). An EbA's related concept is Nature-based Solutions (NBS) (IPCC, 2022a), both depicted in Table 1.1.

Ecosystem-based Adaptations (EbA)	Actions that protect, manage and restore ecosystems and their biodiversity, while providing co-benefits to the environment, society and the economy (FEBA, n.d.)
Nature-based Solutions (NBS)	Focuses on the naturalisation of modified ecosystems and on social inclusion and emancipation through actions (EC, 2015).

Table 1.1: EbA and NBS´ concepts

A high-impact NBS in cities is the urban watercourses' freshwater ecosystems restoration (see Chapter 3. Section 3.1.3). The enhancement or restoration of these ecosystems allows

not only multiple ecosystem benefits but also re-establishes or reconfigures a new link with the city and the citizenry in terms of environmental education, recreation and leisure (Addy et al. 2016; EA 2006; Devi et al. 2015; Griscom et al. 2017; Hathway & Sharples 2012; IPCC 2022; IUCN 2016; WB 2021) .

> *"The naturalisation of the urban system is a catalytic strategy that can contribute to achieving this systemic change, as it allows us to be aware of eco-dependence, manage natural resources in line with ecological processes, adapt to climate change, improve living conditions, experience direct contact with nature and with each other, and generate changes in social values and practices. To achieve this, we need to understand the city as a complex system in which nature, built space and human activities can complement and benefit from each other."* (Morán Alonso et al., 2021:5) (Author's trans)

A special and significant characteristic in relation to the restoration of urban water ecosystems in conjunction with urban green areas is their educational potential from an environmental perspective, which would allow for an internal transformation of the system that gives rise to the ecological crisis, through its users. These types of spaces are educational resources in themselves and are privileged spaces to work on multiple contents associated with climate change, freshwater ecosystems, the water cycle and biodiversity, among many others. They can be used for practical participatory training in situ, citizen science actions, comprehensive co-design and co-participation experiences for new proposals and/or their transformation, as well as community co-management of the space. The results of this type of action generate ramifying and multiplying effects on other people and build resilient community[4] networks (Morán Alonso et al. 2021).

One of the ways to build resilient communities that also enjoy the multiple co-benefits associated with sustainable development is through Community-based adaptation (CbA) (IPCC, 2018a; Satterthwaite et al., 2007). CbA is a socially inclusive approach to climate change adaptation by involving and empowering local communities in the planning, design and implementation of social, economic and/or environmental adaptation practices and/or measures (Forsyth 2017). An example of this is the active participation of citizens in the process of restoring the urban freshwater ecosystem and the transformation of its associated urban green area. Citizen participation is essential for these practices and spaces

[4] The capacity of the social system to respond to adversities that are affecting the collective at the same time and in the same way, while developing and strengthening its existing resources to reorganise itself (United Nations 2020).

to be successful and long-lasting. One of the possible processes to achieve this is through co-production or also called co-design (see Chapter 3. Section 3.1.4) (Burkett, n.d.; NRC, 2008; Shandas & Messer, 2008). This type of process is composed of horizontal and creative participatory methods that involve all actors in the process, allowing for the incorporation of the knowledge and experiences of its participants and the needs of its users. In addition, co-production or co-design allows for the development of literacy and awareness of water processes, ecosystems, climate change and human rights, promoting citizenship and empowering them in the management of their resources and better democracies (ADB & MU 2021c; McKercher 2021; Mees et al. 2016; NRC 2008; Rubi & Hack 2021).

1.2 STATEMENT OF THE PROBLEM

The Iyuí[5] Stream is an urban watercourse with a high content of pollutants for a high and medium vulnerability population located in Casavalle's neighbourhood in Montevideo, Uruguay. Iyuí is a highly urbanised and modified watercourse that shows very advanced symptoms of urban stream syndrome (see Section 1.1.1). Some of the main factors contributing to its current state are the discharge of effluents from informal settlements along its banks, leachates from landfills and solid waste disposal, depicted in Figure 1.3 (IM et al., 2019). In addition, 98% of the population unit associated with the watercourse is in conditions of high and very high vulnerability.

Figure 1.3: Iyuí Stream in Dr. Horacio García Lagos and Dr. Rodolfo Almeida Pintos streets to the west. Date: September 2021

Author: Adriana Piperno. Reproduced with permission.

Iyuí Stream is located in Casavalle, a neighbourhood that was deeply affected by Uruguay's socioeconomic crises which, over the years, meant both a structural reproduction of poverty becoming one of the areas that experience multiple socio-

5 "Iyuí" is pronounced "Ish-**we**" in English and is a word that in the Guarani language means "río de aguas claras" which could be translated as "clear waters river".

economic issues which have led to environmental problems. This neighbourhood became one of the areas that received people suffering from the Uruguayan socio-economic crises reinforced by the phenomenon of urban segregation[6] in the capital. Over the years, the precariousness and social vulnerability experienced by its inhabitants were compounded by environmental problems, conflicts of coexistence and problems related to violence, among others. The repercussions and long-term effects of this compendium of problems meant both a structural reproduction of poverty and the reproduction of internal and external stigmatisation, marginalisation, social exclusion and consequent isolation mechanisms (Álvarez, 2009, 2012; Filardo, 2005; Lombardo, 2005; Núñez, 2019; OPP, 2018; Rosas, 2011; UE. IM, 2008)

Following the situation in Casavalle, in 2008, at the request of neighbours, organisations and local representatives, an Integral Plan for the Casavalle Basin was created, through which the area has been positively transformed and the quality of life of many of the people who live there has improved. In this Plan are condensed a set of actions and long-term strategies whose objective is to "promote urban and environmental recovery, revitalisation, social integration and structuring of the area in question (...) in a participatory manner" and the improvement of "the quality of life of its inhabitants, the structures, and urban infrastructure, and the urban landscape of the sector." (IM 2012:12). Within the set of actions proposed, the Iyuí Stream is proposed as the linear park's structuring element of an integral urban operation.

The Urban Operation comprising the Iyuí Stream, is considered a priority and includes the cleaning and environmental recovery of the Stream and its banks and the creation of public recreational and landscape spaces with collective facilities being "social participation" as a "permanent line of action in the process" (IM 2013:9). This is depicted in Figure 1.4.

[6] This factor determines people's location in the physical space of a city based on their income. This generates spatialities in the territory of homogeneous social composition. One of the most polarised expressions is the informal settlements, many of them located on the flood-prone banks of rivers and streams. At a social level, the consolidation of these phenomena over time generates negative feedback that deepens inequality, marginalisation and social fragmentation and isolation of the urban poor from the rest of society. At an environmental level, such settlements increase water risk and the vulnerability of the people who suffer from this segregation (Tonkiss 2013; Kaztman 2001; Harvey 2012; Cheshire 2007).

Nonetheless, despite its priority nature, only some of the proposed actions have been materialised. Additionally, the Plan´s actions have not yet addressed some of the intentions described in it. They propose the watercourse and its margins' canalisation and rectification not having incorporated a sustainable ecosystemic vision into the proposal, nor have they generated instances of participation (IM, n.d.).

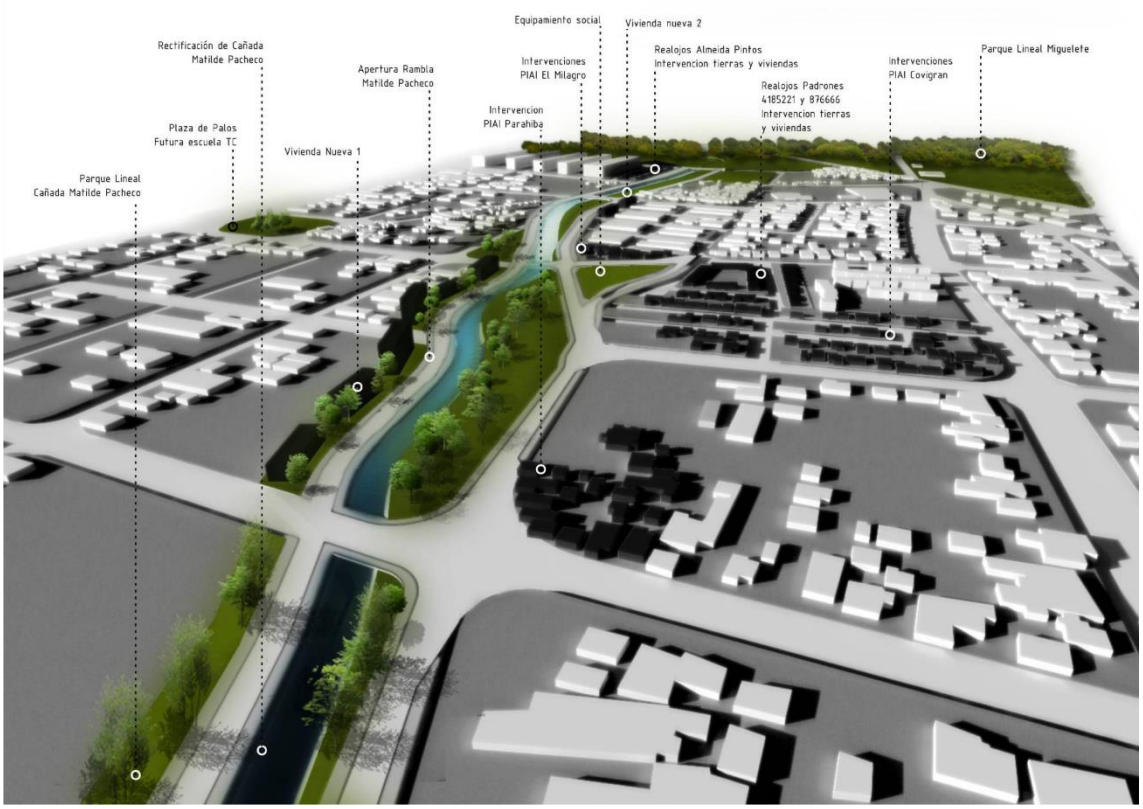


Figure 1.4: Proposal of the Iyuí Stream´s Urban Operation

Source: Intendencia de Montevideo (2012:162)

In essence, at the macro scale, the proposal for the Iyuí Stream fails to visualise the urban watercourse as a key element of sustainable development of the area, addressing present and future challenges by generating a balance between economic, social and environmental issues (see Section 1.1.2). Specifically, plans and proposals for the Iyuí Stream have not yet managed to visualise and incorporate the transformative potential and associated benefits as an Ecosystem and community-based adaptation action that this resource and associated spaces have (see Section 1.1.3). Thus, it misses out on turning Iyuí Stream to be an educational-environmental space that both evidences and raises awareness of its ecosystem value and potential, as well as being a platform for

environmental literacy, action and citizen empowerment, with the community being the designer, manager and guardian of its own resources. The significant number of new inhabitants resulting from the planned relocation and new housing cooperatives, as well as the new high school students who will attend the new high school planned on the Iyuí Stream´s margins (see Chapter 2. Section 2.4.1), are potential and essential co-creators and co-managers of their surroundings, and can both generate positive environmental, urban and social feedback and benefit from all the amenities that this process of ecosystemic participation entails (see Chapter 3. Sections 3.1.3 and 3.1.4).

Notwithstanding what happens with the Plan for Iyuí Stream, there are already satisfactory experiences of co-design and co-management of parks and socio-community projects near this watercourse, as well as new paradigms of ecosystemic environmental recovery of urban watercourses with transversal citizen participation (see Chapter 2. Section 2.5). Therefore, a co-designed rehabilitation project for Iyuí Stream could be a viable proposal following a paradigm shift in the course of the gradual implementation that Urban Operation is undergoing.

1.2.1 SCIENTIFIC LITERATURE GAP

While publications related to Ecosystem and Ecological Restoration are a trending topic (IUCN, 2016), more research is needed to address sustainable local-scale planning approaches together with communities (Albert et al. 2019; Kabisch et al. n.d.; Nesshöver et al. 2017; Raymond et al. 2017). Furthermore, the literature that links urban watercourses' rehabilitation and co-design are scarce. More even those within the global south (Brown et al. 2018; French et al. 2020; RISE n.d.; Zari et al. 2020) and related to precariousness and socio-economic vulnerability contexts ADB & MU (2021b), Dobbs et al. (2018) and Rubi & Hack (2021).

1.2.2 VICTORIA, AUSTRALIA AS A BENCHMARK IN WSC AND PARTICIPATORY URBAN STREAMS REHABILITATION

Among the countries of the global North, Australia is a benchmark in the development of literature associated with Water Sensitive Cities, a vision through achieving sustainable development (ADB & MU 2021a, 2021b, 2021c; Brown et al. 2016; CRC for WSC 2013; CRC for WSC n.d.). One of the ways in which Australia, and within this Victoria, is doing this is through the co-designed rehabilitation of urban waterways along with the community with many successful experiences already implemented (WSC n.d.; Sammonds & Vietz 2015; Mekala et al. 2015; MW n.d.; CRC for WSC 2017; ICC 2016; MW n.d.). It is in Victoria where there are multiple potential cases from which to draw lessons for the Iyuí Stream case (see Chapter 4. Section 4.2); being one of them, the Stony Creek case.

Stony Creek, is an example of a participatory and ecosystemic project whose rehabilitation is incorporated into a 10-year work plan and largely materialised. The proposal depicted in Figure 1.5, deals with the rehabilitation of a watercourse that has suffered the highest pollution levels in 30 years in Melbourne. It covers key topics such as waterway health, water quality, education and engagement, amenities and accessibility. The plan was carried out through the participation of two large and very active community groups, Friends of Stony Creek and Friends of Cruickshank Park (MW et al., 2019; Outlines, n.d.). It is estimated that this project has multiple elements that could be references to a possible Iyuí Stream co-designed rehabilitation.

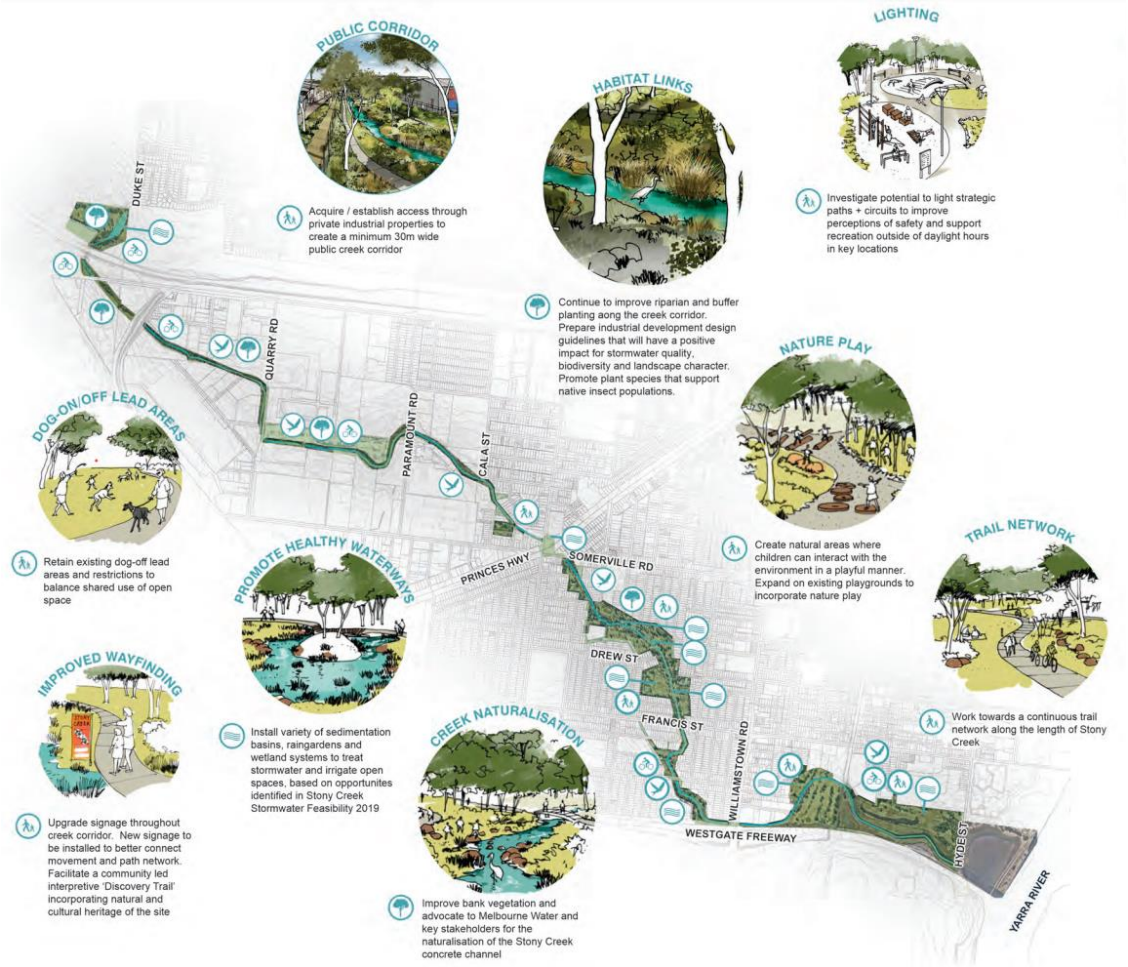


Figure 1.5: Stony Creek Rehabilitation Plan

Source: Outlines et al. (2019)

1.3 AIM & SCOPE

From all of the above, the aim, objectives and questions of this thesis emerge, detailed in Table 1.2. In order to achieve the aim, two objectives are established. Each objective is supported by a series of research questions that guide this research, which this thesis intends to answer.

AIM	To identify causal attributions for the success of co-design with local communities in urban watercourse rehabilitation in Victoria, Australia to generate strategic recommendations for Iyuí Stream´s co-designed rehabilitation in Montevideo, Uruguay.
OBJECTIVE 1	To identify and analyse causal attributions for the success of the co-designed rehabilitation of the Stony Creek urban watercourse in Victoria Australia.
OBJECTIVE 2	To Identify, select and analyse those causal components of the success of the Stony Creek co-designed rehabilitation case that could be transferable to the Iyuí Stream case in pursuit of a co-designed rehabilitation.
RESEARCH QUESTION 1	What were the causal factors that led to the effective rehabilitation of Stony Creek?
RESEARCH QUESTION 2	Which causal attributions of success from the Stony Creek case might be transferable to the Iyuí Stream case in pursuit of co-designed rehabilitation?

Table 1.2: Research aim, objectives and questions

1.4 SIGNIFICANCE OF THE STUDY

This study will contribute new knowledge to the vast research gap related to the absence of literature linking urban watercourse rehabilitation and co-design. Furthermore, it will add evidence-based empirical information related to the global south in the contexts of precariousness and socio-economic vulnerability in Latin America, for which more research and practical experimentation are needed to address the complex and profound challenges they face. This, and the suggested possible future studies, will also benefit the scientific and urban design community, specifically the Urban Water Research Nucleus (NAU); being this work a contribution to the evaluation of one of its urban streams' pilot case studies in Uruguay, providing information that will benefit the construction of better interdisciplinary methodologies to address similar problems in the Uruguayan territory.

Additionally, this research will be beneficial for the Iyuí stream community as well as for other communities in Montevideo with similar characteristics and problems (see Chapter 2. Section 2.1). Through learning from successful examples in Victoria, Australia, this study will provide information on the possibilities and scope for community action in the rehabilitation of their ecosystems and urban environments. In addition, this study will provide information that will be a useful tool for the community of Casavalle, and the organisations that are already working through the tentative recommendations for transforming the existing project into a co-designed rehabilitation.

Finally, this study will be beneficial both for the Montevideo City Council[7] and other professionals who are working on urban watercourse rehabilitation projects together with communities. This study will provide examples of successful examples of co-designed rehabilitation in Victoria, Australia, following joint work between the public, private and local communities. Specifically, this study will provide Montevideo City Council with a set of recommendations that can benefit both, all stakeholders and the environment, by transforming their current Iyuí Stream project into a co-designed rehabilitation.

[7] For the purposes of this study, the Intendencia de Montevideo is translated as Montevideo City Council. However, its legislative and administrative powers are departmental, so it functions as a second level of government, after the national government. It is worth noting that Montevideo also has eight municipalities, which form the third level of government. One of them is Municipality D, which corresponds to the neighbourhood of Casavalle.

1.5 OVERVIEW

The following research will be organised and structured in seven chapters, detailed in Table 1.3.

Chapter 1. Introduction	The overall context of the research is described, the specific problem to be addressed is introduced and the relevance of the study is stated. The aim, research questions and structure of the research are defined.
Chapter 2. Study Area. Iyuí Stream, Montevideo, Uruguay	The current situation of the Iyuí stream ecosystem and its community is described in terms of its socio-economic, environmental and urban characteristics and the problems they currently face. In addition, the Montevideo City Council's Plan proposed for this watercourse is described and analysed. Lastly, both the existence of precedents and/or possible proposals linked to co-design and ecosystemic rehabilitation by the Casavalle's community and the Montevideo City Council are identified and analysed.
Chapter 3. Literature Review	The most relevant scientific literature related to the research topic is identified and critically analysed. The gap in this literature linked to the research topic is identified and the relevance of this study is confirmed, framing it within the existing scientific knowledge.
Chapter 4. Methodology	The methodologies and methods selected to answer the research questions are described. Details of the decision-making, procedures and traceability of the sources of information used are provided.
Chapter 5. Stony Creek Case Study, Victoria, Australia	The results of the methods carried out described in Chapter 4 are narrated, providing the answer to Research Question 1 of the Objective n°1.
Chapter 6. Iyuí Stream. Lessons learned from Stony Creek	The results of the methods carried out described in Chapter 4 are narrated, providing the answer to Research Question 2 of the Objective n°2.
Chapter 7. Discussions and Conclusion	Relevant findings are summarised and the results are discussed within the framework of the research aim and objectives. Recommendations are suggested for the Iyuí Stream case. The results of this research are framed within the existing scientific literature. Some limitations encountered in the research are mentioned. Furthermore, the conclusion of the study and its implications are described. Lastly, possible future studies are proposed.

Table 1.3: Thesis outline

2

STUDY AREA: IYUÍ STREAM, MONTEVIDEO, URUGUAY

Chapter 2. Study Area: Iyuí Stream, Montevideo, Uruguay describes and contextualises this case based on the information and concepts described in Chapter 1. Introduction. It addresses both the current situation of the Iyuí Stream ecosystem and its community in terms of its socio-economic, environmental and urban characteristics and the problems they currently face, as well as the Montevideo City Council Plan proposed for this watercourse. It also analyses some local antecedents of successful practices, materialisations and proposals linked to socio-community co-design and co-management and urban watercourses' ecosystemic environmental restoration; setting the framework for Chapter 3. Literature Review.

2.1 MONTEVIDEO

In Montevideo, Uruguay, many of the urban watercourses and their associated ecosystems experience the settlement of highly socio-economically vulnerable populations on their banks as well as significant ecological damage mainly due to the type of urban development and the pollution loads they receive. Although Montevideo is the economic and cultural centre of the country (OPP 2014), it is one of the departments[1] with the highest levels of inequality (Gini Index) (INE 2021). This inequality is one of the factors influencing the intensification of the processes of metropolitan territorial expansion, materialising in the capital's territory through the emptying of central and intermediate zones and the subsequent population increase in peripheral areas (Kaztman et al. 2004; MVOTMA 2018; IM 2018). This phenomenon (see "urban segregation" definition in

1 Department is a first-level political division of the Oriental Republic of Uruguay. In this text "department" does not translate as "State", as they differ in degree of sovereignty.

Chapter 1. Section 1.2), brought with it the emergence of irregular settlements[2] with unsatisfied basic needs[3] inhabitants (INE 2013b). Of the population with high socio-economic vulnerability, 17% inhabit flood zones on the banks of bodies of water in precarious settlements (Kaztman et al. 2004; NAP-Cities 2021; IM et al. 2019). In addition, as a result of urban development with a hygienist conception, the growth of Montevideo's urban tissue, the subsequent soil waterproofing together with the loss of vegetation cover and the channelling of watercourses, generated alterations in the water cycle contributing significantly to the deterioration of the associated natural ecosystems and to the loss of scenic value and recreational space (see Chapter 1. Section 1.1.1) (Ad@pta FADU 2021). Furthermore, the discharge of untreated residential and industrial wastewater, from combined sewerage system relief structures and leachates from uncontrolled solid waste landfills are the main pollutant loads that many of Montevideo's urban watercourses still receive, significantly deteriorating the health and quality of their ecosystem (IM et al. 2019).

Figure 2.1 identifies that the territorial units of special interest and priority for action where it is necessary to propose measures for pollution control and the recovery and preservation of natural resources are in the central and eastern fringe of the department of Montevideo. This figure shows on Montevideo's map both the watercourses classified by levels of environmental pressure and the level of criticality of the territorial units associated with the watercourse, with those in red being classified as high criticality, those in yellow as medium and those in green as low. The image also identifies several of the elements that influence the deterioration of the watercourses (overflow drain, industries with discharge into a watercourse, landfill and sanitary landfill), the informal housing and natural ecosystems (wetlands and riparian forests) and green areas close to them. It is in these 24 territorial units where it is necessary to propose measures that address the need for sanitation, flood risk reduction, pollution control, improvements in the management of solid urban waste and the recovery and preservation of natural resources (IM et al. 2019).

2 Grouping of more than 10 dwellings, built without the owner's authorisation in formally irregular conditions, without respecting town planning regulations (Observatorio Territorio Uruguay n.d.)
3 Lack of access by the population to certain goods and services that are considered critical for human development, such as access to decent housing, electricity, drinking water, sanitation, comfort items, and access to education. water, sanitation services, comfort items and access to education (INE 2013b).

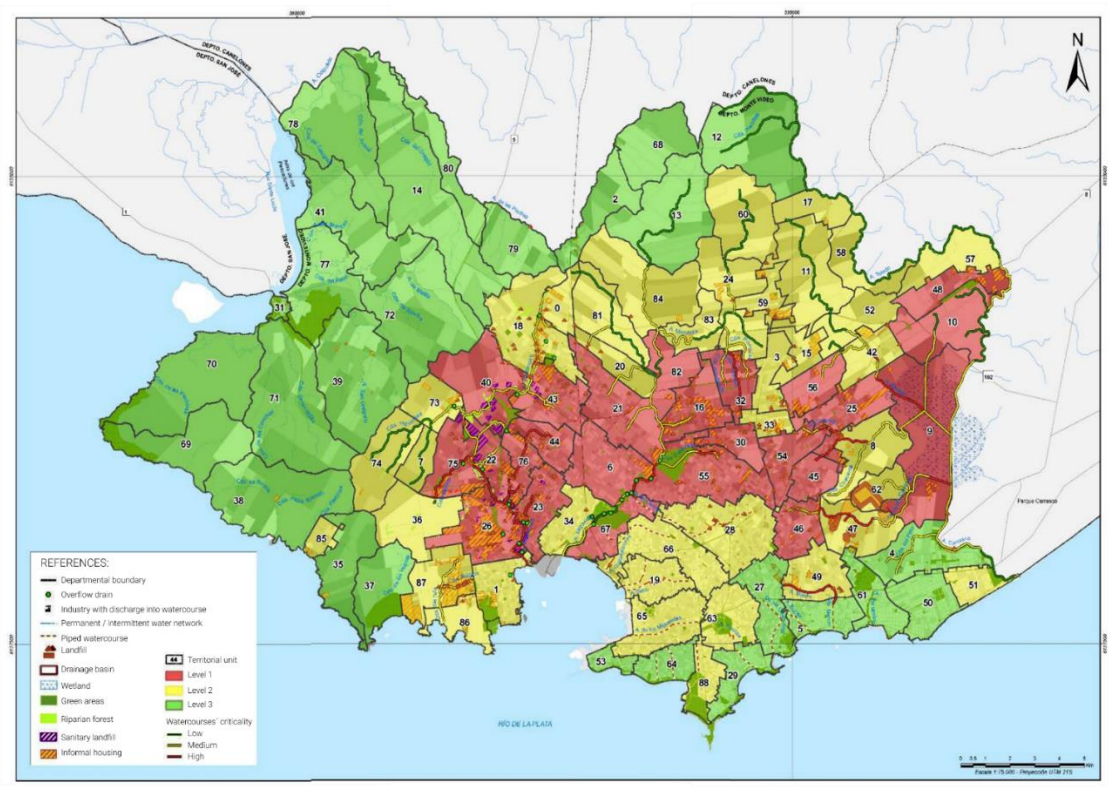


Figure 2.1: Montevideo´s environmental pressures on land units and watercourses

Source: Adapted from IM et al. (2019:281)

Among the territorial units classified with high criticality and priority for action is the unit corresponding to the Iyuí Stream in Casavalle's neighbourhood (no.16 in Figure 2.1) (IM et al. 2019).

2.2 IYUÍ STREAM

The Iyuí[4] Stream is an urban watercourse with a high content of pollutants and a high and medium vulnerable population settled along its banks. The Iyuí Stream (also sometimes referred to as the Matilde Stream or Matilde Pacheco Stream) belongs to the Miguelete Stream Basin and is a tributary of the Miguelete Stream. It has an area of 256 ha and a length of approximately 4870m, being the main watercourse that crosses the Casavalle neighbourhood from east to west. As can be seen in Figure 2.2, the Iyuí Stream is a highly urbanised and modified watercourse. Its morphology is mostly rectilinear except for the slightly winding 1400m stretch in its natural state that runs from Dr. Rodolfo Almeida Pintos Street to Avenida General San Martín visible in Figures 2.5 to 2.7. In the middle and upper basin of the Stream, it is made up of 3 smaller streams, the North, Northeast and South. Many of these still present a morphology with some winding sections in open channels, however, some of its sections are rectified and piped, crossing private properties (IM 2014). As can be seen in Figures 2.3 to 2.7, the Iyuí Stream is a watercourse that shows very advanced symptoms of urban stream syndrome, (see Chapter 1, Section 1.1.1) establishing its criticality level as medium-high (IM et al. 2019). The population unit associated with the watercourse is 26,709 inhabitants, 98% of whom are in conditions of high and very high vulnerability. One of the main factors in the high level of criticality of the watercourse is the discharge of effluents from informal settlements on its banks (e.g. El Milagro and Matilde Pacheco). The percentage of the population living in informal settlements is 30% of the population unit. Other main factors contributing to the high level of criticality of the watercourse are leachate from landfills and the disposal of solid waste (IM et al. 2019) all depicted in figures 2.3 to 2.7. Lastly, Figure 2.7 shows both the informal settlements located on both sides of the watercourse and the landfills to the east and southwest.

[4] "Iyuí" is pronounced "Ish-**we**" in English and is a word that in the Guarani language means "río de aguas claras" which could be translated as "clear waters river".

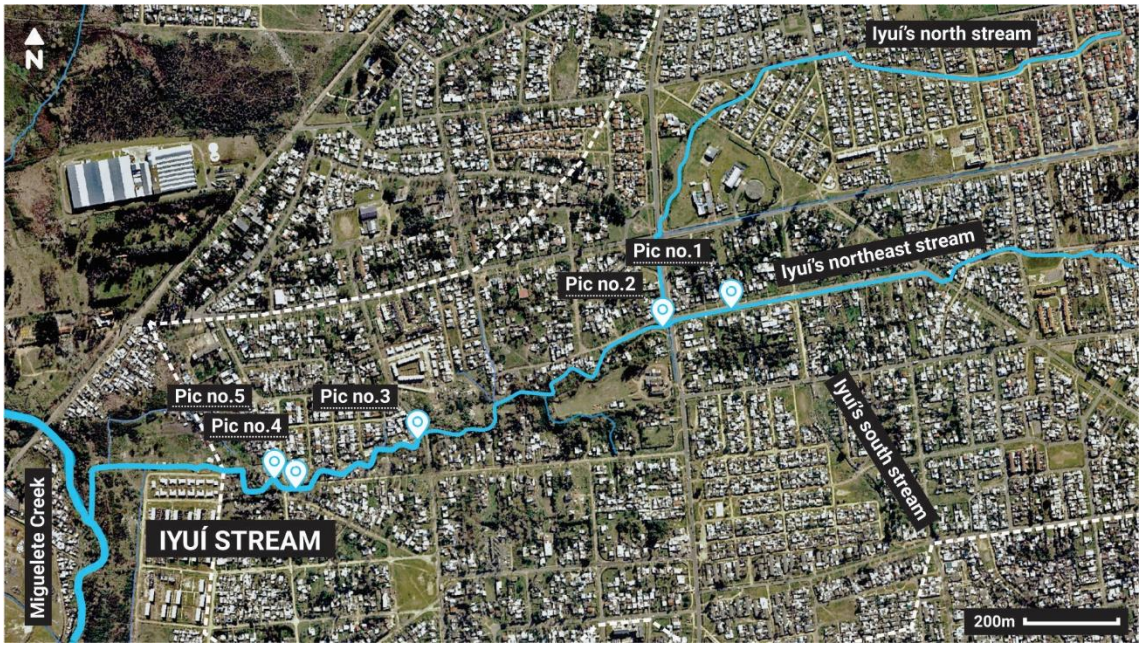


Figure 2.2: Iyuí stream and its tributaries and site photos´ location

Figure 2.3: Pic N°1. Iyuí Stream in Matilde Pacheco de Batlle y Ordóñez and Oscar Bonaudi streets to the east. Date: July 2022

Author: Victoria López. Reproduced with permission.

Figure 2.4: Pic N°2. Iyuí Stream in Matilde Pacheco de Batlle y Ordóñez and Campinhas streets to the east. Date: February 2022

Figure 2.5: Pic N°3. Iyuí Stream at the intersection with Calle 4to the west. Date: February 2022

Figure 2.6: Pic N°4. Iyuí Stream in Dr. Horacio García Lagos and Dr. Rodolfo Almeida Pintos streets to the east. Date: July 2022

Author: Pablo Sierra. Reproduced with permission.

Figure 2.7: Pic N°5. Iyuí Stream in Dr. Horacio García Lagos and Dr. Rodolfo Almeida Pintos streets to the west. Date: September 2021

Author: Adriana Piperno. Reproduced with permission.

2.3 CASAVALLE

Iyuí Stream is located in Casavalle, a neighbourhood whose inhabitants still experience a structural situation of precariousness and socio-economic vulnerability that has given rise over the years to a compendium of problems, among which are the environmental ones. The statistics represented in Figure 2.8 are a comparative socio-demographic snapshot between Casavalle and Montevideo in the years 2007-2009. They point to the social inequalities that were occurring and being reproduced in the territory. In the first place, it is shown the significant percentage of young people living in Casavalle, when the tendency in Montevideo is towards an ageing population, as well as the concentration of a larger Afro-descendant population. There are also high rates of people living with at least one unsatisfied basic need, many of them minors, as well as a higher unemployment and underemployment rate among the population. Additionally, it can be perceived the low rates of school attendance and basic education completion. Even lower, are those related to secondary education, as well as the large number of young people who neither study nor work. Lastly, there are a large number of people and households living in poverty and destitution, many of them in overcrowded conditions, and a high percentage of dwellings are considered constructively inadequate. In addition, this area is characterised by a particular phenomenon of population growth (which is also the inverse of what happens in the rest of Montevideo), as well as the low-income levels of the population, labour informality and difficulties in accessing basic services (Álvarez 2012; Lombardo 2005; Filardo 2005).

In addition to these data, Álvarez (2012), Lombardo (2005) and Filardo (2005) mention the sorting and sale of rubbish as the main source of income for the population living in informal settlements and their surroundings. For some, the latter turns out to be a highly recurrent labour strategy when resources are scarce, but for others, it is already a feature of their identity. This is particularly relevant to the possible environmental recovery of the stream, as it points to an economic and cultural link with waste that needs to be considered in such an approach.

Figure 2.8: Socio-demographic data for Casavalle and Montevideo (years 2007-2009)

Source: Adapted from OPP (2018) and UE IMM (2008)

The conjuncture in Casavalle described above is a long period's corollary in which its inhabitants experienced situations of precariousness and social vulnerability which meant a structural reproduction of poverty, the reproduction of stigmatisation mechanisms and the proliferation of stereotypes and prejudices that increase their marginalisation, social exclusion and isolation. The statistics presented in Figure 2.8 are the outcome of the historical process described in Box 2.1. Consequently, the repercussions and long-term effects of this compendium of problems meant both a structural reproduction of poverty and the reproduction of internal and external stigmatisation mechanisms that were amplified through the mass media. To this were added environmental problems, conflicts of coexistence and problems related to security, among others. This meant that the name "Casavalle" became symbolically impregnated with a negative character associated mainly with insecurity and violence, which led to the proliferation of stereotypes and prejudices that strengthen and reproduce internal and external mechanisms of marginalisation, social exclusion and isolation (Rosas 2011; Núñez 2019; Filardo 2005; Álvarez 2009, 2012; OPP 2018; UE. IM 2008; Lombardo 2005).

• BOX 2.1 •

CASAVALLE'S SETTLEMENTS HISTORY

Casavalle was originally an area of country houses, vineyards and farms with a historical past linked to the struggles for Uruguay´s independence, being its first settlement the product of the movement from the countryside to the city in search of better job opportunities. From the 1950s onwards that Casavalle was affected by the socio-economic crisis that Uruguay was going through, becoming one of the receiving areas for people suffering from the crisis and the phenomenon of urban segregation[1] in the capital. This phenomenon was materialised in housing solutions promoted by the state through permanent and provisional programmes that became permanent, lacking in territorial planning. This constituted an area made up of fragments of heterogeneous and disintegrated single-family housing complexes without the necessary facilities and infrastructure, as well as large vacant plots of land. It is on these plots of land that, following the existing housing shortage, private informal occupations were generated. This process deepened and worsened with the socio-economic crisis of the 1990s, which transformed Casavalle into an area that is still experiencing opposite and contrasting phenomena to the rest of Montevideo (Rosas 2011; Núñez 2019; Filardo 2005; Álvarez 2009, 2012; OPP 2018; UE. IM 2008; Lombardo 2005).

[1] It is a factor that determines people's location in the physical space of a city based on their income. This generates spatialities in the territory of homogeneous social composition which are the territorial manifestation of existing economic inequalities (Tonkiss 2013; Kaztman 2001; Harvey 2012; Cheshire 2007).

2.4 IYUÍ STREAM URBAN OPERATION

After the situation that Casavalle was experiencing, the Casavalle Plan was created at the request of the neighbours and stakeholders, which includes an urban operation whose structural axis is the Iyuí Stream. The Casavalle Plan and the Partial Plan described in Box 2.2, define specific strategic high-structural impact actions that are a synthesis of the proposed guidelines, among which are the *"Complex Urban Operations"*. The Urban Operation comprising the Iyuí Stream consists of a set of actions differentiated into three sections with a linear park as the structuring axis, as depicted in Figure 2.9. The first

section, which is the area that concerns this study, is the only section in which the Plan establishes an urban preliminary design and an imaginary, represented in Figures 2.10 and 2.11 respectively. Both figures show the stream rehabilitated after its cleaning and environmental recovery, following the canalisation and rectification of 1.5 km of the watercourse and its banks. As well, five hectares of public recreational and landscape spaces and public facilities are incorporated. These can be seen as purple dots in Figure 2.10. Furthermore, the orange areas in Figure 2.10 are the sites proposed for controlled residential and mixed uses. Some of these are identified in Figure 2.11 as black volumes, representing both the relocation of existing informal occupations and/or flood zones and the construction of new housing cooperatives and rehousing. In addition, both figures show the new connectivity created after the creation of edge roads parallel to the creek, as well as the transversal road connections (IM 2013). These allow for linking this linear park with the system of public spaces in the city centre (IM 2012).

It is worth noting that the Plan highlights "social participation" as a "permanent line of action in the process", emphasising the diagnosis. Accordingly, based on this, addressing issues related to "work and training, use and optimisation of services, specific programmes for the different age groups emerging in the area, environmental improvement, among others" (IM 2013b).

With regard to Section 1 of Iyuí Stream's Urban Operation, despite its priority nature, only some of the actions proposed have been materialised or gradually developed, still falling short of addressing some of the intentions related to both participation and the environmental recovery of the stream. These will be presented and discussed in the next section.

Figure 2.9: Iyuí Stream's Urban Operation subdivisions

Source: IM (2012:153)

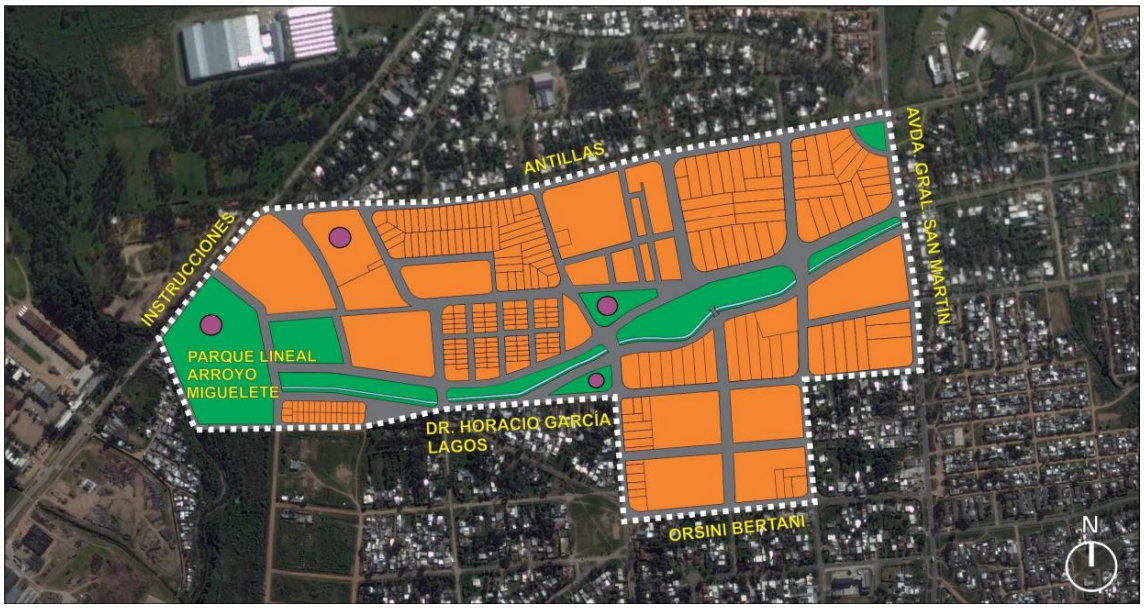


Figure 2.10: Urban proposal for Section 1of the Iyuí Stream's Urban Operation

Source: IM (2012:159)

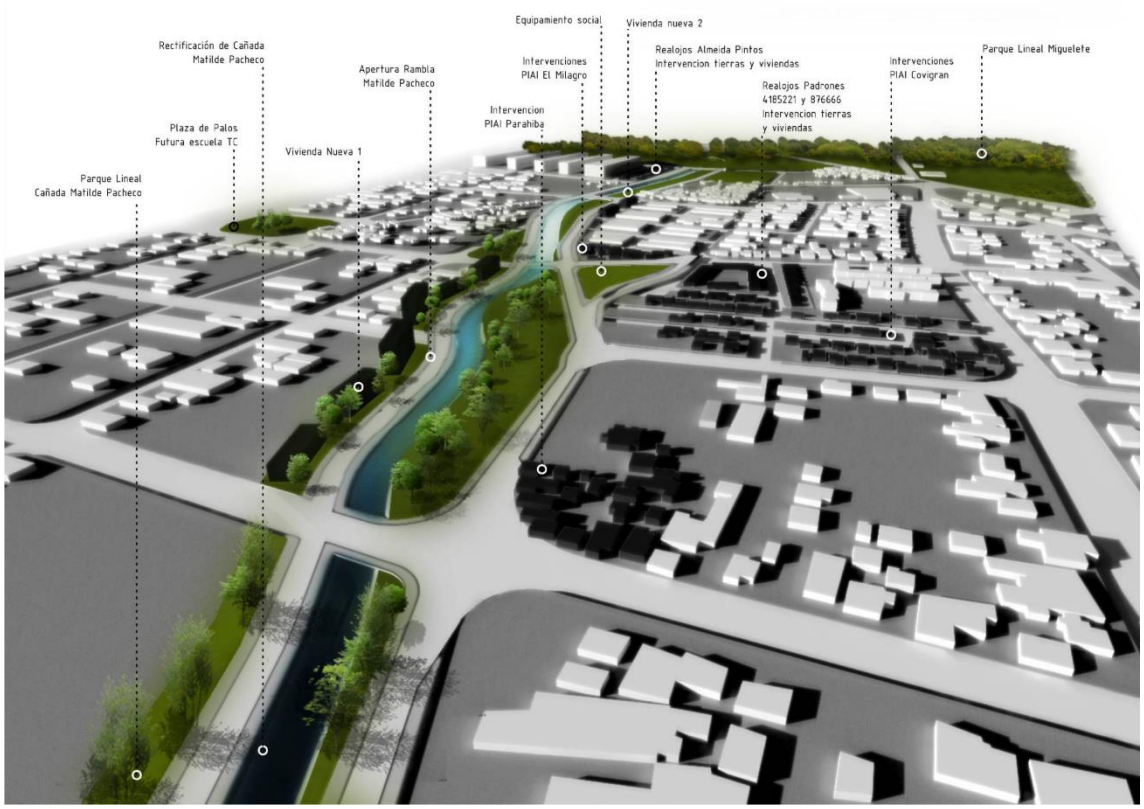


Figure 2.11: Render of the Section 1 proposal of the Iyuí Stream´s Urban Operation

Source: IM (2012:162)

• BOX 2.2 •

CASAVALLE COUNCIL AND CASAVALLE PLAN

In 2008, after the situation that Casavalle was experiencing, the Casavalle Council was created at the request of the neighbours, organisations and local representatives, and with it, the Casavalle Basin Integral Plan, through which the area has been positively transformed and the quality of life of many of the people who live there has improved. The *Casavalle Stream Basin Programme Council (Casavalle Council)* is an inter-institutional body created by resolution of the departmental government and made up of representatives of various state bodies from the three government levels[2]. Its objective is to define action strategies and areas of action in the territory and to coordinate their execution among the institutions involved. The Council began its work in 2010 and is responsible for initiating and carrying out the *Casavalle Urban Planning, Recovery and Integration Plan (Casavalle Basin Integral Plan*) (IM 2012). This Plan is a planning and management instrument in which are condensed a set of actions and long-term strategies whose objective is to "promote urban and environmental recovery, revitalisation, social integration and structuring of the area in question (...) in a participatory manner" and the improvement of "the quality of life of its inhabitants, urban structures and infrastructure, and the sector´s urban landscape" (IM 2012:12). The Plan covers the area limited in Figure 2.12, and addresses aspects linked to neighbourhood infrastructure, social integration, security, health, housing, employment and education from a rights-based approach, with priority given to the "hard core of precariousness and exclusion". It is a Plan that is considered innovative as it is the first multidimensional plan that integrates the normative and the urban through the territorialisation of social and economic policies in and for Montevideo´s urban periphery (Municipio D 2019a; IM n.d.).

Within this Plan, the *Casavalle Partial Plan for Urban Planning, Recovery and Integration (Partial Plan)* is formulated within which the regulatory norms, action programmes and urban projects are formulated (DP. IM 2015a; IM n.d.). This Partial Plan focuses on urban operations of restructuring, reparcelling, renovation and requalification, which are proposed as programmes or concrete projects of integrating and multi-scalar public spaces. In a medium and long-term vision, the Plan seeks through them to generate an impact on broader collective identities and to promote both social integration and zonal territorial development integrated into the metropolitan context. In addition, it intends that these planning and intervention proposals be conceived and approached with a "conscious view from the natural support" (DP. IM 2015a:8). This implies a paradigm change in the way of seeing and constructing the territory, conceiving the natural support as an opportunity. Specifically, the Plan values and highlights "watercourses and relief" (DP. IM 2015a:8), considering them as elements with landscape and visual potential, generating public spaces of outstanding quality and as territorial structuring and connecting elements.

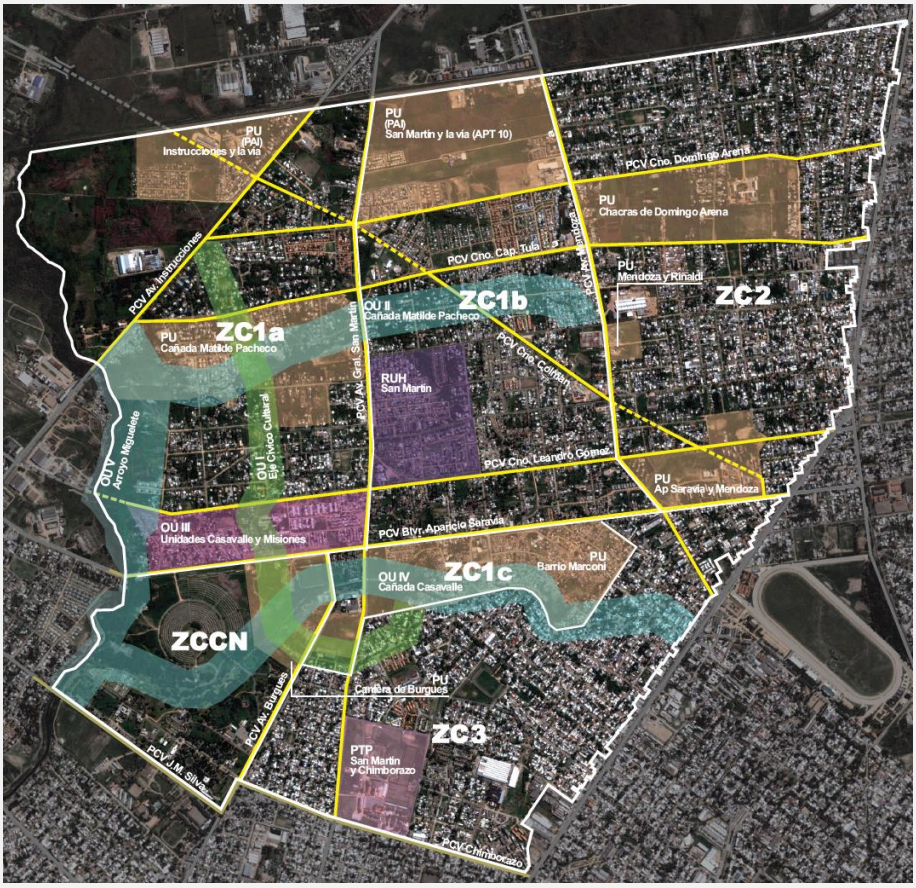


Figure 2.12: Casavalle Plan limits and Iyuí Plan (as "OU II. Cañada Matilde Pacheco" in aqua green)

Source: (DP. IM 2015b)

2 Representatives of Ministry of Social Development (MIDES), Ministry of Education and Culture (MEC), Ministry of the Interior (MI), Ministry of Public Health (MSP), Ministry of Labour and Social Security (MTSS), Ministry of Housing, Land Management and Environment (MVOTMA), National Sports Secretariat (SND), Social Security Bank (BPS), State Health Services Administration (ASSE), National Public Education Administration (ANEP), UTU Technical Professional Education Council (CETP), National Housing Agency (ANV), Plan Juntos, University of the Republic (UdelaR), Montevideo City Council (IM), Municipality D (Municipio D) and Neighbourhood Council 10 and 11 (CCZ 10 and 11) (Municipio D 2019a)

2.4.1 IYUÍ URBAN OPERATION, PROGRESS AND MATERIALIZATIONS DISCUSSION.

For the moment, the urban proposal for the Iyuí Stream is still in a preliminary state and with a very gradual progress despite being a priority project. Moreover, the current proposals are incongruent and fragmented. As analysed in Box 2.3, currently there are no preliminary project proposals in the area where the Iyuí Stream and the Miguelete Stream are linked. Thus, not achieving, regarding public spaces, a territorial development integrated into the metropolitan context, objective of the Partial Plan. Even so, there is no public space proposal for the Iyuí Stream´s southern section between Curitiba Street and San Martín Avenue, nor are there any links between the preliminary projects or with the existing materialisations. As well, and even more important, there are no single and integral preliminary plans for the entire Iyuí Stream as a whole linear public space with the stream as a structuring piece; the objective of Iyuí Stream Urban Operation. Regarding the intentionality of natural support as an "opportunity" (IM n.d.:28), it only seems to be approached with the Stream as an urban structuring element and not from the landscape and visual potentials and/or as generators of public spaces of outstanding quality, as the plans announced. Apparently, the only exception to this is tender No. 373537/1, which has a brief mention of a sustainable drainage approach and the incorporation of associated landscape elements. Albeit, it would be necessary to wait for the final project proposal, so that the same as with the examples mentioned above does not happen.

Even, the Plan does not manage to incorporate a sustainable ecosystemic vision into the proposal or to generate instances of participation. Firstly, there is a clear absence of the ecosystemic dimension in the environmental recovery's intentionality that the plans indicate and aspire to. There is a reiterated will to achieve urban-environmental approaches and the promotion and valorisation of natural support as an opportunity, but this approach is neither integral nor sustainable. As far as participation is concerned, although it is a substantial part of each of the narratives that make up the structure of the actions, establishing itself as a "permanent line of action in the process" (IM, 2013:9); however, with the exception of the Casavalle Plan's preparation, no citizen participation was found in any progress (IM n.d.).

In essence, at the macro scale, the proposal for the Iyuí Stream fails to either visualise the urban watercourse as a key element of sustainable development of the area (see Chapter 1. Section 1.1.2), or to incorporate the transformative potential and associated benefits as an Ecosystem and community-based adaptation action that this resource and associated spaces have (see Chapter 1. Section 1.1.3). In fact, the Iyuí Stream has the potential to be an educational-environmental space that evidences and raises awareness of its ecosystem value and potential, as well as being a platform for environmental literacy, action and citizen empowerment, with the community being the designer, manager and guardian of its own resources. Likewise, without participation, the chances of erratic integration of cultural-symbolic dimensions and the generation of bonds of belonging and recognition among inhabitants are greater, and opportunities for social integration are reduced. The significant number of new inhabitants resulting from the planned relocation and new housing cooperatives, as well as the new high school students who will attend the new high school planned on the Iyuí Stream´s margins (see Box 2.3. Table 2.6), are potential and essential co-creators and co-managers of their surroundings, and can both generate positive environmental, urban and social feedback and benefit from all the amenities that this process of ecosystemic participation entails (see Chapter 3. Sections 3.1.3 and 3.1.4).

Notwithstanding the Iyuí Stream Plan's situation, there are already satisfactory experiences of co-design and co-management of parks and socio-community projects near this watercourse. Even, there are new proposals by the Montevideo City Council[5] for ecosystemic environmental restoration of urban watercourses with transversal citizen participation. Both experiences are detailed in the following Section. Therefore, it is estimated that a co-designed rehabilitation project for Iyuí Stream could be a viable proposal following a paradigm shift in the course of the gradual implementation that Urban Operation is undergoing.

[5] For the purposes of this study, the Intendencia de Montevideo is translated as Montevideo City Council. However, its legislative and administrative powers are departmental, so it functions as a second level of government, after the national government. It is worth noting that Montevideo also has eight municipalities, which form the third level of government. One of them is Municipality D, which corresponds to the neighbourhood of Casavalle.

• BOX 2.3 •

IYUÍ STREAM URBAN OPERATION PROGRESS AND MATERIALISATIONS

With regard to Section 1 of Iyuí Stream's Urban Operation and despite its priority nature, since the Casavalle Plan inception to the present day, only some of the actions proposed have been materialised and gradually developed. Initially, Table 2.1 and 2.2 show two road and sewage interventions that have already materialised for which practically no information was available. These involve the canalisation of an Iyuí Stream´s fragment by a closed concrete collector to also generate a pedestrian and vehicular roadway in the upper part, improving connectivity at those nodes. However, the structure shown in Table 2.1 generates a total discontinuity between the projected infrastructure and the surrounding public space, failing to comply with and making it difficult to achieve the spirit of the Partial Plan and Urban Operation II of wanting the watercourse to be an element of both landscape and visual potential and a public space of outstanding quality.

Figure 2.13: Road and sanitation work in Montes Pareja Street and Iyuí Stream. Date: September 2021

Intervention	Road and sanitation work
Location	Dr. Justo Montes Pareja and Iyuí Stream
Date of realization	n/d
Description	Intervention that connects both Stream´s banks by foot and by vehicle, replacing an old pedestrian bridge and also channels it into a rectangular concrete channel. The initiative improves the accessibility of the area (PATIO 2015; FADU 2015).

Table 2.1: Road and sanitation works in Iyuí Stream and Montes Pareja Street

Figure 2.14: Road and sanitation work at Iyuí Stream and San Martín Avenue intersection. Date: February 2022

Intervention	Road and sanitation work
Location	Avenida General San Martín and Iyuí Stream
Date of realization	n/d
Description	Intervention that belongs to the public tender no 265470/1. It consists of a double rectangular concrete canalization where the Iyuí Stream, the North Stream and the South Stream converge, being the closing point of the waters coming from the Iyuí Stream´s upper basin. The intervention also includes a road project with a vehicular road and pedestrian sidewalks (DDA. DS. IM 2013).

Table 2.2: Road and sanitation work at Iyuí Stream and San Martín Avenue intersection

Concerning the urban proposals, as can be seen in Table 2.3, in 2019 a preliminary project was developed for the Iyuí Stream´s banks landscaping of the closest sections of the Miguelete Stream. On the one hand, it can be identified the spirit of both Plans for an urban-environmental recovery by rectifying and channelling the Stream. On the other hand, the intentions to improve accessibility in the area through the proposal of a new street, the pedestrian walkway with associated lighting and the bicycle path are visualised. As well, the preliminary project addresses the aspects of improving the quality of life, social integration and implementation of collective facilities through the programming of these spaces with sports and recreational facilities. However, first of all, the preliminary project is too basic, failing to visualise the opportunity or to exploit the natural support on which it is placed. The preliminary project also has a fragmented and autistic programming with the environment, not responding neither to the socio-cultural needs of its inhabitants nor integrating any cultural or symbolic dimension that allows generating "links of belonging and recognition" (IM 2014b).

Figure 2.15: Fragment of Iyuí Stream Park project´s blueprint from Calle 10 to Dr. Justo Montes Pareja Street
Source: DDU. IM (2019a)

Figure 2.16: Fragment of Iyuí Stream Park project´s blueprint from Dr. Justo Montes Pareja Street to Dr. José Martirene Street
Source: DDU. IM (2019b)

Intervention	Iyuí Stream Park project
Location	Calle 10 to Dr. José Martirene Street
Date	July 2019
Description	Preliminary project for parks on the banks of the Iyuí Stream from the Miguelete Stream to Dr. José Martirene Street. Large tree-lined green areas with perimeter walkways and associated lighting are proposed. A coloured concrete cycleway is indicated on Dr. José Martirene Street. The area above Horacio García Lagos and Dr. José Martirene Street is programmed with a soccer field. Likewise, between Almeida Pintos and Dr. Justo Montes Pareja streets, a new street is planned, the remaining free area is mainly equipped with sports and recreational programmes (soccer field, lawn volleyball, multi-sports court and children's playground).

Table 2.3: Preliminary project for parks on the banks of the Iyuí Stream from the Miguelete Stream to Dr. José Martirene Street

In addition to the previous urban proposal, as can be seen in Table 2.4, an urban preliminary design was developed in early 2020 for the northern fragment of the Iyuí Stream close to Urban Operation´s Section 2 (see Figure 2.9). This is a significantly more detailed proposal than the one in Table 2.3. However, it focuses more on the development of the new housing and the coordination of the basic services associated with it than on the public space associated with the Iyuí Stream. Nonetheless, the proposal identifies the northern bank of the Iyuí Stream and recognises its topography and existing tree species, generating a minimal proposal for lighting and revegetation with native species loaded with symbolism (Ibirapitá). Nevertheless, although the project comes close, it does not delve into the landscape or visual aspects, lacking programmatic proposals and/or collective equipment that take advantage of the spatial potential. As no descriptive memories have been found associated with the urban proposal, it is not possible to determine whether this is the definitive programmatic landscape proposal for this space or simply a minimal expression´s complementary project approach.

Figure 2.17: Urban Operation II. Matilde Pacheco urban proposal plan´s fragment between Iyuí Stream and Curitiba Street
Source: DDU. IM (2020)

Figure 2.18: Urban Operation II. Matilde Pacheco urban proposal plan´s fragment for Iyuí Stream between Parahiba and Campinas streets.
Source: DDU. IM (2020)

Intervention	Urban Operation II. Matilde Pacheco urban proposal plan for Iyuí Stream between Parahiba and Campinas streets
Location	Matilde Pacheco Street between Curitiba and Campinas streets
Date	27/01/2020
Description	Detailed urban design proposal for the northern strip of the Iyuí Stream between Curitiba and Campinas streets. The proposal includes the location of new constructions and demolition of existing housing adjacent to the watercourse, as well as details of the construction of associated water supply, sanitation, drainage and public lighting services. The Iyuí Stream is projected to receive the new projected storm drains (green lines) from this new urban development. The green space on the Iyuí Stream´s banks is indicated as free and buffered, equipped only with lighting. In terms of landscaping, the project takes into account the topography of the terrain and indicates the contour lines. It is proposed to maintain all existing tree species (trees in light blue) and to plant new Ibirapitá trees (trees in orange) along Matilde Pacheco Street.

Table 2.4: Urban design proposal for the northern strip of the Iyuí Stream between Curitiba and Campinas streets.

Additionally, also in 2020, the tender detailed in Table 2.5 is launched for the intervention of the Iyuí Stream´s entire Section 1. The project brief calls for a design that achieves satisfactory coordination with the urban, road and landscape projects already developed by Montevideo City Council (detailed in Tables 2.1 to 2.4) and at the same time eliminates the likelihood of flooding. In addition, it mentions the consideration of drainage infrastructures of potential landscape value through the incorporation of green or sustainable drainage measures that improve the context of the neighbourhood, giving as examples possible meanders and plants on the slopes. This narrative proposes a different approach to the watercourse and its surroundings´ urban-environmental recovery, valuing it as a natural support. However, this approach does not agree with both the urban proposals submitted (which show a stream channelled and rectified with concrete slopes) and the materialisations already carried out.

Intervention	Tender for Iyuí Stream´s executive intervention project
Location	Iyuí Stream from San Martín Avenue to Miguelete Stream´s mouth
Date	2020
Description	Tender Nº 373537/1 for the elaboration an executive project for Iyuí Stream intervention from San Martín Avenue to Miguelete stream´s mouth. It is requested that the project to intervene in the Iyuí Stream considers both the elimination of possible flooding in formal patterns, the incorporation of green or sustainable drainage measures promoting potential landscape value´s drainage infrastructures to improve the neighbourhood context (e.g. plants on slopes, meanders), that it incorporates both Montevideo City Council´s landscaping projects for the Iyuí Stream´s banks as well as housing resettlement´s projects and road interventions. It is also requested that the project for the Iyuí Stream be designed for a return period of 25 years and 100 years for the formal lands (IM 2020a).

Table 2.5: Tender for Iyuí Stream´s executive intervention project

Lastly, Table 2.6 mentions the last of the implementations surrounding the Iyuí Stream, the construction of High School n°69. The implementation of this type of educational programme implies a new and massive target public, a significant change both in the dynamics of the area and in the cultural-symbolic and social dimensions to be considered both in the design of public space projects associated with the Iyuí Stream and with which to build the city jointly.

Intervention	Secondary School n°69
Location	Calle 12 Metros and Matilde Pacheco Street
Date of realization	07/2022 – 08/2023 (Canal 5 2022)
Description	The construction of the new building of the full-time secondary school n°69 has started. It has a minimum capacity of 300 students and will accommodate the student population of the neighbourhood from the recent resettlements in the area. It will consist of a construction of 3205m2 in total distributed over two floors framed by central sports and recreation area. The school will also have various facilities such as 4 laboratories, a library, a kitchen and a dining room, among others (JDM 2021; ANEP 2021; Canal 5 2022).

Table 2.6: Secondary School n°69

2.5 BACKGROUND FOR THE CO-DESIGNED REHABILITATION OF URBAN STREAMS IN MONTEVIDEO

Notwithstanding the lack of participation and the very gradual and erroneous environmental recovery and the generation of public space with landscape/visual potential for the Iyuí Stream (see Section 2.4 and 2.4.1); there are practices, materialisations and proposals that have managed to satisfactorily address some of these aspects that the Iyuí Stream´s Urban Operation unwisely resolves. This can be perceived both in some of the materialisations within the Casavalle Plan and in some proposals within other similar land-use plans detailed in Box 2.4. These examples point out that, close to the Iyuí Stream, there already exist both successful experiences of co-design and co-management of parks and socio-community projects as well as new paradigms of ecosystemic environmental recovery of urban watercourses with transversal citizen participation. Therefore, a co-designed rehabilitation project for Iyuí Stream could be a viable proposal as a paradigm shift in the course of the gradual implementation that the Urban Operation is undergoing. Given the new housing and re-housing already implemented and planned, the area around the Iyuí Stream is already undergoing changes at the community level, with a significant concentration of young people along the watercourse on the near horizon. Both the historic community of Casavalle and this new imminent community have great binding potential to co-design and co-manage the environment that will form a crucial part of their daily setting.

• BOX 2.4 •

PRACTICES, MATERIALISATIONS AND PROPOSALS OF CO-DESIGN, CO-MANAGEMENT AND REHABILITATION OF URBAN WATER STREAMS IN MONTEVIDEO

Concerning citizen participation, Table 2.7 shows a Casavalle neighbourhood´s co-management project implemented in the SACUDE Municipal Complex. This is a positive example of a project linked to the areas of health, culture and sport, which has been in operation for more than a decade in its new format where the neighbours together with state technicians make up the highest decision-making body. A project with broad and growing participation and impact in the community and which is also a reference for other neighbourhoods with similar needs and projects (El País Uruguay 2018; SACUDE 2019, n.d.) In addition, Table 2.8, shows a materialised public square project co-designed jointly with the neighbours of the area. In order to make the final project a reality, there were several instances in which the community designed and conveyed what they wanted for this space. Project decisions that clearly demonstrate this are the incorporation of fire pits, and equipment that no other square in Montevideo has. Other examples are the incorporation of recreational water jets and the "Marconi" signage. Regarding the environmental recovery of the watercourse and its associated ecosystem and the generation of public space with landscape-visual potential, Table 2.9 shows a Plan under review for an urban watercourse 6km away from Iyuí. This Plan is developed in an area with similar socio-territorial issues to those of the Casavalle Basin. However, there is a paradigm shift in the imaginary and the environmental recovery proposal´s approach. The Plan has a vision that integrates a search for rehabilitation with an ecosystemic perspective together with integral participation and citizen environmental education.

Figure 2.19: Activities at SACUDE

Source: (JBC DE PIRIAPOLIS 2020)

Title	SACUDE Municipal Complex
Location	5340 Los Angeles Street, Casavalle, Montevideo
Land Management Plan	Integrates Casavalle Plan, Urban Operation I - Civic Cultural Axis "SACUDE - CEDEL".
Status	Completed and operational
Community link with the project	A socio-community project co-managed by representatives of the Montevideo City Council and neighbourhood representatives. The Co-management Commission is the highest decision-making body of the complex. It is made up of: - four City Hall technicians (the management coordinator and one responsible for the health area, one for culture and one for sports) -three neighbourhood representatives (one responsible for health, one for culture and one for sport)

	- one neighbour representing Friends of SACUDE Complex (Asociación Civil Amigos del Complejo SACUDE). It focuses on community participation through teamwork, networking, inter-institutional and interdisciplinary work. It is committed to individual and collective transformation for the people of the Casavalle, to improving the quality of life of the neighbours with a focus on rights and social equity (SACUDE n.d.).
Brief description	Originally a historic Municipal Club (1941), a meeting place for neighbours to practice sports and cultural activities, managed by a neighbourhood committee. In 2010, within the framework of the Casavalle Plan, an extension was built, reaching a surface area of 10,700 square metres, including an enclosed multi-purpose gymnasium, changing rooms, polyclinic, community hall and theatre for 500 people, an amphitheatre for 100 people, football pitch, open park of 4,200 square metres and healthy community facilities. There are sports and recreational activities for all ages and a variety of cultural workshops and free, high-quality shows (SACUDE n.d.).

Table 2.7: Co-managed socio-community project SACUDE

Figure 2.20: Aparicio Saravia Space Square

Source: (IM 2020b)

Title	Aparicio Saravia Space Square
Location	3622 Aparicio Saravia Boulevard, Marconi, Montevideo
Land Management Plan	Part of the Casavalle Plan, "Barrio Marconi Urban Project" within the Linear Public Spaces associated with roadways (Intendencia de Montevideo 2012)
Status	Completed and operational
Community link with the project	The project arises from exchanges carried out in three different instances of participation with neighbours and groups in the area through design workshops between 2017 and 2018 (Pilarsyl S.A n.d.; DDU.IM 2018; Municipio D 2019b; IM 2020b).
Brief description	An accessible 10,000 m2 square with recreational spaces, with a healthy play area, hammocks, a "living" area, skateboarding activities, children's games, water games, a multi-purpose court and paved areas for multi-purpose use (amphitheatre, skateboarding, firepits, etc.) (Pilarsyl S.A n.d.; DDU. IM 2018; IM 2020b).

Table 2.8: Aparicio Saravia Space Square participatory design project

Figure 2.21: Chacarita Creek Strategic Operation

Source: (IM 2020c)

Title	Chacarita Creek Strategic Operation
Location	Chacarita Creek, Bañados de Carrasco, Montevideo
Land Management Plan	Chacarita Creek Basin Plan
Status	Not built. Plan launched in 2016 under review (IM 2020c)
Community link with the project	A call for suggestions and feedback for the final drafting of the Plan was made by e-mail and in person at the Montevideo City Council (IM 2020c)
Brief description	Plan for the Chacarita Creek Basin still under review. This basin presents both environmental problems and socio-economic vulnerability problems similar to those of Casavalle. The Plan recognises both the ecosystemic and fragile value of the wetlands of the Carrasco Creek Basin to be preserved and the high fragility of the edges of the watercourses given the pressures of informal occupations on them. The watercourses of the Basin are considered as potential new articulators of these areas, proposing them as

	new landscape connectors and as future linear parks. The recovery of Chacarita Creek and its redevelopment is considered from a perspective linked to the care and recovery of the environment and the respectful use of its watercourses. It is established that the proposals to be developed for this watercourse must recognise the hydrology, and the environmental management of the course in articulation with the social, economic and temporal aspects of the interventions. An imaginary for Chacarita Creek is established in which the recovery of the watercourse to a "natural state of citizen use" is proposed(IM 2020d:92). It is proposed that both the constructed work and the proposal to work with the community generate a new link between the inhabitants and the watercourse, seeking to encourage them to better manage and care for urban water (IM 2020d).

Table 2.9: Chacarita Creek's environmental restoration

3

LITERATURE REVIEW

Chapter 3. Literature Review critically recapitulates what the researcher considers to be the main existing scientific knowledge on co-design with local communities in the rehabilitation processes of urban watercourses, presented in Chapter 1. Introduction, building Chapter 4. Methodology foundations. Additionally, it identifies a gap related to the research topic in the existing literature, determining the relevance of this study and framing it within the existing new scientific knowledge.

3.1 TRENDS AND GAPS IN THE SCIENTIFIC LITERATURE

There is a clear trend of increasing publications since the 2000s on Nature-Based Solutions and within these, on Ecosystem and Ecological Restoration, thus it is considered an in-vogue topic (IUCN 2016). Figure 3.1 represents, in *bordeaux*, a significant increase in publications linked to ecological restoration, in relation to the rest of the themes linked to nature-based solutions.

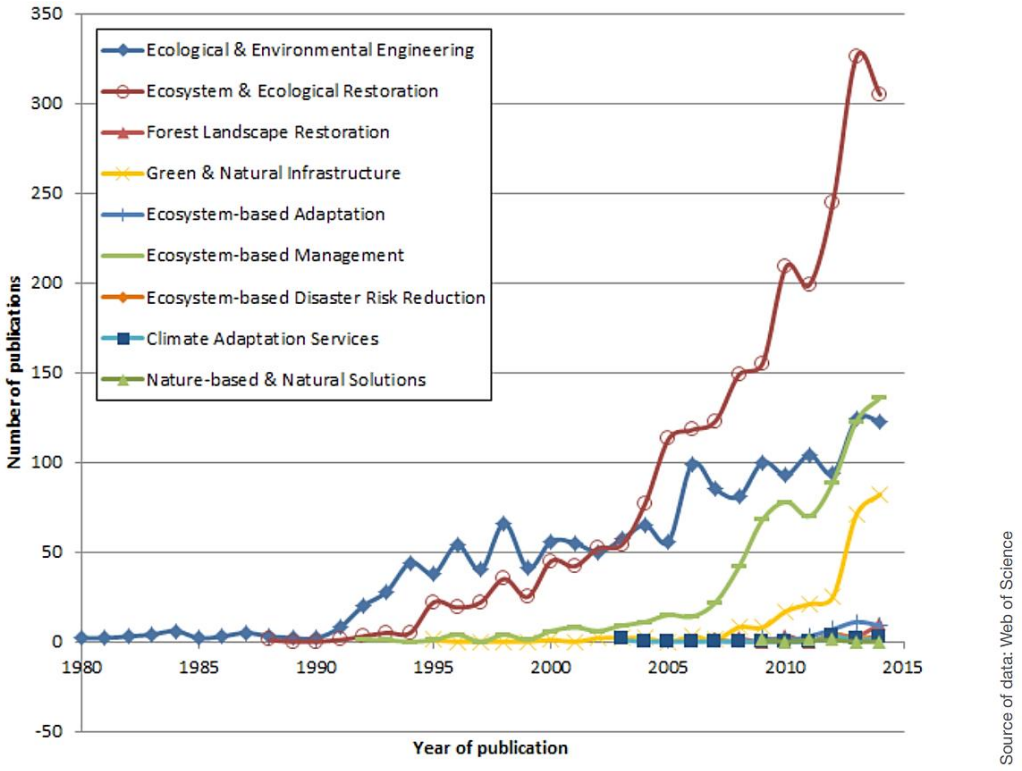


Figure 3.1: Trends in the number of research papers mentioning NbS approaches (1980-2014)

Source: IUCN (2016:23)

Within the literature related to NBS, it is indicated that more research and practical experimentation is needed to address sustainable local-scale planning approaches together with communities, in order to address challenges such as water pollution (Albert et al. 2019; Kabisch et al. n.d.; Nesshöver et al. 2017; Raymond et al. 2017).

Of all the literature consulted in relation to watercourse rehabilitation and co-design, it was found that there is a clear lack of studies and information linked to the global south and within this to the precariousness and socio-economic vulnerability contexts of Latin America. The clear gap between the literature pertaining to the global north and the global south is represented in Figure 3.2. Within the literature found, multiple case studies of restoration or ecological rehabilitation of urban watercourses from the global north were found (AR 2016; Brown et al. 2018; ECRR n.d.; Riley 2016; NWRM n.d.; IUCN 2016; EA 2006; Prominski et al. 2017; RRC 2013; Lim et al. 2022; WWF & EcoAct 2021; WSC n.d.; Sammonds & Vietz 2015;) compared to the global south (Brown et al. 2018; French et al. 2020; RISE n.d.; Zari et al. 2020). Even within the global south, the cases identified

in the literature related to Central and South America are very few (Espinosa et al. 2016; Veról et al. 2020). The need for research on these issues in the global south and especially in the context of informal urban settlements are made explicit in ADB & MU (2021b), Dobbs et al. (2018) and Rubi & Hack (2021) articles.

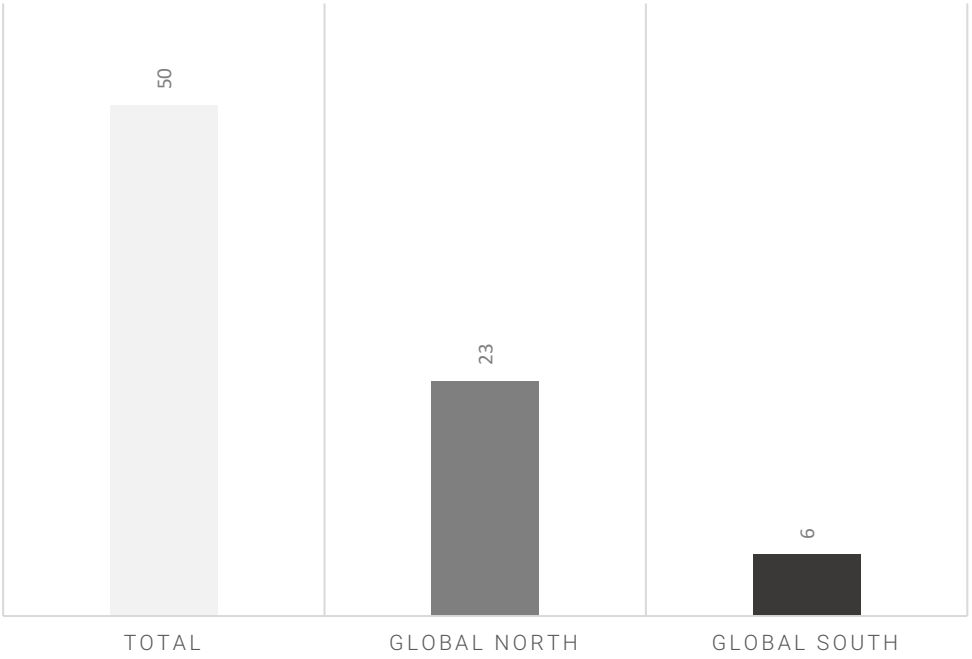


Figure 3.2: Information sources origin resulting from the literature used

Among the countries of the global North, Australia, and within this Victoria, is a benchmark in the development of literature associated with Water Sensitive Cities with many successful experiences related to urban waterways' co-designed rehabilitation already implemented. Within the global north, the literature associated with Water Sensitive Cities is predominantly Australian (ADB & MU 2021a, 2021b, 2021c; Brown et al. 2016; CRC for WSC 2013; CRC for WSC n.d.). There is both literature on manuals and protocols for naturalisation and rehabilitation of their urban watercourses available (ADB & MU 2021a, 2021b, 2021c; Rutherfurd et al. 2000), as well as specific literature related to co-design with communities (ADB & MU 2021c; Burkett n.d.; McKercher 2021; Steen et al. 2011). Moreover, Australia, and within this, Victoria, has multiple successful experiences of urban watercourse naturalisation/rehabilitation implemented with the aim

to transform their city into a Water Sensitive City (WSC n.d.; Sammonds & Vietz 2015; Mekala et al. 2015; MW n.d.; CRC for WSC 2017; ICC 2016; MW n.d.).

Having identified this clear literature gap, this chapter will delve into the scientific literature related to Water Sensitive Cities, and within these, rehabilitation as a way to address the problem of polluted urban watercourses, as well as co-design practices for their implementation and management. While these will be taken mostly from literature linked to the global north, they will be critically reviewed with a view to implementing it in the Iyuí Stream case, described in *Chapter 2*.

3.1.1 WATER SENSITIVE CITIES

Water Sensitive Cities (WSC) is a holistic vision of urban water management and is considered the last of the stages in the development of a city's water management. WSC integrates a self-sufficient and healthy water network through the creation, repair and protection of the ecosystem and recreational services in the urban ecological landscape, the reduction of the effects and impacts of climate change, the enhancement of public health and the promotion of an actively engaged community with water (Brown et al. 2009; 2016).

The six distinct stages of development in the transition to more water-sensitive cities are shown in Figure 3.3 (Brown et al. 2009). The dark blue vertical line that divides the first three states from the next three, indicates a paradigm shift in the view of water management in a city. Firstly, the first three states (Water Supply City, Sewered City and Drained City) have a management approach ranging from the most basic, water supply to a city, to flood protection. In this first division, Jefferies & Duffy (2011) identify several cities in global south countries. Thereafter, the second three states (Waterways City, Water Cycle City and Water Sensitive City) have a more sophisticated management approach that involves a change in the perception of waterways, incorporating aesthetic and social value, a pursuit toward water self-sufficiency and the incorporation of measures to reduce

and mitigate climate impacts. In this second division, Jefferies & Duffy (2011) identify several cities in global north countries.

Therefore, for the transition to a WSC to happen, changes are needed both at the socio-political level and related to the provision of water supply and drainage services. This means that is necessary an incremental change in the expectation, attitude and environmental awareness of the prevailing society and institutions towards the management of their water. Equally important, it is also required adaptive and multifunctional urban designs and infrastructures that reinforce water-sensitive values and behaviours. Figure 3.3 represents this change with the two horizontal arrows accompanying the transition.

However, while the nested continuum of transition states appears sequential, Brown et al. (2016) indicate that this shift is not necessarily linear or progressive. The concept of 'leap-frogging' is introduced, which implies the jump from one transition to another, more sustainable and water-sensitive phase, not passing through one or more of the intermediate stages of water cycle management.

In fact, the latter concept is particularly relevant for cities such as Montevideo, with water management systems corresponding to the first set of three stages as shown in the Iyuí case (see Chapter 2. Section 2.1). Through 'leap-frogging', Montevideo could both avoid the environmental, social and economic vulnerabilities associated with that primary set and gain the benefits associated with WSC (see Sections 3.1.2 to 3.1.4).

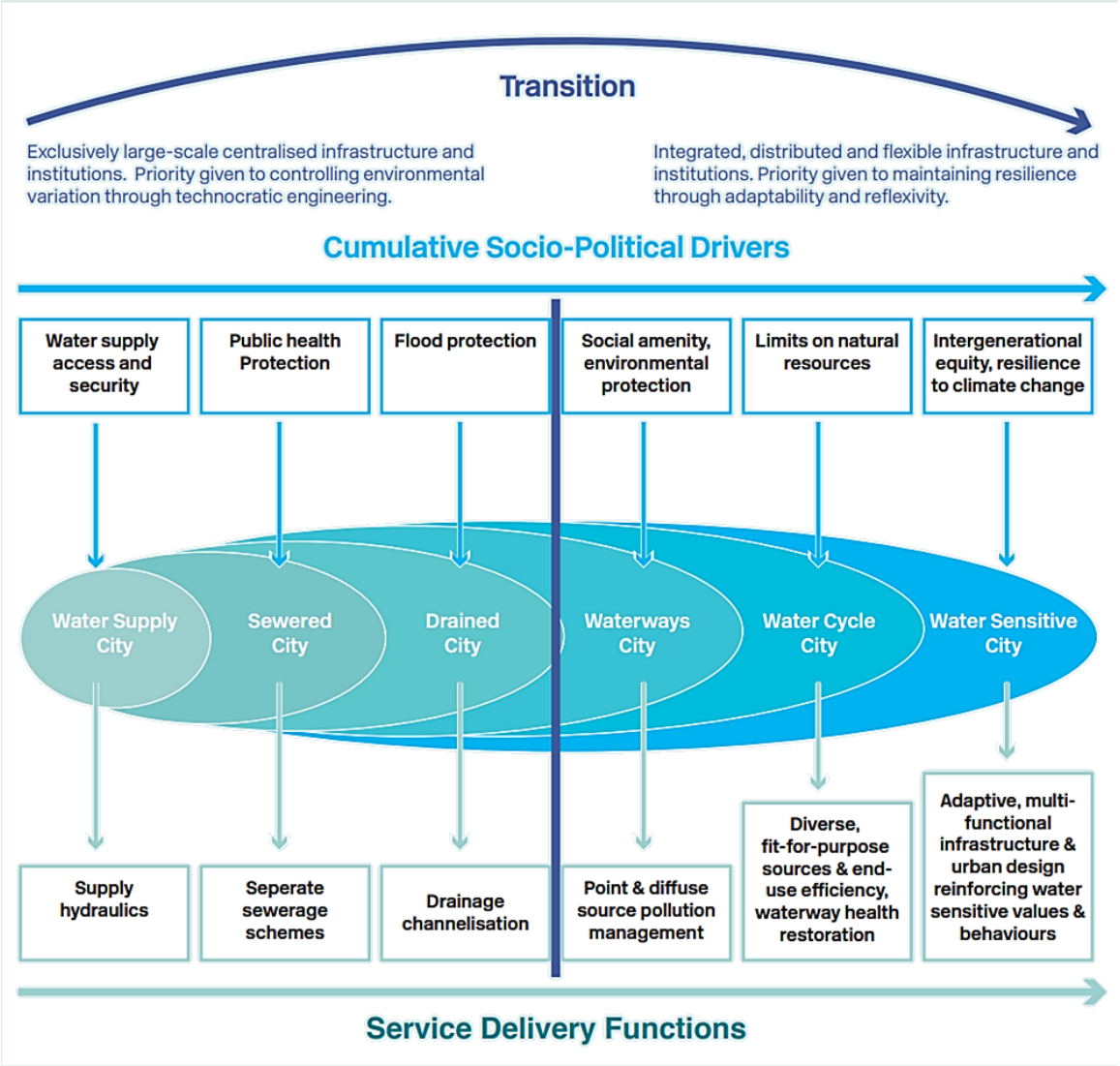


Figure 3.3: Urban Water Transitions Framework

Source: Brown et al. (2016:12)

WSCs are cities that provide ecosystem services and comprise water-sensitive communities. These are two of the three pillars that support it, which are represented in Figure 3.4 (Brown et al. 2016). "Cities providing ecosystem services" means building and/or transforming the urban landscape, its public spaces and green spaces towards spaces that incorporate sustainable water, environmental management and other ecological services that maximise water-related, built-environment and people co-benefits. This implies understanding and designing the city as a liveable and climate change-resilient ecosystem (ADB & MU, 2021a). In fact, an important component of this pillar is the environmental protection and rehabilitation of degraded waterways, bays and

groundwater (see Section 3.1.3). This is the improvement of the health of existing water bodies and their ecosystems (ADB & MU, 2021a). On the other hand, "Cities comprising water-sensitive communities" mean community support in the adoption and implementation of sustainable, water-sensitive and human rights-based solutions. This pillar implies an informed and active participatory community in all aspects related to the co-design, co-production and maintenance of water services programs and projects (see Section 3.1.4) (ADB & MU, 2021b).

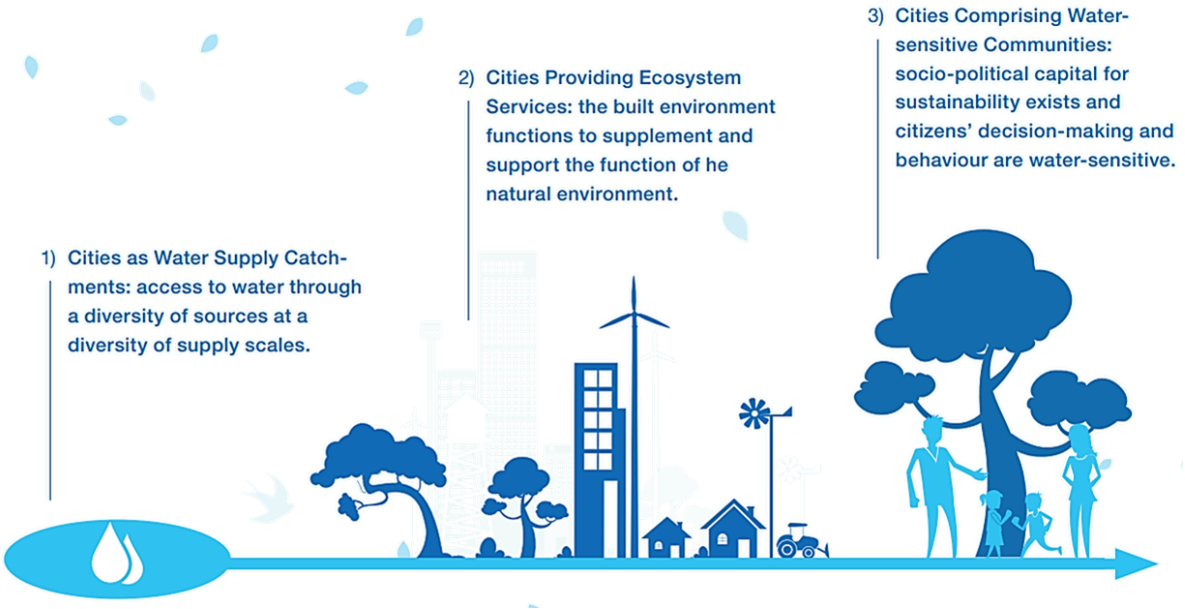


Figure 3.4: Water Sensitive Cities' pillars

Source: ADB & MU (2021a:10)

3.1.2 NATURE-BASED SOLUTIONS (NBS)

Natured-Based Solutions is a relatively young concept introduced by the World Bank in the late 2000s (Pauleit et al. 2017) and is still under development, so multiple definitions with minor variations can be found. However, the concepts that are discussed most in the literature are those of the International Union for Conservation of Nature (IUCN) and the European Commission (EU), depicted in Table 3.1 (Albert et al. 2019; IUCN 2016; Kabisch et al. n.d.; Nesshöver et al. 2017; Raymond et al. 2017).

In essence, both definitions share the view that NBS are sustainable and adaptive actions of restoration, maintenance and management of natural or modified ecosystems that provide multiple benefits to human well-being and biodiversity. However, the European Commission uses a more encompassing definition with a focus on the naturalisation of modified ecosystems and on social inclusion and emancipation through the actions.

IUCN :	"Actions to protect, sustainably manage and restore natural or modified ecosystems that address societal challenges effectively and adaptively, simultaneously providing human well-being and biodiversity benefits." (IUCN, 2016:5)
European Commission :	"…actions which are inspired by, supported by or copied from nature. (…) Nature-based solutions use the features and complex system processes of nature… in order to achieve desired outcomes, such as reduced disaster risk, improved human well-being and socially inclusive green growth. Maintaining and enhancing natural capital, (…) These nature-based solutions ideally are energy and resource-efficient, and resilient to change…"(European Commission, 2015:5)

Table 3.1: Definitions of NBS by the IUCN and the EU

Source: EC (2015) and IUCN (2016)

A key advantage of implementing NBS over other technical solutions is the "co-benefits" which are the additional benefits that they provide (Albert et al. 2019; EC 2015; Kabisch et al. n.d.; Raymond et al. 2017). Co-benefits arise by addressing social, economic and environmental challenges through building or enhancing ecosystem services co-produced with the community. Figure 3.5 represents the main co-benefits resulting from the

application of NBS within the different systems that constitute the urban system as well as four other dimensions that can appear simultaneously in the application. This shows the co-benefits are holistic. Of these, I highlight the improvements to environmental systems and the physical environment, such as improved green spaces, air and water quality. Together with these, there are benefits to socio-economic and sociocultural systems such as improved water and green space management, following participatory planning and governance that improves social justice and cohesion, public health and well-being, and provides economic opportunities and green jobs (Raymond et al. 2017)

However, despite the goodness of the associated co-benefits, NBS is not always the most favourable solution. They require more space than traditional grey infrastructure, more time to implement, and sometimes more funding (Albert et al. 2019; Davis & Naumann 2017; Tucci 2005).

The latter is relatively special for a city like Montevideo with a more constrained budget. However, while the initial cost may be higher, the associated immediate and long-term co-benefits (e.g., the immediate well-being benefits associated with the implemented environment, its community and biodiversity) amortise these initial costs by far (CIRIA 2017; Davis & Naumann 2017; Raymond et al. 2017; Sandström et al. 2006; Tucci 2005).

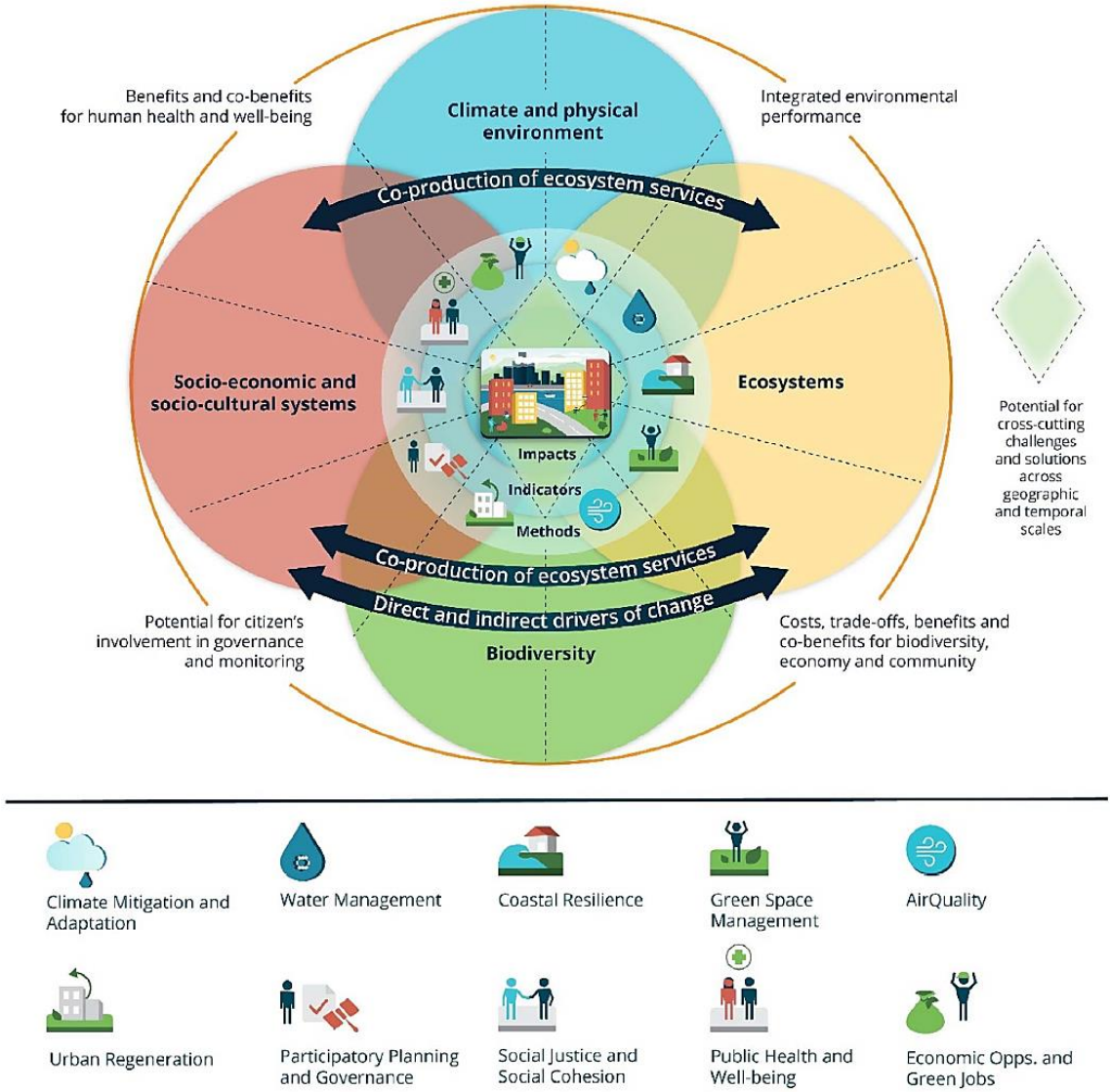


Figure 3.5: Co-benefits of implementing Nature-based Solutions in urban areas

Source: Raymond et al. (2017:5)

The NBS can materialise in a very diverse set of interventions, which have different characteristics and requirements and generate different urban spatialities (Eggermont et al. 2015; Eisenberg & Polcher 2019; WB 2021; WWF & EcoAct 2021). The most relevant for this work concerns to waterways restoration (WB, 2021)

3.1.3 URBAN WATERCOURSE RESTORATION

Urban stream restoration is a significant Nature-Based Solution to be implemented to address urban stream syndrome (see Chapter 1. Section 1.1.1). This solution also provides multiple ecosystem services to the city and its community, forming one of the pillars of Water Sensitive Cities (see Sections 3.1.1 and 3.1.2) (ADB & MU 2021b; Brown et al. 2016).

There are multiple terminologies when it comes to the repair or enhancement of a freshwater ecosystem. The most commonly used terms are restoration, rehabilitation, remediation naturalisation, and enhancement, among others. These tend to be defined similarly or used as synonyms (Espinosa et al. 2016; IUCN 2016; WSC n.d.). However, the majority of the literature reviewed recognises the definitions given in Table 3.2 and explained in Figure 3.6 (Findlay & Taylor 2006; IUCN 2016; Riley 2016). Figure 3.6 shows the schematic diagram elaborated by Findlay & Taylor (2006) which succeeds to show in a simplified way the scope of some of the concepts detailed in Table 3.2. A triangle represents the degraded ecosystem, which after *rehabilitation* action is improved and transformed into a partially re-instated ecosystem (represented as a four-pointed star). This is the intermediate step to the complete recovery and reconversion of the ecosystem to its original state, which will be achieved by the *restoration* action. It should be noted that the number of sides of each shape representing an ecosystem increases as the biodiversity and complexity of the ecosystem increases (i.e. an original natural ecosystem has more species diversity compared to when it is degraded). The created/modified ecosystem (represented as a five-pointed star) is the alternative ecosystem that did not previously exist and is reached through direct *creation*, or through *remediation* of an unsuccessful rehabilitation process. As defined by Brookes and Shields (Riley 2016), the action of *enhancement* could be placed close to the degraded ecosystem as it represents an improvement of the degraded ecosystem. *Naturalisation*, on the other hand, represents a hybrid between rehabilitation and creation and could therefore be placed in between the two.

Restoration	"…the process of assisting the recovery of an ecosystem that has been degraded, damaged, or destroyed." (Society for Ecological Restoration 2004:3) "Replicating the original state of a stream in regard to water quality, structure and stability, flow regime, and plant and animal communities" (Rutherfurd et al. 2000:377)
Rehabilitation	"The return of as much as possible of the original, pre-European characteristics of a stream, including the physical structure and stability, water quality, flow regime, and the suite of organisms in the stream. The organisms present in the stream are a good measure, in most cases, of the health of the stream, and thus whether it is being rehabilitated. Ideally, improvements introduced to the stream should be self-sustaining." (Rutherfurd et al. 2000:376) The "partial return to a predisturbance ecosystem structure and functions" Brookes and Shields (cited in Riley 2016:38)
Remediation	"Attempts to improve the condition of a stream may produce a stream that is very different from the natural stream, but nonetheless improved. Remediation is often an appropriate goal in urban stream rehabilitation" (Rutherfurd et al. 2000:376)
Creation	"…the construction of a new alternative ecosystem that did not previously exist at the site" Brookes and Shields (cited in Riley 2016:38)
Naturalization	"…an alternative to restoration and rehabilitation that defines a viable management goal for watersheds situated in landscapes characterized by intensive human modification of the biophysical environment. It implicitly acknowledges that the concept of ''natural'' is a social construct and that each community socially negotiates an appropriate mix of human and biophysical components in the local landscape" Evernden and Potts (cited in Rhoads et al. 1999)
Enhancement	"…any improvement in a structural or functional attribute, but not representing an environment of a predisturbance condition" Brookes and Shields (cited in Riley 2016:38)

Table 3.2: Some definitions used for a freshwater ecosystem repair, improvement or creation

Source: (Rhoads et al. 1999; Riley 2016; Rutherfurd et al. 2000; SER 2004)

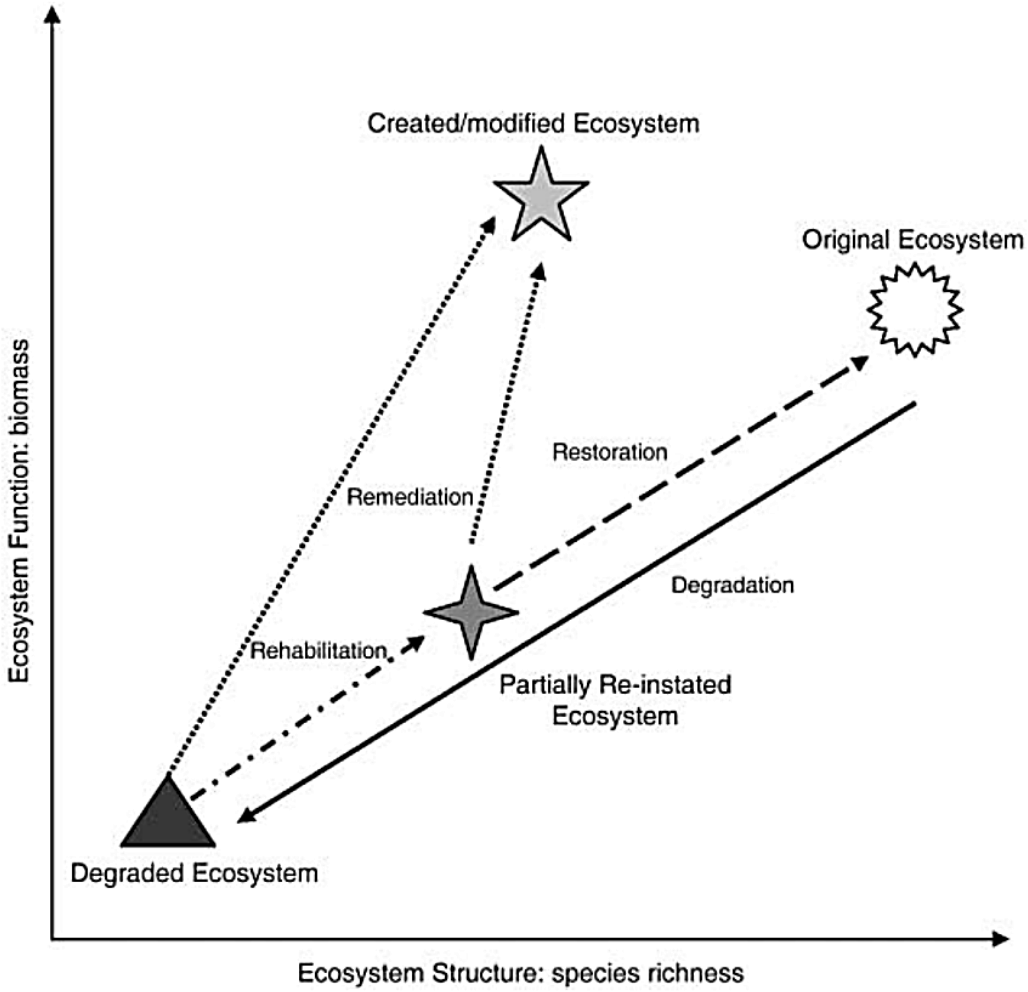


Figure 3.6: Schematic diagram distinguishing between restoration, rehabilitation and remediation

Source: Findlay & Taylor (2006)

The implementation of such actions has multiple ecosystem, social and economic benefits and services. These types of measures are considered climate change adaptation and mitigation measures, and therefore bring with them associated benefits (Addy et al. 2016; EA 2006; Devi et al. 2015; Griscom et al. 2017; Hathway & Sharples 2012; IPCC 2022; IUCN 2016; WB 2021). Some of these are depicted in Figure 3.7 and include the reduction of risks and consequences associated with water pollution. They also restore and increase biodiversity. In addition, the restoration of freshwater ecosystems establishes a meaningful relationship between the community and its environment. In conjunction with restoration, public spaces are created for community social interaction, recreation, cultural, educational and/or contemplation, thus contributing to the identity of the city.

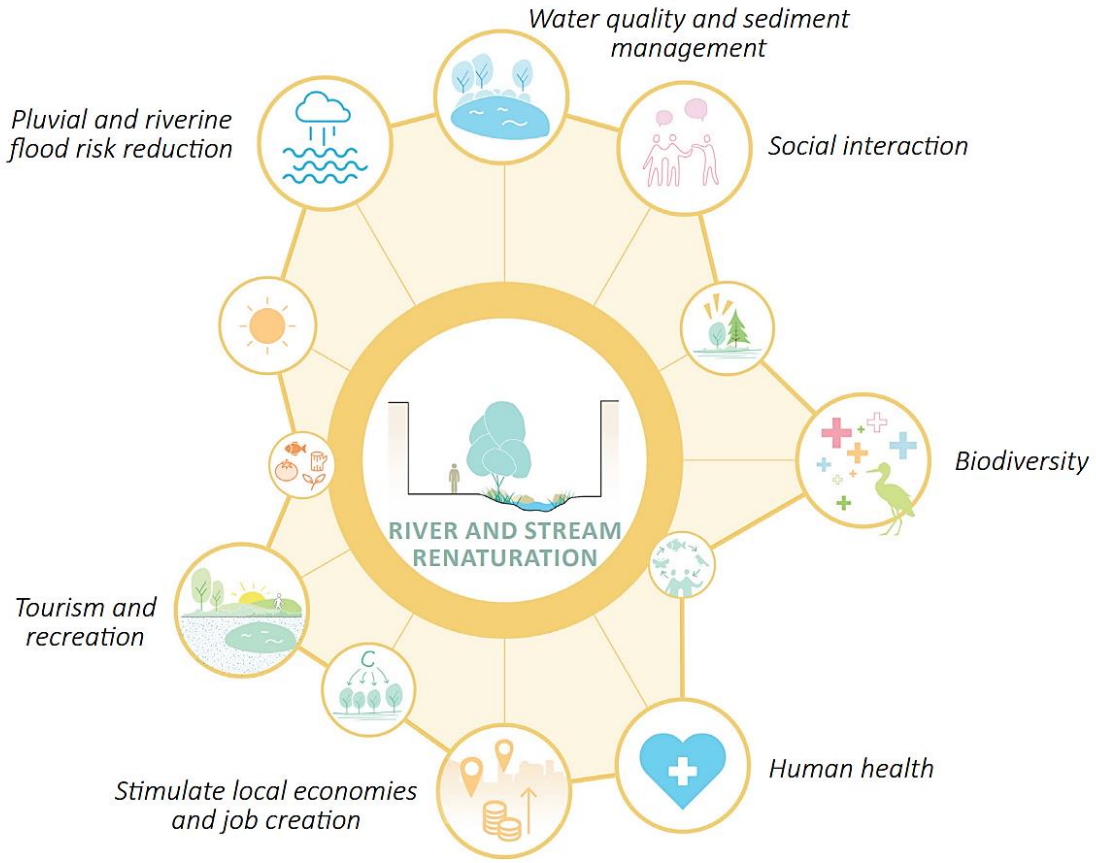


Figure 3.7: River and stream renaturation co-benefits

Source: World Bank (2021:74)

Ecological restoration of a freshwater ecosystem can be applied at a wide range of scales and with a variety of techniques and designs (Prominski et al. 2017; RRC 2013; Rutherfurd et al. 2000). Riley (2016) mentions the different schools of restoration that emerge from the different perspectives associated with each disciplinary field involved in the process. Some of the techniques include daylighting (removal of obstructions that cover and/or pipe a watercourse, Figure 3.8), reprofiling/extending flood plain area (enlargement of space to control and manage flooding, Figure 3.9), creation of branches, channel widening and length extension, reprofiling the channel cross-section, incorporation of diverting and deflecting elements (incorporation of elements to modify water and sediment dynamics) and living revetment (Eisenberg & Polcher 2019; WB 2021).

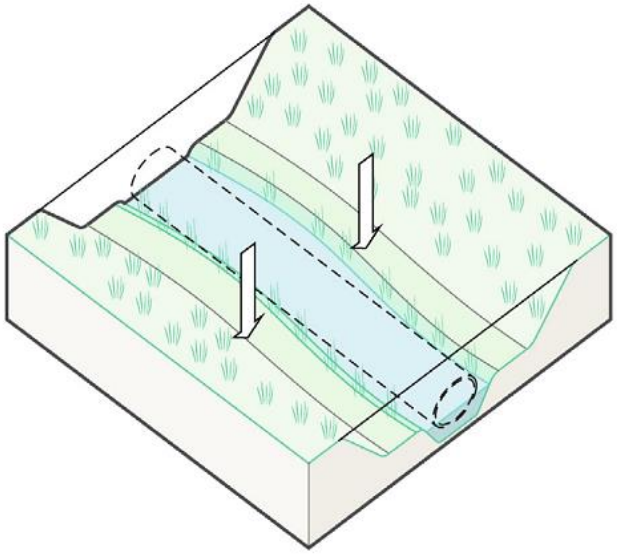


Figure 3.8: River and stream´s daylighting technique

Source: WB (2021:73)

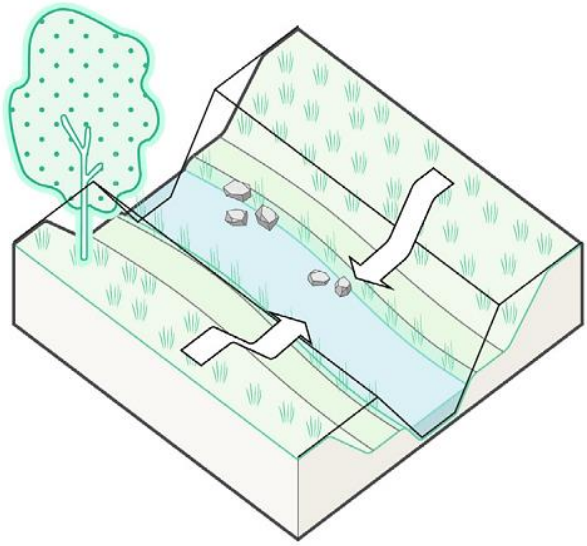


Figure 3.9: River and stream´s reprofiling/extending flood plain area technique

Source: WB (2021:73)

In addition to the techniques mentioned above, there are a variety of designs to be implemented for a freshwater ecosystem repair or enhancement process. These are shown in Figure 3.10, which displays that there is a wide range of possible interventions. These can be materialized as platforms, through which a direct link and access to the water are generated. Also, there are approaches that have minimal constructive interventions and are more in the order of giving greater prominence to the landscape. Each of these has a

series of considerations to contemplate linked to the socio-economic and geographical characteristics of the context where it is inserted, which are described below.

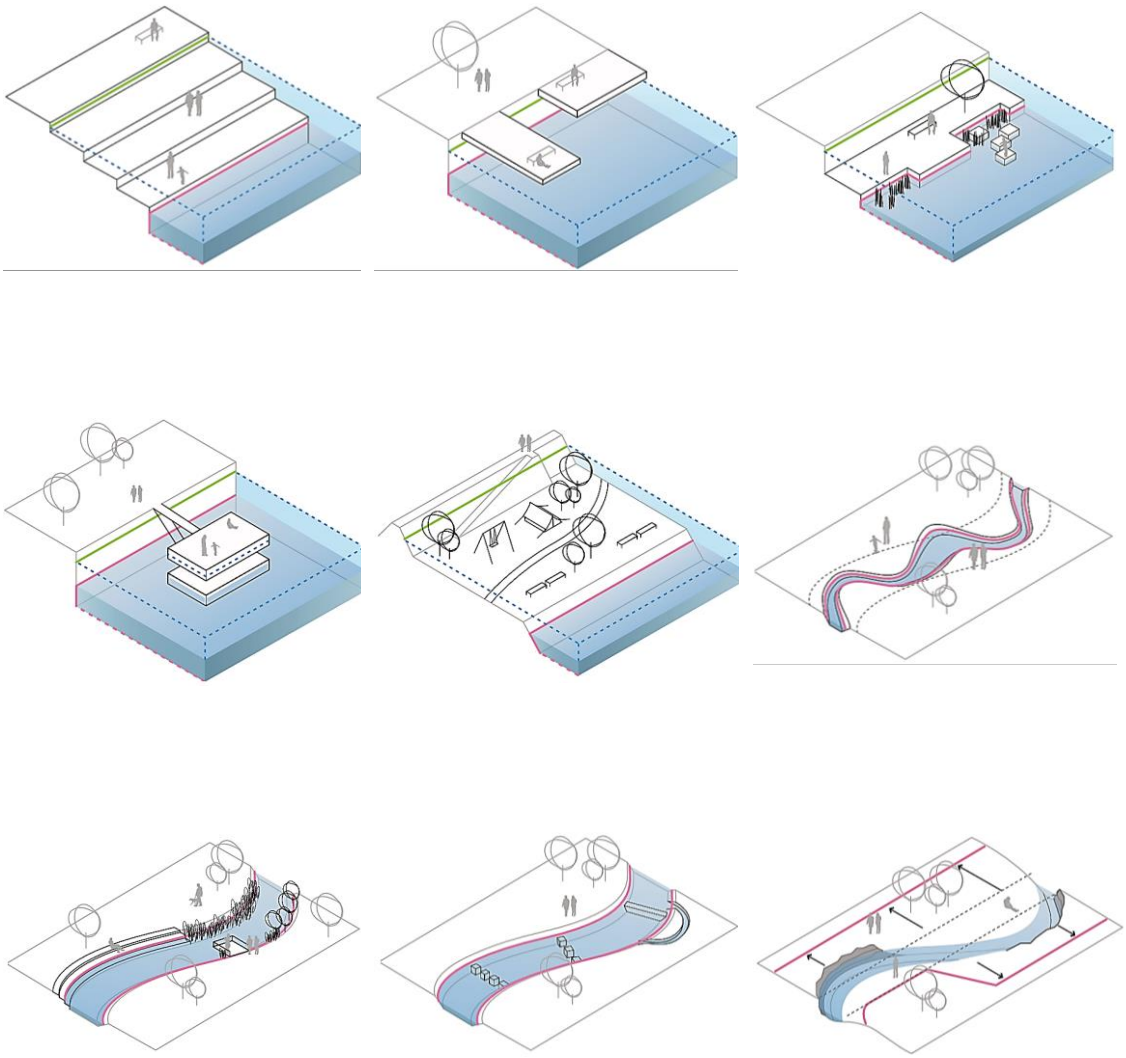


Figure 3.10: Some possible conceptual designs to implement for a freshwater ecosystem repair or enhancement process

Source: Prominski et al. (2017:52, 58, 60, 64, 100, 118, 122, 126, 140)

Regardless of the type and design of ecological restoration chosen, there are a number of considerations to account for when restoring waterways. These are depicted in Table 3.3 and includes environmental, urban, spatial design, technical, economic and social considerations (Aerts 2018; Eisenberg & Polcher 2019; Findlay & Taylor 2006; Prominski et al. 2017; Rutherfurd et al. 2000; SER 2004; WB 2021). As far as the Iyuí case is

concerned, aspects related to the characteristics of the user population are considered especially relevant, given that there is both a highly vulnerable population living on its margins and a neighbouring population whose basic needs are covered. Besides, in terms of the environment, it is necessary to identify whether it is still possible to restore the ecosystem to a previous state or whether a new one is being created. Lastly and above all, study the feasibility of the proposal so that it is both constructible and sustainable over time.

Environmental	It is particularly important to take into account the characteristics of the site and its climate, the hydrology of the watercourse, the type of soil and the attributes of the ecosystem to be restored
Urban and social	Some of the aspects to be considered are the programme and spatial uses to be incorporated in conjunction with the proposal, the density and characteristics of the user population, the scale and surface area of the project.
Spatial design	Must contemplate all the technical and ecosystemic characteristics, generating a spatiality that is accessible, with a focus on environmental education and human rights, offering a variety of possible uses (leisure, recreational, educational, among others).
Technical	It is necessary to consider the characteristics of the watercourse (from fluctuations in the water level to morphodynamical processes), the topography and dimensions of the site, the requirements of the flora to be implemented and the technologies to be incorporated for its materialisation, among others.
Economical	The feasibility of the proposal must be taken into account, considering that not only does the implementation of this type of solution have a higher initial cost than traditional solutions (land to be expropriated, management, design and construction), but also that maintenance during the first years is high

Table 3.3: Considerations to take into account when implementing an ecological restoration solution to a waterway

Lastly, one of the most significant aspects to consider for successful ecological restoration lies in community participation. The success of any attempt to repair or improve the ecological status of freshwater ecosystems in urban areas will depend to a large extent on their communities (Booth 2005; NRC 2008; Walsh et al. 2005;). Indeed, problems related to both the urban water syndrome (see Chapter 1. Section 1.1.1) often arise from dispersed

sources of pollution; thus, direct community involvement is essential (Shandas & Messer 2008). This implies informed and active community participation at all stages of the process. By achieving community support for the adoption and implementation of sustainable, water-sensitive and human rights-based solutions, one of the pillars of Water Sensitive Cities is achieved (see Section 3.1.1) (ADB & MU 2021b; Brown et al. 2016).

3.1.4 CO-OPERATIVE APPROACHES TO SERVICE DESIGN AND DELIVERY

Citizen participation specifically in water resources planning and management is a phenomenon that emerges with the emergence of environmental advocacy groups, capacity building at the local level, and reactions to top-down management and implementation**.** It dates back to the 1970s in the United States (Shandas & Messer 2008) and the 1990s in Australia with Landcare groups (Landcare Australia n.d.; Ciccone 2021; Landcare Australia 2019a, 2019b, n.d.).

"Co-design" and "co-production" are some of the terms for the joint participation of citizens, service providers and policymakers in social services (Burkett n.d.; NRC 2008; Shandas & Messer 2008). These have in common the prefix "co-" meaning "with or together"(Cambridge L.D., n.d.) which denotes the intention of a co-operative community-centred social approach. The differences between the terms co-design and co-production focus mostly on the stages of the joint participation process. Both definitions are detailed in Table 3.4. Nevertheless, sometimes the term Co-design is used as Co-production (ADB & MU 2021c; Polk 2015; Webb et al. 2018; Wilk 2020).

Regardless of the term used, the application of this type of public participation process in decision-making has a high short-term cost that will be offset by the multiple benefits both socially and in terms of program and policy development and design and service delivery (ADB & MU 2021c; McKercher 2021; Mees et al. 2016; NRC 2008; Rubi & Hack 2021). Some of the benefits highlighted are: empowerment of individuals involved in the process, improved democratic capacity, improved quality of decisions and increased effectiveness of outcomes, prevention and resolution of conflicts at pre-implementation stages, expansion of information about the specific problem, identification of context-

specific aspects relevant to planning and design. Specifically, with regard to water resources planning and management, participation enables the development of literacy and awareness-raising on water processes, ecosystems and climate change, among others ADB & MU 2021c).

Co-production	"….the involvement of citizens, clients, consumers, volunteers and/or community organizations in producing public services as well as consuming or otherwise benefiting from them." Alford (cited in Mees et al. 2016:3; Moran et al. 2019:4)
Co-design	"… is an approach to design with, not for, people." "is a designed-led process that uses creative participatory methods" (McKercher 2021:14)

Table 3.4: Co-production and Co-design definitions

Source: McKercher (2021); Mees et al. (2016) and Moran et al. (2019)

For the development of a co-design approach there are a number of principles that can be applied in different contexts and with different types of people. As the literature on co-design has many variants, Table 3.5 shows two different principles with similar backgrounds. On the left side, are the principles of an abstract co-design text (McKercher 2021) and on the right side, are the principles of a text with a focus on urban informal settlements (ADB & MU 2021c). Despite variations, both principles of co-design aim at inclusion and the development and valorisation of participants' ideas and learning throughout the process. Although McKercher´s (2021) principles have a focus on relational dynamics and their forms in the design instances, the ADB & MU´s (2021c) principles have a much more caring tone towards the participants and the ways in which they are involved.

McKercher´s co-design principles	ADB & MU´s co-design principles
• Share power: the quality of knowledge and ideas should be prioritised over the influence of decisions. • Prioritise relationships: processes and outcomes will reflect the connections and trust between participants. • Use participatory means: one-way presentations and lectures should be avoided and participatory instances should be prioritised. • Build capability: the idea that all participants are teachers and learners simultaneously throughout the whole process must be motivated and conveyed.	• All work must be carried out in a safe, ethical and inclusive manner. • The burden on communities when planning their participation must be reduced. • Be flexible and adaptable and incorporate learning throughout the process. • Engage communities in culturally and contextually appropriate activities. • Developing local capacity • Supporting integrated urban design and multifunctional infrastructure

Table 3.5: Co-design principles

Source: ADB & MU (2021c) and McKercher (2021)

In addition to the principles detailed above, ADB & MU (2021c) set out a guide of six steps and activities to be undertaken in the co-design of Water Sensitive Cities. These steps are depicted in Figure 3.11 and broken down into a design phase (Steps 1, 2 and 3) and an implementation phase (Steps 4, 5 and 6). Each of the steps is characterised by a series of six discussion themes linked to the dynamics of the site and the scope and objectives of the intervention to be implemented. These six themes address pollution and health influencing factors (to be linked to community activation motives), future site development involving that community, existing social practices, land tenure, possible water-sensitive technologies to be applied and their maintenance and conservation.

Each of these steps has critical nodes to be addressed for the process to be successful. For *step one*, it is crucial that project funding is secured and all stakeholders are actively involved, the project objective is confirmed, water-sensitive technologies are identified, and critical points of the project are determined. In *stage two* it is crucial that stakeholder groups are formed and operational, and that there is enthusiasm and appreciation for change. While in *stage three* it is essential that the plan is satisfactorily adapted to the

needs and requirements of the environment and the community, that the community is active and that there has been an improvement in its literacy in relation to the issues addressed. In addition, it is especially important that all parties are aware of the roles, responsibilities and budget required for the construction and maintenance of the system to be implemented and that there is a common agreement.

In essence, it is of particular relevance that any changes to the conceptual plan that occur during the course of the process must be reviewed and agreed upon with the community, with stakeholder participation throughout all stages being crucial to achieving the desired improvement (ADB & MU 2021c).

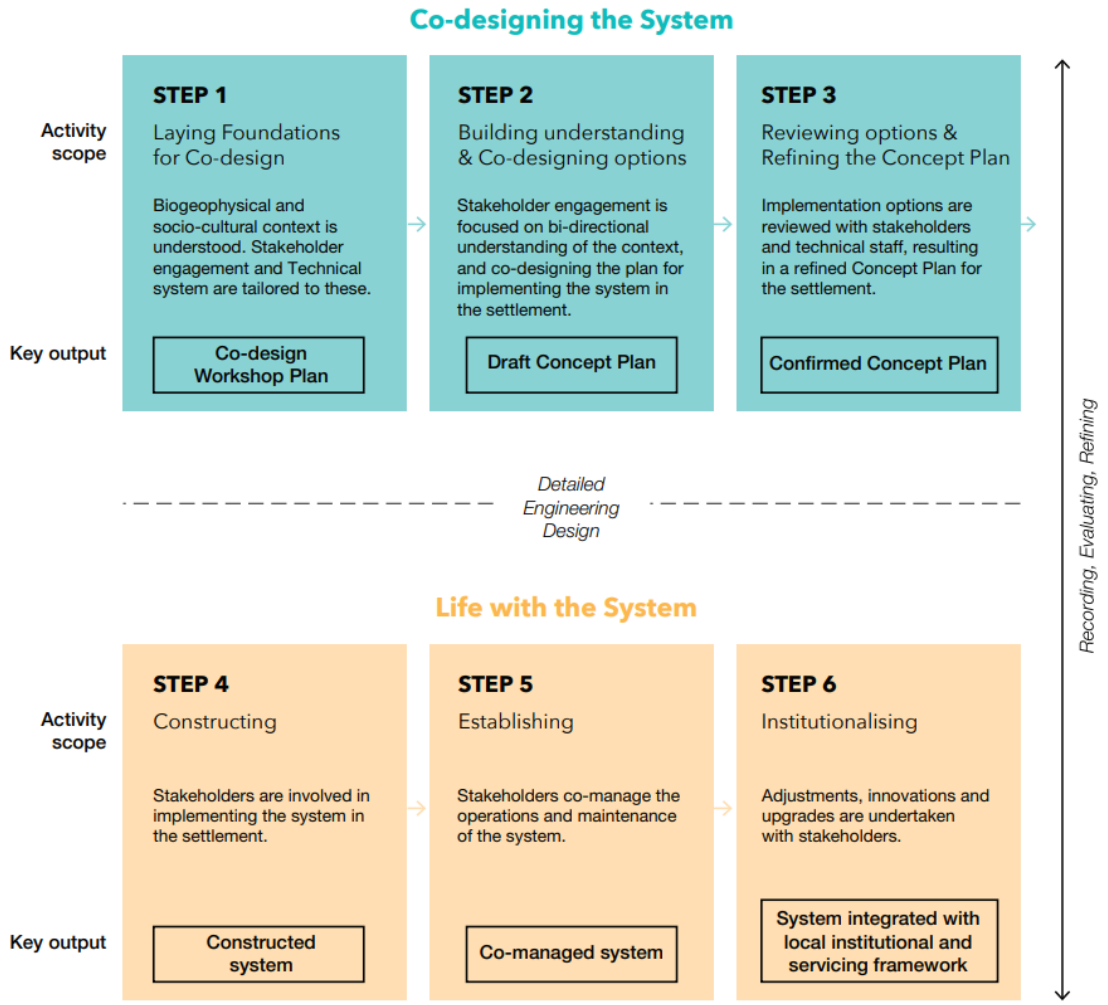


Figure 3.11: Co-design process

Source: ADB & MU (2021c:16)

4

METHODOLOGY

Chapter 4. Methodology describes the methodologies and methods selected to answer the research questions posed in Chapter 1. Introduction and thus achieve the objectives and aims of the thesis. The selected protocols and types of analysis are detailed here and build both Chapter 5. Stony Creek Case Study, Victoria, Australia and Chapter 6. Iyuí. Lessons learned from Stony Creek.

4.1 METHODOLOGICAL FRAMEWORK AND METHODS

In order to achieve the aim of this study and to answer the research questions posed, two integrated comparative case studies are carried out. This is done following the case study's methodological framework based on Goodrick (2014) and Yin (2003) detailed in Box 4.1. It consists of a sequence of iterative steps that guide and articulate this research. To this structure, is added a three-phase study where each of these phases is composed of a method, complementary and iterative to each other. These are detailed in Section 4.4. Whereas the methodological structure and phases selected for this study are depicted in Figure 4.1.

Regarding the embedded comparative case study's methodological framework, it allows for deepening the multifaceted elements of a co-designed urban watercourse's successful rehabilitation. The sub-unit analysed is the local community participation's influence in the process. In fact, the comparison of the Iyuí Stream case study (described in Chapter 2) with another successful participatory rehabilitation case in Victoria, Australia, will allow understanding and synthesising both processes nested in each context. Furthermore, it will allow the formulation of both propositions and causalities, in order to propose possible

adaptations for the Iyuí Stream's current case transformation towards a co-designed rehabilitation. This is summarised in this research's aim, represented in Table 4.1 below.

AIM	To identify causal attributions for the success of co-design with local communities in urban watercourse rehabilitation in Victoria, Australia to generate strategic recommendations for Iyuí Stream´s co-designed rehabilitation in Montevideo, Uruguay.

Table 4.1: Thesis aim

This chapter is then articulated according to the steps corresponding to the comparative case study methodological framework's first stage called "Define and design" (see Figure 4.1). This *first step* begins with the research purpose's determination and the consequent objectives and questions that guide and focus the research. Although these were anticipated in Chapter 1 (see Section 1.3), they are repeated in Tables 4.1, 4.4 and 4.5 of this chapter framed by a narrative that allows them to be entirely understood. After determining the objectives and research questions, the case to be compared with the Iyuí Stream case is selected. This *second step* is described in Section 4.2 of this chapter. As a *third step*, the methods and procedures used in this study and the format and assumptions under which the information obtained is synthesised are defined and detailed. This is described in Sections 4.4 to 4.7 of this chapter.

Once the first stage of the methodological framework of the comparative case study "Define and design" has been completed, the "Prepare, Collect and Analyse" and "Analyse and Conclude" stages follow. Here the propositions are elaborated, the causalities of the phenomena studied are established and the results are verified in order to draw conclusions. These sections form the basis on which Chapters 5 and 6 are developed and with which the research questions posed in this research are answered.

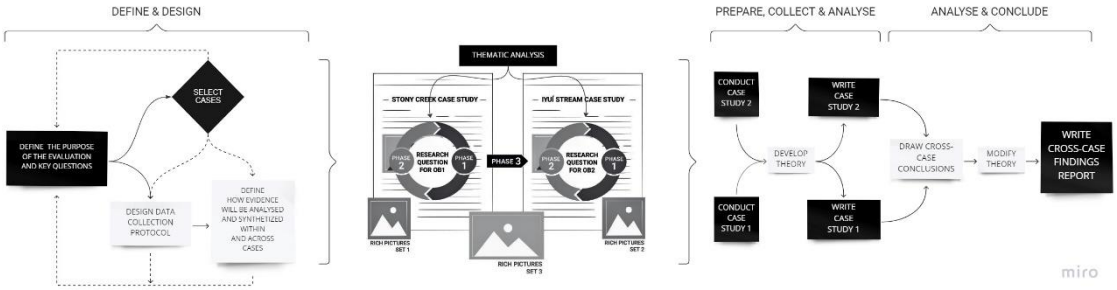


Figure 4.1: Research's comparative case study framework *

Source: Adapted from (Goodrick 2014; Yin 2003)

* see the figure with better resolution in the Annex (Figure 0.4.1)

• BOX 4.1 •

COMPARATIVE CASE STUDY

The *case study* is an empirical research methodology with a high content analysis that addresses complex and multifaceted phenomena in context (Yin, 2003). It is used both when the boundaries between phenomenon and context are not clearly evident and when a holistic view of the phenomenon in a given context is to be achieved. In this methodology, depicted in Figure 4.2, special emphasis is placed on understanding the context in which the phenomenon occurs, since it is considered that this is where the main influences and determinants of the phenomenon are to be found (Yin 2003; Altamirano & Martínez 2011; Goodrick 2014). It is worth noting that the 'embedded' classification refers to the sub-unit of analysis, which is the element that is emphasised in the research (Yin, 2003).

The *comparison between case studies* allows the analysis of the links, structure and dynamics of the same or similar phenomena in different contexts, and thus to observe differences, similarities and patterns in common between the cases. This makes it possible to formulate propositions regarding the causalities of success or failure of an intervention with which to formulate possible adaptations of the case studies with a view to obtaining the desired results (Yin, 2003).

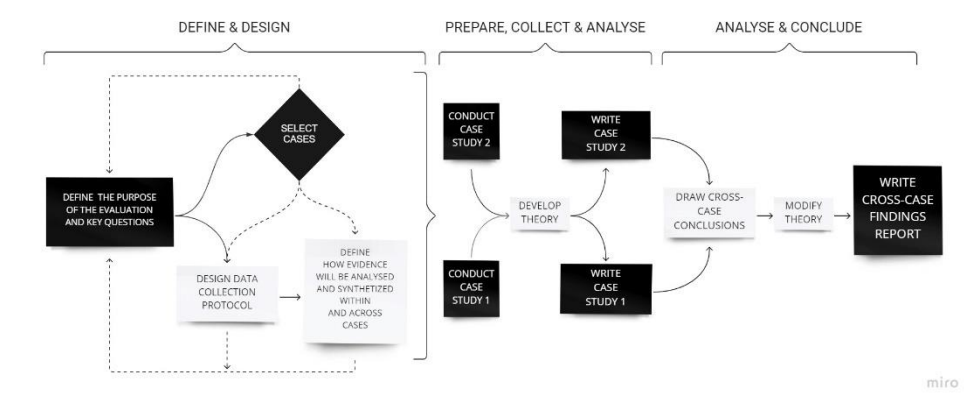


Figure 4.2: Comparative case study framework underpinning this research

Source: Adapted from (Goodrick 2014; Yin 2003)

4.2 CASE SELECTION IN VICTORIA, AUSTRALIA

As indicated in the methodological framework defined in the previous section, once the objective of the study has been defined, the selection of the remaining case study for this research's comparative study commences. According to this study's aim (see Table 4.1), two participatory urban watercourse rehabilitation cases make up this research. On the one hand, the Iyuí Stream case in Casavalle, Montevideo, Uruguay detailed in Chapter 2. It is worth remembering that this is a case has a watercourse that suffers from urban stream syndrome (described in Chapter 1, Section 1.1.1) and presents a high content of pollutants and a high-water risk for high and medium-vulnerability populations. Likewise, the Iyuí Stream is proposed as a linear park's axis whose urban operation has not yet materialised. Thus, it still has the possibility of incorporating its community in its design and management. On the other hand, this research is shaped by another case study in Victoria Australia, whose participatory rehabilitation has been successful and has already been widely implemented. Another thing to note is that, this case should not only be a representative case in Victoria, but also a legitimate reference for Iyuí Stream's participatory rehabilitation. Lastly and especially relevant to this research, it should be noted that the limitation of the number of cases to only one additional case for this comparative case study is due to the intention to achieve a high content analysis based on the time frame given for this academic research.

A preliminary study is then conducted in order to identify a case in Victoria, Australia, which is also a legitimate reference for the Iyuí Stream. This analysis first generates a pre-selection of cases determined by a series of characteristics that each case must meet. Then, after a brief analysis of each of the proposed cases, the selection process is determined, defining the case for this comparative study. The preliminary case study is detailed in Box 4.2.

In short, it is considered that of the eight projects evaluated in Box 4.2, the one with the best elements to be a relevant case for Casavalle is the Stony Creek case. This case is detailed in Table 4.3. It not only complies with the necessary requirements indicated in Box 4.2, but it is also the only project whose water course has suffered high levels of contamination (the highest levels in 30 years in Melbourne) and whose rehabilitation is

incorporated into the Plan and largely materialized. In addition, Stony Creek has comprehensive 10-year work plans that cover key topics such as waterway health, water quality, education and engagement, amenities, and accessibility. Regarding the community, it has two large community groups, Friends of Stony Creek and Friends of Cruickshank Park. They are very active groups and with multiple annual activities related to the improvement and maintenance of the watercourse, its ecosystem and the associated urban green area. It is estimated that this project has multiple elements that could be references to a possible Iyuí Stream co-designed rehabilitation.

Figure 4.3: Stony Creek Rehabilitation Plan. Key Actions Summary

Source: Outlines et al. (2019)

Figure 4.4: Stony Creek Rehabilitation Plan. Duke Street Reserve

Source: Outlines et al. (2019)

Title	Stony Creek Rehabilitation Plan
Location	Maribyrnong
Travel time to the site by public transport	40 min
Percentage of people living in poverty	17% (Maribyrnong LGA) (Tanton, Peel & Vidyattama 2018)
Construction year	2019-2029
Status	17% completed 52 proposed actions. (MW et al. 2019) 2019-2020 actions completed: WH10, WQ8, E5, AM7, AC2 (MW et al. 2020) 2019-2020 actions completed: WH1, WH5, E12, AM7 (MW et al. 2021)

Dimensions	5 km reach of Stony Creek (MW et al. 2019)
Designers	Outlines
Stakeholders	Melbourne Water Maribyrnong City Council Environment Protection Authority Victoria (EPA) The local community (Friends of Cruikshank Park and Friends of Stony Creek) (MW n.d.)
Aboriginal and Torres Strait Islander people involved	No
Communities' involvement in project	- 2,206 views of the Your Say page during the initial community consultation period - 200 people shared their feedback in person at two community 'pop up' information events (February 2019) - 24 community members participated in a two-day workshop in (March 2019) - 237 stories and ideas were shared online and in person (MW et al. 2019)
Brief description	The Stony Creek Rehabilitation Plan (2019-2029) follows Melbourne's worst river pollution incident in 30 years. A two-week fire from a warehouse harbouring toxic chemicals resulted in the loss of numerous plants and animals and affected the health of the local community. The Plan identifies long-term and sustained actions for the recovery, rehabilitation and protection of the creek and its surroundings developed in consultation with local community members, organisations and government agencies covering key issues such as Waterway Health, Water Quality, Education & Participation, Amenities and Accessibility. The Project focuses on achieving ecological rehabilitation and recreational activation of the space by proposing wetland areas and native planting along the creek channel, paths for pedestrians and cyclists, furniture and educational signage (MW et al. 2019; Outlines n.d.).
Project analysis	Project with a unique pollution event linked to the surrounding industrial area. It has already concluded its design stage in which there have been several instances of participation. At the design level, the interventions are few, the generation of different atmospheres along the watercourse is prioritized and the existing natural areas and revegetation are enhanced. Elements of WSUD are incorporated into the Project. Plan with a horizon of 10 years and medium scale. The percentage of progress is small in terms of the Plan but high in terms of the rehabilitation of the water course. The distance to the site is short, which would allow several visits. The Project does not involve Aboriginal and Torres Strait Islander people, which makes it easier to obtain the approval of the ethics committee for conducting interviews.

Table 4.2: Stony Creek case general description

• BOX 4.2 •

POSSIBLE CASES' PRELIMINARY STUDY IN VICTORIA, AUSTRALIA

To determine the case study, a pre-selection process was carried out, as specified by Yin (2003), whose projects had to meet a series of specific characteristics. Firstly, the projects had to be located within the Victoria region. Next, they had to have a low-flow watercourse (streams, streamlets, brooks or creeks) as one of the main axes of the project. In addition, the design of the plan or project must be attractive and seek to meet the needs of the environment and the community(ies) that inhabit it. The project must also mention some indication of community participation within it. Finally, at least one of its stages has already materialized. Based on these premises, 8 possible cases were selected, represented in Table 4.3 and located on the map in Figure 4.5. These case studies are described in greater detail in the Annex (see Annex. Section 0.4.1).

			
Arnolds Creek	Blind Creek	Dandenong Creek	Edgars Creek
			
Jan Juc Creek	Stony Creek	Tarralla Creek	Wanyarram Dhelk— Bendigo Creek

Table 4.3: Possible Victorian cases' grid

Source: 3 ALA & DDWCAC (n.d.), Chandra et al. (2019) , , CRC for WSC (n.d.), Friends of Edgars Creek (n.d.), Outlines et al. (2019) and REALMstudios (n.d.)

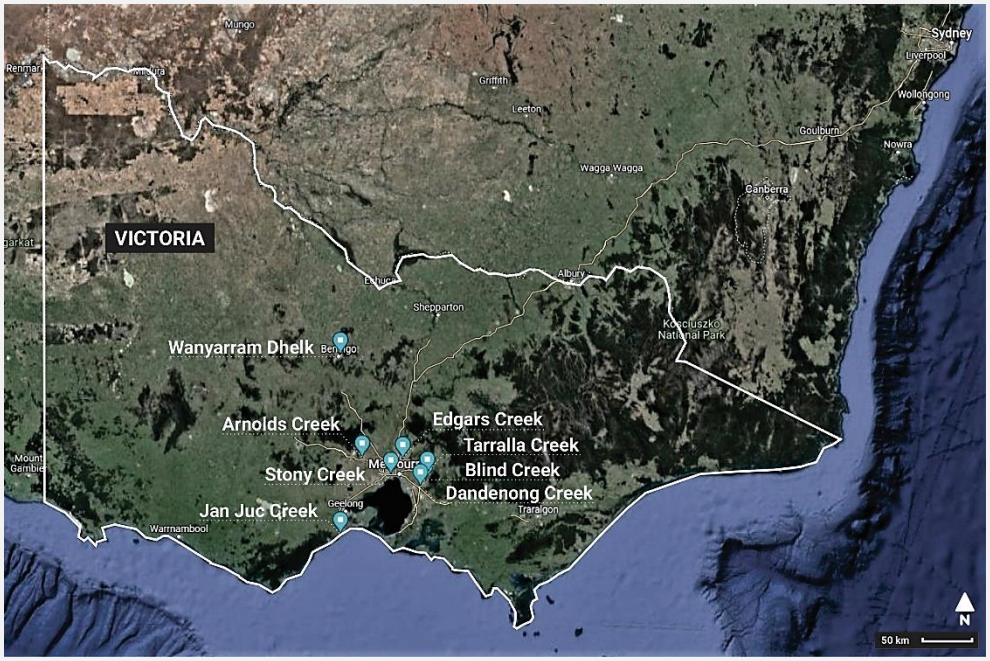


Figure 4.5: Possible cases' location map

Once the cases have been identified, a general description of each of them is made to evaluate them simultaneously and select the most appropriate case study for Casavalle. As can be seen in Table 4.3 and in the Study Cases' General Description tables (see Annex. Section 0.4.1), a set of categories is determined for individual evaluation and simultaneous comparison. The categories are composed of travel time to the site by public transport, LGA's percentage of people living in poverty, project's construction year, status and dimensions, project's designers and stakeholders, whether Aboriginal and Torres Strait Islander people were involved in the project, quantification of communities' involvement in project design and a brief project's description.

Based on the categories described above, for the selection of the case study, priority was given to the project that met the following characteristics. Primarily, the travel time to the site by public transport[1] was short. This enables better and more frequent accessibility of the site, which allows much more frequent contact with the case study and its community(ies) and, therefore, better quality information for research. Also, given the situation of social vulnerability experienced by Casavalle and for the subsequent comparative analysis of cases (see Section 4.4.3), projects that would have been implemented in those areas with the highest percentage of people living in poverty in the Local Government Area[2] were prioritized. Likewise, those projects in which there would have been no participation of Aboriginal and Torres Strait Islander people in the project were pre-empted. This is solely due to the time constraints of the research and the time required to obtain proper ethical approval to interview Aboriginal qualified informants. Finally, those projects whose design and/or execution have been carried out jointly with the community with various instances of

participation in the process were prioritized.

[1] This data is extracted from the data provided by Google Maps 'Indications' tool from Melbourne's point zero to one of the project points. Melbourne's point zero is taken as a starting point as it is considered for this study as a neutral, central point in the city. It is located at the Former General Post Office (338-352 Bourke Street and 188-218 Elizabeth Street and 327-337 Little Bourke Street, MELBOURNE VIC 3000). It is the point from which distances are measured from Melbourne to other points within regional Victoria (Heritage Council Victoria n.d.).

[2] The 'Percentage of people living in poverty' data refers to each Local Government Area (LGA) where each project is located. According to the Social Policy Research Centre (2016), a standard definition of poverty was used to determine it (Tanton, Peel & Vidyattama 2018). This is determined by a household's income after subtracting rent or mortgage payments, plus property rates and water charges. The resulting number is adjusted according to the household's number and the characteristics of the people. This procedure determines a person's poverty threshold as that person who has a disposable income of 353.45 dollars per week, after payment of the household expenses listed above. The percentage indicated in the category 'Percentage of people living in poverty' then represents the percentage of people in that LGA living in households below this poverty line. Data are from the 2015-16 ABS Survey of Income and Housing (Tanton, Peel & Vidyattama 2018). It is worth noting that the highest poverty rates in the state of Victoria are 22% (Hume LGA) and the lowest is 8% (West Wimmera LGA) (Tanton, Peel & Vidyattama 2018).

4.3 PURPOSE AND KEY QUESTIONS

Having defined Stony Creek as a case study of participatory urban watercourse rehabilitation in Victoria and following the case study methodological framework, the research objectives and research questions are established. In order to achieve the aim proposed for this research in Table 4.1, two objectives are articulated. As can be seen in Table 4.4, the first one refers to Stony Creek's participatory rehabilitation embedded case study. The second objective takes the information from the first and transposes it to the Iyuí Stream case study. Each of the objectives has an associated question described in Table 4.5. The answers to these questions are obtained as a result of the methods described in the following sections, which enable each corresponding objective to be met and thus jointly achieve the aim of this research.

OBJECTIVE 1	To identify and analyse causal attributions for the success of the co-designed rehabilitation of the Stony Creek urban watercourse in Victoria Australia.
OBJECTIVE 2	To Identify, select and analyse those causal components of the success of the Stony Creek co-designed rehabilitation case that could be transferable to the Iyuí Stream case in pursuit of a co-designed rehabilitation.

Table 4.4: Research objectives

RESEARCH QUESTION FOR OB1	What were the causal factors that led to the effective rehabilitation of Stony Creek?
RESEARCH QUESTION FOR OB2	Which causal attributions of success from the Stony Creek case might be transferable to the Iyuí Stream case in pursuit of co-designed rehabilitation?

Table 4.5: Research questions

4.4 DATA COLLECTION, ANALYSIS AND SYNTHESIS

To answer the research questions posed above and following the case study methodological framework, a three-phase study is proposed. Each of these phases is composed of one method, which is complementary and iterative to each other. *Phase 1* corresponds to the *Systematic Literature Review* method, which is detailed in Section 4.4.1. *Phase 2* corresponds to *Interviews with Individual Experts*, which is explained in Section 4.4.2. Finally, *Phase 3* corresponds to a *Comparative Analysis* between cases. The latter is described in Section 4.4.3. As shown in Figure 4.6, each case study is composed of Phases 1 And 2. Thus, the answer to the Research Question associated with Objective 1 (OB1) is obtained after applying the two phases to the Stony Creek case study. While the answer to the Research Question of Objective 2 (OB2) is obtained after applying Phase 3 to the answer to the Research Question of OB1 in addition to the information resulting from the first two phases applied to the Iyuí case study. It should be noted that the information obtained after applying the methods of the first two phases to each case study is analysed by means of a *Reflexive Thematic Analysis*. This is described in Section 4.6. In summary, the analysis for each case concludes with a set of *Rich Pictures* (see Section 4.7), thus producing three Rich Pictures sets in total. One set of pictures for the Stony Creek case synthesizes the answers to OB1's research question. Another set of Rich Pictures synthesizes the Iyuí Stream case's current situation. Finally, another set of Rich Pictures depicts the OB2 research question's answer (resulting from the Phase 3 analysis).

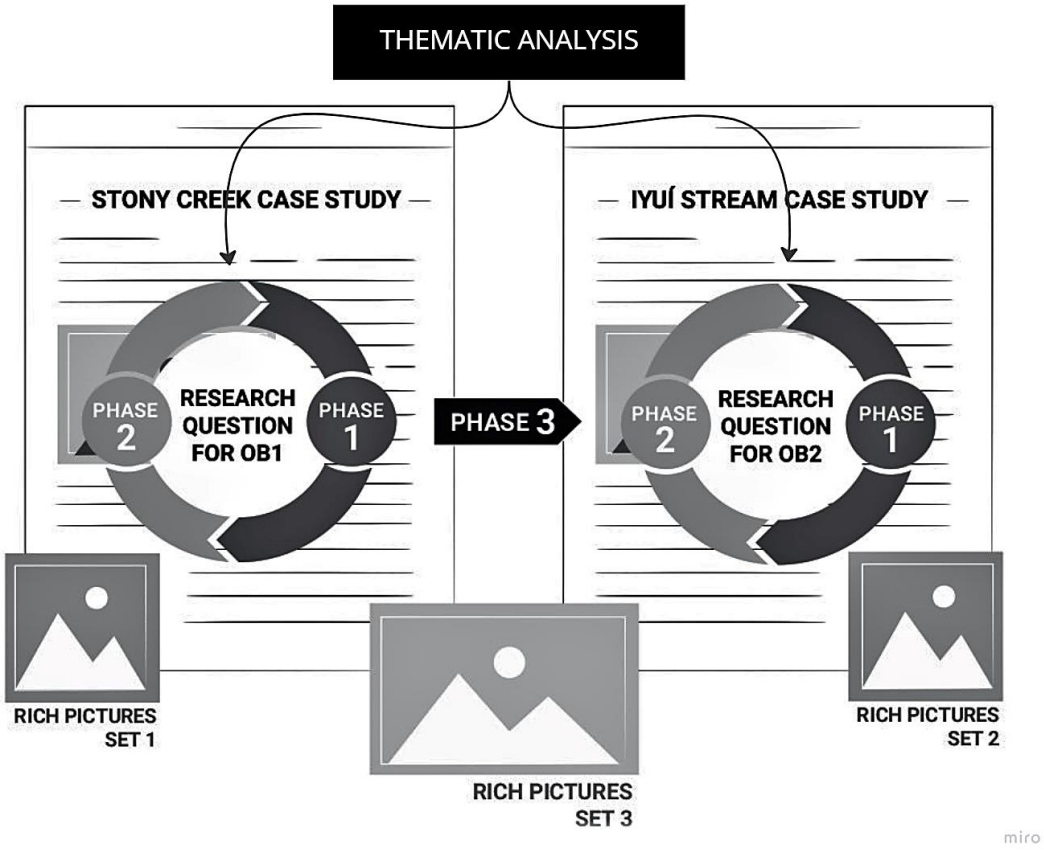


Figure 4.6: Case study's phases framework

4.4.1 PHASE1: SYSTEMATIC LITERATURE REVIEW

A systematic literature review is a rigorous and thorough search, collection and subsequent evaluation and analysis of all those sources of information that meet predetermined eligibility criteria on the specific study topic of interest or research question (Burgers et al. 2019). This systematicity lends validity, reliability and reproducibility to the study (Xiao & Watson 2017).

In relation to the Stony Creek case, by using this method it is possible to collect and analyse all the information available on the web about both, the rehabilitation project, the instances of community co-design and influences on it, and the materialisation of the project and data concerning its participants and environment. It identifies and understands

how the participatory processes were and how they ended up influencing and impacting the plan and its materialisation, thus addressing the answer to Research Question for OB1.

According to the Iyuí Stream case, through the use of this method, it is possible to collect and analyse all the information available on the web about the Iyuí's urban operation proposed by Montevideo´s City Council. This makes it possible to identify whether there are proposals for community co-design in some of its stages and/or to discern possible areas of the plan where the community can be incorporated, thus addressing some of the necessary aspects that provide OB2's Research Question answer.

4.4.2 PHASE 2: INTERVIEWS WITH INDIVIDUAL EXPERTS

This method allows for the collection of more information linked to the case studies. Moreover, it enables the incorporation of the perspectives of those involved in the rehabilitation plans or whose opinion is significant in answering the research questions posed (Bryman 2001; SAGE 2008).

The target audience for these interviews is limited to individual experts, also called qualified informants. These are people linked to the object of study, who can provide detailed information because of their experience, links or outstanding knowledge of the topic to be analysed (Bryman 2001).

In the Stony Creek case, this method provides insight into the experiences, motivations and impressions of the people involved in the community participation processes in the watercourse rehabilitation project and its surroundings. The characteristics of the people who make up the community involved are also known in greater depth. Furthermore, through this method, it is possible to complement and contrast the information obtained

in the Systematic Literature Review method (see Section 4.4.1), which is a substantial component that contributes to answering Research Question for OB1.

In the Iyuí Stream case, this method makes it possible to deepen knowledge about the watercourse´s plan. Through interviews with both professionals and governmental actors, it is possible to know both the short and long-term objectives of the project and to discern if they are contemplated or if there are possibilities of incorporating community participation in the design process and/or management. In the same way, it allows to gain the professional knowledge regarding the specificities to be contemplated to successfully implement a plan in Casavalle and Iyuí Stream´s context. Furthermore, through interviews with some community members, it is possible to complement those aspects that built up the population profile, to learn about their intentions and needs for this space, to identify the links with the current project for the rehabilitation of the watercourse and their possible intentions to participate in future processes. Lastly, this method complements and contrasts the information obtained in the Systematic Literature Review method (see Section 4.4.1), and is a substantial component that contributes to answering Research Question for OB2.

4.4.3 PHASE 3: LEARNING FROM STONY CREEK TO IYUÍ

This phase consists of a *comparative analysis*, which after compiling all the information obtained in the methods of Phases 1 and 2 on the Stony Creek case (see Chapter 5) and the Iyuí Stream case (see Chapter 2 and 6), analyses and compares them, thus achieving Research Question for OB2 answer (see Chapter 6). The *comparative analysis* consists primarily of similarities and salient differences´ study between the proposed cases, which then narrates possible points of relationship and feasible contributions from the Stony Creek case to the Iyuí Stream case (SAGE 2008).

4.5 METHODS´ PROTOCOLS

Each of the methods described above is detailed and articulated through protocols, focused and structured in terms of answering the research questions and objectives. According to Yin (2003), the procedures' protocolisation is one of the techniques through which the actions carried out to obtain information's replicability is achieved, thus verifying the case studies' validity. The recording of information should be carried out by maintaining what Yin (2003) calls a "chain of evidence". This consists of establishing beforehand a set of detailed and ordered procedures in order to obtain procedures' systematisation to obtain the desired information. Within these, Yin (2003) recommends both citing all the information that is part of the study and indicating the circumstances under which it is collected. The protocols corresponding to the methods applied in this study are detailed in Boxes 4.3 and 4.4.

• BOX 4.3 •

SYSTEMATIC LITERATURE REVIEW (SLR) PROTOCOL

The literature review´s systematisation allows to answer each of the research questions posed in this study through previously established and detailed criteria, strategies and procedures. An SRL is elaborated taking into account the key principles proposed by Pittaway (Thorpe & Holt 2015). These include clarity, detail and transparency in the preparation and execution of the review and a continued focus on the research questions. It also requires a formulation that ensures both broad coverage of the issues raised and easy comparison, contrast and drawing of conclusions. It also requires accessible and available sources and research results. All of the above allows for a well-developed, reproducible, more reliable and truthful SLR with less bias in the resulting analysis (O'Brien & Mc Guckin 2016; CSU n.d.).

The sequence of development of the SRL has been articulated according to the stageability set out by Cranfield (Thorpe & Holt 2015). In the *first stage,* a protocol has been established to define the objectives and to systematise both the source search strategy and the selection criteria. Then, the *second stage* consists of a review and subsequent evaluation of the selected sources from which the relevant data for the literature are extracted, conclusions are drawn and the information is synthesised. Finally, the *last and third stage consists* of the preparation of the reports and the findings (see Chapters 5 and 6).

The protocol corresponding to *Stage 1* in which the search strategy and selection criteria have been systematised and defined, is detailed in Table 0.4.8 (see Annex. Section 0.4.2). Its outline is based on the categories determined by Lynn (UT n.d.). Table 0.4.8 is headed by the research questions to be answered with this method. It should be noted that the table´s format shows under each column those data that are specific to each research question. In cases where the data are unified under one row, the information provided is valid for both research questions. The Research Questions are followed by the Research Objectives, which focus on and guide the research plan and the subsequent drawing of conclusions. Next, the formats chosen for systematising the information are explained. First of all, the search scheme is applied using a *Search Plan Template (SPT)* based on O'Brien & Mc Guckin (2016) and DU (n.d.). This consists of a search scheme and strategy designed to be used in previously selected electronic databases, by means of a specific selection of search keywords and boolean operators. Following the SPT, the findings are organised under a matrix called *Table of Evidence (ToE)* based on Pacheco-Vega (2016) and NYU Libraries (n.d.). In this, each selected source of information is analysed and synthesised, and the primary conclusions that make up the literature review of each case study are drawn up.

A Search Plan Template (SPT) is established for each research question. In each one of them, the keywords corresponding to each of the questions posed are determined,

with which the base search terms are established. It should be noted that the terms designated for the search of the Research Question for OB2 are in Spanish, as this is a governmental project in Uruguay for which there is no literature in English. Next, possible synonyms are established with which to broaden the search terms. Once the synonyms have been established, a search strategy is defined using boolean operators. The strategy defined for this study is one that allows a simultaneous search with all the proposed keywords and synonyms. It is defined in this way because the search for sources of information is extended in a second order from citations and bibliographic sources within the selected texts. The protocol also determines the research databases in which the search is carried out. It should be pointed out that the research databases used to answer the Research Question for OB2 are limited to the Google search database and the Uruguayan governmental authorities´ official websites, given that the rehabilitation plan is governmental. It should be noted that external literature recommendations from qualified experts linked to each of the plans are established as valid and incorporated into the review. Likewise, all those relevant sources from citations and bibliographic sources within the texts selected after the search are added. Finally, the criteria for inclusion and exclusion of information are established, which, in addition to specifying the type of source that can be considered, mentions the characteristics that must be met in order to be a valid or rejected source.

• BOX 4.4 •

QUALITATIVE SEMI-STRUCTURED INTERVIEWS WITH INDIVIDUAL EXPERT'S PROTOCOL

Given the singularity and complexity of the dimensions of each case study and in order to obtain both the vision of the people involved and data related to each context, semi-structured interviews were defined (Corbetta 2007). This is a qualitative data collection strategy in which informants are asked a series of predetermined questions within the subject matter of the study but at the same time open-ended, giving respondents flexibility within the structure of the research and allowing them to express their views in their own words. This format allows for both global, specific and indirect information to be obtained about each case through the experiences, knowledge and perspectives of each interviewee as well as related to each context. Although this type of interview is articulated as a "guided conversation" (Yin 2003:106), in this type of format the voice that should predominate is that of the interviewee, being the interviewer limited to dialogue in those cases where clarification is necessary for a better understanding of the interviewee's point of view and/or the topic under discussion (Vargas 2012; Corbetta 2007).

The format of the questions, the way of conducting the interviews and of storing them are based both on the indications of Corbetta (2007), Vargas (2012), Turner (2010) and Yin (2003) and on the requirements of the National Statement on Ethical Conduct in Human Research (2007) (NSECHR) (Australian Government 2018a), detailed in the protocol of Table 0.4.9 (located in the Annex. See Section 0.4.2). Table 0.4.9 illustrates that the protocol is headed with the research questions, which establish the guidelines for the conformation of both the protocol and the interviews (Yin 2003). In this way, two large groups of individual experts to be interviewed are defined. On the one hand, those of the Stony Creek case and, on the other, those of the Iyuí Stream case. The determination of the target audience to interview linked to each case is based on Creswell & Creswell (2018) and Corbetta (2007). Both suggest selecting those qualified candidates, expert knowledge of the phenomenon, with a direct and profound vision of it, who can provide credible and quality information for the study and who also have a representative position within the object of study. Next, the format of the interview is explained, which is semi-structured and "focused" (Yin 2003:107). This means, among other things, that the person is interviewed for a short period of time. In this case, the interviews were predetermined to be between 45 and 75 minutes long. Next, in the protocol, a list of topics to be addressed in each interview and according to each participant is established. From these topics, the primary and secondary questions of the interviews arise based on the detailed formulation criteria and based on ethical considerations according to the NSECHR. Another element that was incorporated transversally in the interviews was the nonverbal factors. These incorporate general and specific information about the environment and the interviewees into the questionnaire and help to contextualize the answers.

Based on what has been described above, four possible questionnaires are made (see

Questionnaires in the Annex. Section 0.4.3). The first questionnaire is focused on the stakeholders and designers of Stony Creek and others in the community, both written and conducted in English. A third questionnaire focused on the Stakeholders of the Iyuí Stream case and a fourth questionnaire for the members of the community, referents and professionals linked to the community. These last two questionnaires are prepared in both English and Spanish and were conducted in Spanish and translated into English. All the questionnaires were established as a guide that determines the perimeter within which the interview is conducted. However, the order in which they are made and the number of questions asked are determined by the dynamics of each interview. Considering the research questions raised, the questions towards the participants of the Stony Creek case are focused more towards the roles, influences and benefits of community participation in the watercourse rehabilitation process and towards the institutional and social frameworks that make that process possible. On the other hand, the questions to the participants in the Iyuí Stream case focus on expanding the existing information on the Montevideo City Council rehabilitation project, identifying whether there were participatory instances in some of its stages, identifying what possibilities and intentions exist at institutional and community level to carry it out. The questions in this case also try to gather information on the characteristics of the population and its context, necessary for the bases of the comparative analysis of case studies, thus addressing the answer to the Research Question of Objective 2.

Although the interviews are non-identifiable, given that the research involves people and interaction with them and is carried out within the framework of Deakin University, the ethical dimensions required by the ACRCR 2018 and the NSECHR 2007 (AG 2018b, 2018a) were considered, processing the Ethics Approval for its realization. The recruitment of participants implies considering the privacy of the people, and can only be done through existing public mail or by the will and initiative of the interested parties themselves. After denoting the interest participation of the potential interviewees in writing, they are given a Plain Language Statement and a Consent Form, and a guide of possible questions to be asked in the interview. Once the consent of each participant was obtained, the interview was coordinated. All records were stored in a secure and non-identifiable form at Deakin University, remaining there for five years.

4.6 DATA ANALYSIS

The above description and discussion of the methods used for data collection will now be discussed in terms of the analysis technique used to interpret the data. The techniques established to analyse both the information from the SLE ToE matrix and the information obtained from the interviews (described in Boxes 4.3 and 4.4) are through a *Reflexive Thematic Analysis.* This is based on Braun & Clarke (2022). Through thematic data analysis, bodies of qualitative data are taken and segmented, categorised, summarised and synthesised through *coding* and established *memos*, so that only relevant, organised and focused concepts are captured to answer the research question (SAGE 2008). *Coding* is done by separating parts of the data, whether whole paragraphs or groups of sentences, from their original context and then sorting them. All data with the same label can be organised and analysed as many times as the process deems necessary. Coding is an iterative process that has been preliminarily determined and has been modified and refined through both the literature review and the incorporation of information through the Systematic Literature review and the Qualified Informant Interviews (see Sections 4.4.1 and 4.4.2). *Memos* are personal notes containing ideas and/or conceptual or theoretical reflections that emerge as data are collected and analysed. Through them, concepts and/or categories of information are formulated to facilitate further analysis (Bryman 2001). Both coding and memos facilitate the development of clusters of concepts and/or categories that are translated into *themes*. Themes are conceptualised as semantic or latent. *Semantic themes* are those that arise from the explicit or surface meanings of the elicited information. Whereas *Latent themes* arise from underlying ideas, patterns and assumptions in the conceptual order of the elicited information. Both types of themes must be clearly defined and organised under a central organising concept (Braun & Clarke 2022).

The thematic analysis chosen for this study is of a "reflexive" nature because it implies that the data obtained are classified and interpreted through the researcher's philosophy. This method takes the researcher's philosophy as both a valid tool and a resource. Whereas the resulting analysis is the result of the cultural interpretation, social positioning, theoretical assumptions, ideological commitments and academic knowledge of the

interpreter. This is why Braun & Clarke (2022) suggest clarifying the philosophical position chosen for the analysis.

In the case of this research the chosen philosophical position is the so-called "Transformative Worldview". It investigates the participatory action of minorities, arguing that change is needed at the policy level in order to modify existing social inequalities and oppressions. This type of philosophical position is also characterised by addressing contemporary social issues and proposing an agenda for action under which the groups' lives under the lens of the study could be positively reformed (Creswell & Creswell 2018).

The result of the reflective thematic analysis can be read in *Chapters 5 and 6* and visualised in the three Rich Pictures sets.

4.7 RICH PICTURES AS DATA SYNTHESIS

As can be seen in the example in Figure 4.7, rich pictures are visual representations of a complex system. They express in a holistic way the multiple factors and patterns that interact in that system, making it possible to visualise it as a whole. “Rich picture" is a concept developed by Checkland (2000) as part of a methodology that addresses complex problems called Soft System Methodology (SSM). It can be conceived as a final research product as well as a starting point. In other words, this tool allows both to facilitate the holistic understanding of the system by the stakeholders involved in the system represented, as well as to be the starting point of a guided participatory process through which views are exchanged, multiple interpretations, reflection, dialogue and debate take place, thus revealing new realities and/or driving possible new research and/or promoting new processes of the system in question (Conte & Davidson 2020).

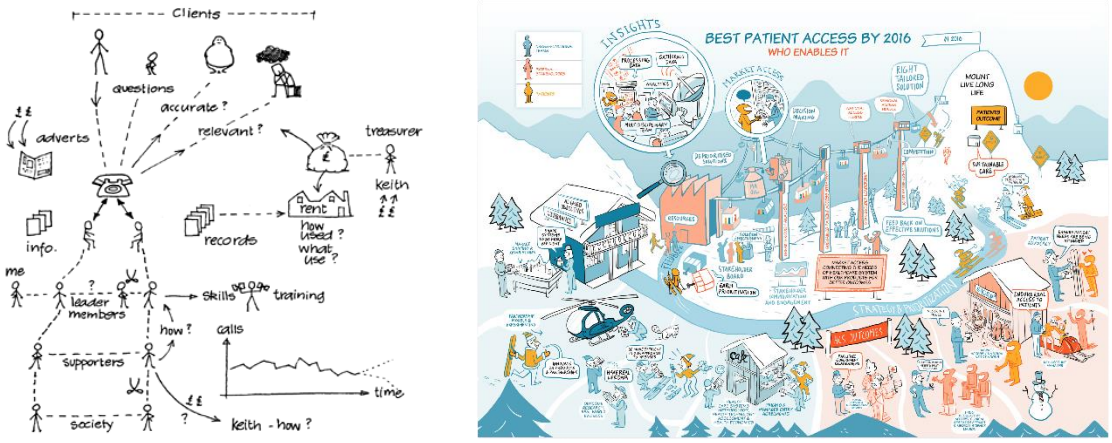


Figure 4.7: Two types of Rich Picture examples. One without and one with graphical layout

Source: Ludic Consulting (n.d.) and The Open University (n.d.)

The Rich Pictures sets belonging to each case study are the visual synthesis of the *thematic analysis* described in Section 4.6, while the third and last Rich Picture set, the one involving the two cases, is the visual synthesis of the *comparative analysis* described in Section 4.4.3. All pictures have been developed under the premises described by Crowe

et al. (2017), Conte & Davidson (2020) and Checkland (2000) and they are both the pictorial synthesis resulting from the Reflexive Thematic Analysis of Phases 1 and 2, and as a result of the Comparative Analysis in Phase 3. These pictures were developed through an iterative process, identifying the components, key characteristics, patterns, relationships and dynamics that make up each system. These key components, in each iteration, have been transformed from descriptions and narratives to symbolic, pictorial and/or metaphorical abstractions, thus generating a "map" of each of them. Additionally, brief textual fragments extracted from the interviews carried out in Phase 2 have been placed in them, which represent the voice, intentions and/or expectations of the actors involved in each process.

5

STONY CREEK CASE STUDY, VICTORIA, AUSTRALIA

Chapter 5. Stony Creek Case Study, Victoria, Australia narrates the results obtained after the application of the methods described in Chapter 4. Methodology with a view to answering the Objective's n°1 question. The content of this chapter is the fundamental preliminary material for the approach of Chapter 6. Iyuí Stream. Lessons learned from Stony Creek, in which the Objective's n°2 question is answered.

As a result of the thematic reflexive analysis described in the previous chapter and considering the narrative structure suggested by Braun & Clarke (2022), an overarching theme is defined which makes up the main section of this chapter; being the sub-section, the sub-theme. The way they are organised and presented makes up the central idea, described in the body of the main text, with the information within the boxes being the analyses in detail. Within this framework, research question 1 is answered (see Chapter 4. Section 4.3).

5.1 CAUSAL FACTORS FOR THE SUCCESS OF CO-DESIGNED REHABILITATION AT STONY CREEK

This theme brings together and synthesises all the information related to the constituent elements of the Stony Creek co-designed rehabilitation process that are essential for an acceptable outcome for all stakeholders. Moreover, it identifies the links and influences between them (inputs and outputs). Finally, it points out the main case's successful participatory rehabilitation factors.

The co-designed rehabilitation of Stony Creek is understood and represented as a process divided into five-time segments, four of them synthesised in a different rich picture, as

can be seen in Figure 5.1. In the following, the corresponding time segments will be described from the milestone where the polluting event occurs onwards. This corresponds to *time segments 2, 3 and 4* in Figure 5.1. As far as *time segment 1* is concerned, it will be described later (see Section 5.1.1) as there are a number of elements that need to be understood in the first instance. In short, Figure 5.2 corresponding to *time segment 2,* is located and described in Box 5.1 and summarises the genesis of the co-designed rehabilitation process. While Figure 5.3 analogous to *time segment 3,* is placed and described in Box 5.2 and represents in detail the co-design process of the elaboration of the most relevant document for Stony Creek's effective rehabilitation. Additionally, Box 5.3 details an intermediate process between *time segments 3 and 4.* This correlates with the participatory process for the elaboration of Stony Creek's Master Plan, under which the actions envisaged in the Rehabilitation Plan (*time segment 3)* materialised. Finally, Figure 5.4, corresponding to *time segment 4*, is located and described in Box 5.4 and summarises Stony Creek's community and stakeholders' current roles and links with some of the plan's actions already implemented.

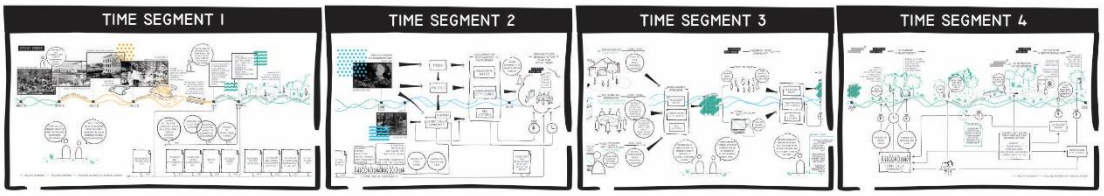


Figure 5.1: Time segments in which the Stony Creek co-designed rehabilitation process is divided into

In summary, there is a multiplicity of causal, semantic and latent factors that make the co-designed rehabilitation of Stony Creek successful. Within the semantic factors, we can identify an institutionalism that advocates for the ecosystemic rehabilitation of the urban waterway in pursuit of the generation of healthy and habitable environments where waterway biodiversity is protected and thrives. As well, this institutionalism advocates for this process to be undertaken together with the community, incorporating their knowledge, experiences and needs, and legitimising the environmental and community benefits that this process brings (see Chapter 3. Sections 3.1.3 and 3.1.4). Another essential factor is the organised, informed, educated, empowered, proactive community, caring for its environment and local surroundings, which is willing to claim, to be part of the process and to maintain and manage it as a long-term responsibility. Additionally, a

beneficial factor for this process is a politically influential community figure ("champion") who advocates for community interests and manages to put such a process on the agenda. For this process to succeed, both stakeholders and the community must contribute time. Time is a critical element of the process and is necessary for successful management, implementation and maintenance. Besides time, it is necessary for these actors to build an accumulation of certain values (honesty, transparency, good dialogue, support and collaboration, high level of trust, among others), thus allowing for a virtuous link between them, which is then positively reflected in the results. Lastly, an essential and determining factor of the dimensions and scope of the process is the budget.

• BOX 5.1 •

STONY CREEK'S COMMUNITY-LED REHABILITATION PLAN GENERATION

The rehabilitation process presented in Figure 5.2, was triggered by a Warehouse Fire, where toxic chemicals and hazardous waste were spilled into the creek. This spill occurred in an industrial area in West Footscray a few metres from the Creek (ATWA, 2019; MW et al., 2019). This event, which was described as "the worst pollution event to a Melbourne waterway in almost 30 years" (MW et al. 2019:2), causes large-scale pollution and devastation to the waterway and its ecosystem, resulting in a significant loss of flora and fauna. Likewise, the health of the local community was also severely affected by the strong chemical fumes from the smoke and odours that lingered for months afterwards (ATWA, 2019; FOSC, n.d.-c). This event generated immediate repercussions in the media, politicians and the community, which led to the mobilisation of multiple state agencies. Table 5.1 details the roles of those agencies that were most significant in the rehabilitation process. While these agencies react immediately to the clean-up and recovery of the urban watercourse and its ecosystem (MCC, 2019b; MW, n.d.-a), the community is dissatisfied with the periodicity of the actions, alerting the agencies to possible future consequences (FOSC, n.d.-c).

Melbourne Water	A state agency that manages and protects the water resources of the City of Melbourne. It manages water catchments and administers and cares for waterways (rivers, creeks, wetlands and estuaries) and major drainage and supply systems in the Port Phillip and Westernport region, working to coordinate and integrate between agencies with complementary responsibilities and local communities. It also contributes to the creation of natural community spaces linked to waterways and the interaction of stormwaters in the urban landscape, among many other services (MW, n.d.-c; MW et al., 2019).
Maribyrnong City Council	Community´s closest level of government who plans and provides services and facilities needed by the locals (urban planning, parks, waste collection, land use, and community development, among others). It also advocates for the management and protection of resources and assets. Implements policies, regulations and programs set by other levels of government, and response to local community needs (MCC, n.d.; MW et al., 2019).

Environment Protection Authority (EPA) Victoria	An authority that regulates, prevents and reduces the harmful effects of pollution and waste on Victoria's environment and its people. Develops in conjunction with other agencies (e.g. DELWP) programs to support environmental protection. Also, it works with communities and stakeholders to protect Victoria's waters and ecosystems and to regulate them, through the implementation of laws, policies and controls (EPA Victoria, n.d.; MW et al., 2019).

Table 5.1: Roles of state agencies involved in the Stony Creek rehabilitation

A new trigger and amplifier of the process is the flooding with contaminated sediments that occurred three months after the event (FOSC, n.d.-c). This event further mobilises the community, amplifying its inputs to both agencies and politicians, who also amplify the inputs from the media.

Additionally, a key player within the community who influences and shifts the political agenda towards issues that are of community interest emerges from the research's interviews with locals. This agent is referred to as a "champion" and is a person who is part of the community and who also has political links, and influence and advocates for the issues that are of community interest.

As a result of these synergies, the group of agencies decided to form a collaborative multi-agency partnership whose output is the development of a community-led rehabilitation plan for Stony Creek. Returning to the contents of Chapter 3. Section 3.1.4, where the issue of co-design was addressed, this point represents the materialisation of *Step 1* where the Co-Design Workshop Plan is established. Nonetheless, the community has no direct involvement in the creation of this process.

Notwithstanding, the characteristics that make up the Stony Creek community are highly influential and determining factors throughout the process. From the interviews it emerges, both semantically and latently, that the participating community is educated, informed, organised, proactive and protective of their environment and local issues, among other positive attributes. These, make up the character of the role that the community assumes in this process, key factors both in its gestation and in the subsequent stages. Moreover, it is these same characteristics that generate positive resonances in the agencies, impacting the composition of the plan and increasing the instances and spectrum of participation.

There are two major community groups that have highly significant and very active roles throughout the process. These are Friends of Stony Creek and Friends of Cruickshank Park. Table 5.2 details the roles that each has historically played in the restoration and enhancement of the Creek and its environment. It also details their outreach to the community. Both groups carry out multiple activities involving

community education, care and environmental awareness.

Friends of Stony Creek	A community group formed in 1993 that advocates for the restoration of Stony Creek and its ecosystem for the enjoyment of current and future generations. They carry out multiple activities throughout the year, such as revegetation, clean-ups and weeding. As well as water monitoring activities, tours and environmental education talks (Facebook, n.d.-b; FOSC, n.d.-b). They currently have around 100 members, of which around 10 make up the active core. They have 1300 followers on Facebook.
Friends of Cruickshank Park	A community group that advocates for the maintenance, improvement and management of the activities that take place in Cruickshank Park. It also undertakes various activities related to revegetation, care of the park's infrastructure as well as educational and recreational activities for the community (BB, n.d.; Facebook, n.d.-a; FOCP, n.d.). They currently have 900 followers on Facebook and 60 on Instagram.

Table 5.2: Main community groups involved in the Stony Creek rehabilitation process

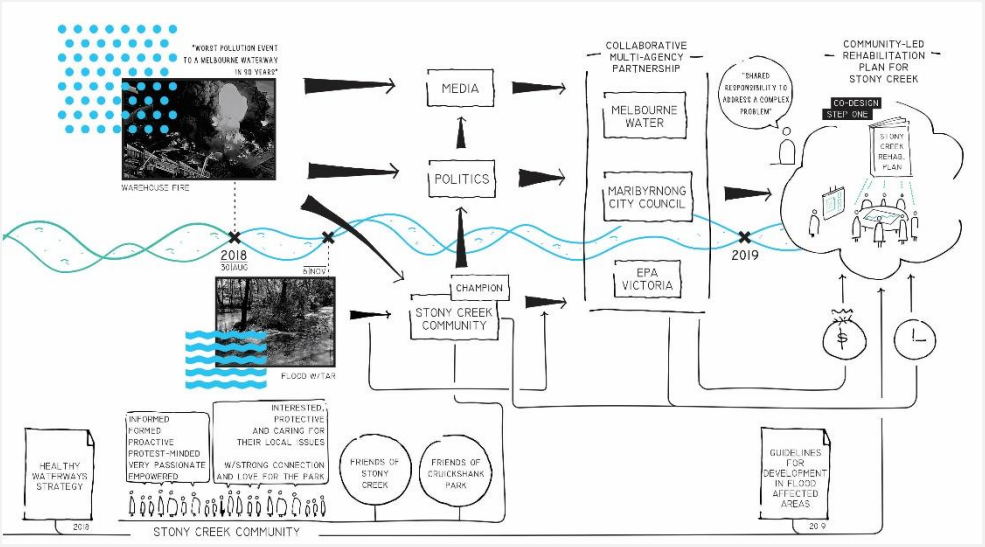


Figure 5.2: Generation of the community-led rehabilitation plan for Stony Creek *

* see the figure with better resolution in the Annex (Figure 0.5.16)

• BOX 5.2 •

STONY CREEK'S CO-DESIGNED REHABILITATION PLAN DEVELOPMENT

The implementation of the participatory process designed by the collaborative multi-agency partnership depicted in Figure 5.2, is summarised in Figure 5.3. It is here that *Steps 2 and 3* of the co-design process materialise (see Chapter 3. Section 3.1.4). *Step 2* comprises the instance where all parties involved reach a state of understanding of the characteristics and contextual considerations and technical requirements to be considered for the implementation of a joint solution. This part of the process culminates after the Draft Concept Plan emerges. In the case of Stony Creek, this is achieved through three major milestones. Two of them, more massive and complementary, comprised of the Pop-up face-to-face events and the virtual insights on "Your Say" webpage. The objective of both was to engage and inform the broader community about the redevelopment plan that was taking place and also to receive their feedback, insights and values towards the space to be redeveloped (MCC, 2019b; MW, 2019a). These activities were the inputs for the Deliberative Workshops composed by a group of representative people from the community, previously selected by the agencies. These workshops included, firstly, an educational instance by technicians, in order to illustrate the community with the necessary knowledge and the relevant regulations and policies to be considered. Afterwards, feedback from the broader community and workshop participants was organised and prioritised, and the set of actions that would form part of the Rehabilitation Plan was subsequently elaborated (MW et al., 2019). These three main inputs formed the Rehabilitation Draft Plan, which emerged from an inter-agency workshop.

Similarly, *Step 3* of the co-design process was initiated following a further public consultation process that concludes with the final Rehabilitation Draft Plan. It is here that the agencies generate the relevant modifications requested following feedback from the Rehabilitation Draft Plan, thus forming a final Rehabilitation Plan (MW, 2019b) adapted to the requirements and needs of the community. This forms a 10-year strategic plan that establishes actions in the short, medium and long term. In fact, the aspirational community vision is also elaborated in phases and points towards the sustainability of the ecosystem and towards the prosperity of the links between actors and between them and nature. A segment of the first intention to be achieved stands out. This is where the watercourse is aspired to as a "healthy and clean natural community asset" (MW et al., 2019:3). Followed by the rehabilitation project to be seen as an example of a successful partnership between community, government and business. These two factors are key to the success of co-designed rehabilitation as they imply a change in perception of both the waterway and the achievement of results as a result of collective work between stakeholders and the community. These concepts are discussed further in Section 5.1.1 of this chapter.

Another characteristic factor of *Step 3* of the co-design process is both the division and agreement of roles and responsibilities between the parties and the common

agreement on the budget, its origins and destinations. This can be seen in its entirety in the "Stony Creek Rehabilitation Action Plan 2019 - 2029" (pages 47-61), where the actions are listed and next to each one of them, the responsible parties, the timeframe and where the funding comes from (MW et al., 2019). It is at this point that the budget constraint on the part of the Maribyrnong City Council emerges as a third factor in the interviews. This is because they have a 3-year budget cycle, which makes it difficult for them to make financial commitments beyond that period.

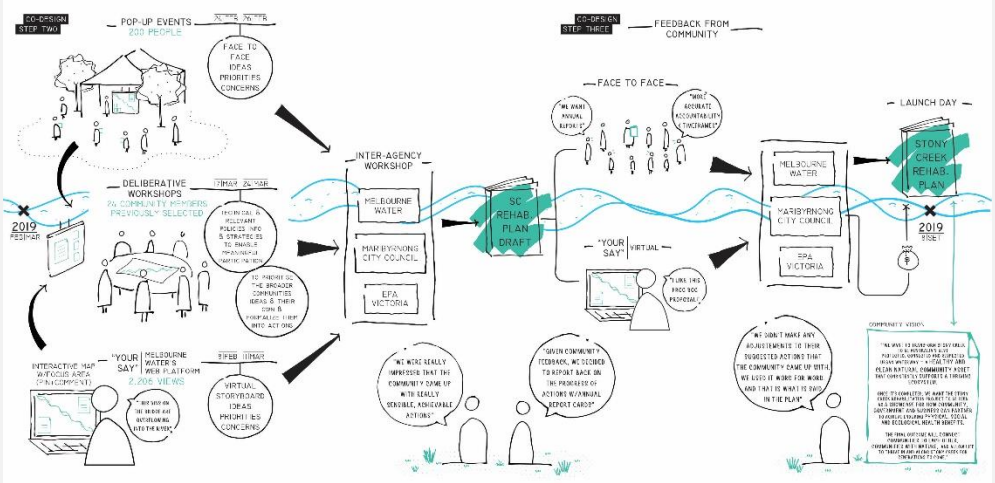


Figure 5.3: Stony Creek's Co-Designed Rehabilitation Plan Development*

* see the figure with better resolution in the Annex (Figure 0.5.17)

• BOX 5.3 •

STONY CREEK'S PARTICIPATORY FUTURE DIRECTIONS PLAN DEVELOPMENT

In partnership with the Stony Creek Rehabilitation Plan (SCRP) process is the development of the creek's masterplan, for subsequent implementation. Relevant conceptual transfers from the SCRP and substantial differences in co-design and budgeting are evident, and the inherent variations of this process are noticeable. The Future Directions Plan (FDP) embodies the actions of the SCRP in a masterplan for the watercourse and surrounding areas within the Maribyrnong City Council boundary (see masterplan in Figure 4.3 in Chapter 4. Methodology)(Outlines et al., 2019). However, there is a notable lack of co-design in this process. This is by large because the City Council, which leads and sustains the process, does not generate or propose a co-design process with its community. However, it does enable a democratic participatory process where three participatory documents are also taken as inputs (MCC, 2019a; YCYV, n.d.). Notwithstanding, community sentiment is positive and the outcome is considered to represent the interest of the majority. On the other hand, a key factor that reappears is that of the budget as an enabler of the process and a conditioning factor for some of the actions to be implemented. This conditioning factor is addressed, to some extent, through the transparency of the implementation plan. There, actions are divided and organised according to priority level (high, medium and low) with unspecified time frames (short, medium and long term) and associated costs, with the most difficult actions to be implemented being transparent in the "advocacy" category (Outlines et al., 2019). Transparency is another key element that contributes positively to the community-government link, contributing to the achievement of the SCRP vision.

It is noteworthy that in the FDP, the SCRP's visions of ecosystem rehabilitation and linkage with nature are maintained and materialised, patenting the change in perception of the waterway and its ecosystem. This is embodied through the vision of achieving a space "rich in habitat and biodiversity" in a human rights-based approach and whose space "will encourage to engage with the natural and cultural heritage of this high valued urban waterway" (Outlines et al., 2019:2). In fact, this is realised in its key objectives, among which "improve water quality and cool the urban environment" and "enhance habitat and biodiversity" stand out. It is in this last key objective that the actions related to revegetation with native plants appear, as well as the "advocate for the naturalisation of concrete channel" (Outlines et al., 2019:2).

• BOX 5.4 •

STONY CREEK'S FUTURE DIRECTIONS PLAN AND REHABILITATION PLAN IMPLEMENTATION

Figure 5.4 summarises the implementation stage of the rehabilitation process where the last three steps of the co-design are materialised. Figure 5.4 represents the current status of the implementation of both plans, which is simultaneously going through *steps 4, 5 and 6* of the co-design process mentioned in Chapter 3. Section 3.1.4. Albeit the systems previously co-designed in the plans have been implemented, the construction has been assumed entirely by the agencies. Nonetheless, all actors involved are aware of their roles and responsibilities and co-manage and act in a complementary way in the space. Consequently, the adjustments, innovations and/or improvements to be made to the plan are part of a common agreement. Accordingly, the co-designed rehabilitation of Stony Creek is institutionalised.

Moreover, this stage reveals new key factors for the successful implementation of rehabilitation actions. These include a community that is organised, proactive and protective of its environment, among other characteristics, with time available to devote to the management and maintenance of the space. Indeed, time is also required from the stakeholders for the co-management of the space, together with an accumulation of certain values that allow for a virtuous link between actors. Finally, the budget available for the materialisation of the actions. In this case, this is achieved either by the direct action of the actors, by the self-financing of the organised community groups described in Table 5.2, and/or by funding mechanisms, incentives or grants programs available in addition to those feasible to obtain through agencies, the state and/or the Commonwealth. An example of this is funding that the organised community can obtain through proposals that align with and contribute to achieving the vision and goals of the Healthy Waterways Strategy 2018-28 (see description in Table 5.3) (MW, n.d.-b).

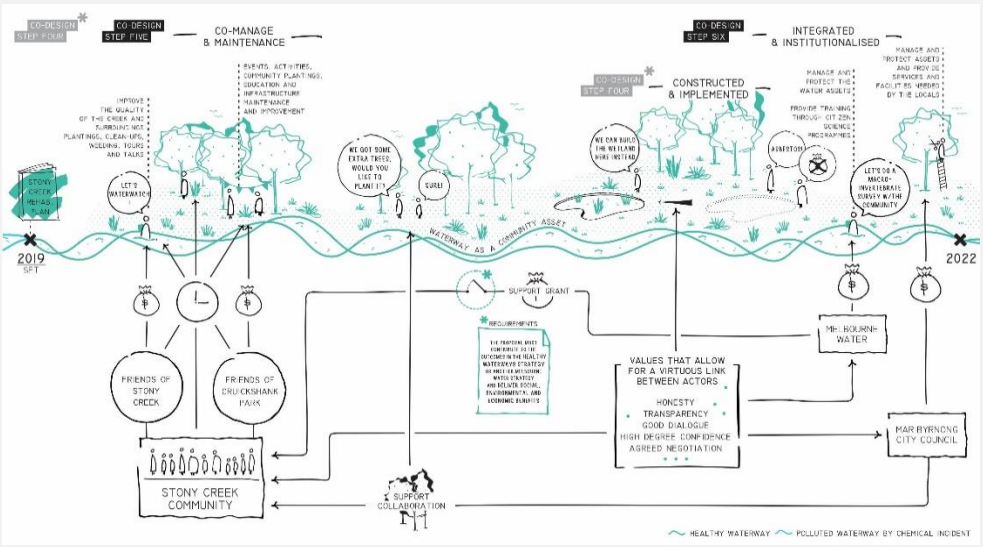


Figure 5.4: Stony Creek's Future Directions Plan and Rehabilitation Plan Implementation*

* see the figure with better resolution in the Annex (0.5.18)

In addition to the factors mentioned above, there is a decisive latent factor that is visualised throughout the whole process as a paradigm shift in urban waterways and the link and role of the community with them. This factor implies a change in the perception of what an urban waterway symbolises and represents for its inhabitants and the multiplicity of benefits that a healthy freshwater ecosystem can generate. As well as a change in the perception of the rights and roles that the community has in the care and management of its habitat and the positive repercussions that community participation brings with it. This paradigm shift is literally evident in the visions of both plans (see Boxes 5.2 and 5.3). In fact, the SCRP vision reflects this very clearly. This vision, which is a literal transcription of what the community elaborated in the deliberative workshop, replaces what could have been the word "waterway" for "community asset" (MW et al., 2019:3) and also incorporates a thriving ecosystem vision. Indeed, this vision strongly believes in collective and horizontal management between government, business and community to achieve the desired outcomes. It also recognises the benefits that such a thriving partnership and sustainable ecosystem rehabilitation can achieve. This vision, reflecting this paradigm shift, is embodied both in the FDP master plan and in the implementation and ongoing management of the site. Nonetheless, this vision was already inherent in the community-led rehabilitation plan for Stony Creek. This is because both the state agent that guided and shaped the process, and the materialised rehabilitation plan, are guided and framed by the Healthy Waterways Strategy (2018-2028) (VSG, 2018). This strategy, described in Table 5.3, is the normative materialisation of such a paradigm shift in Victoria's institutions. In fact, this document is the contemporary milestone in a historic process of linking society, government and the environment.

In essence, the above reveals that a large component of the success of the co-designed rehabilitation of Stony Creek is due to that historical construction prior to the actual event.

This is reflected in a succession of regulations governing these changes in the State of Victoria and within the State of Victoria, in the processes of change and transformation that Stony Creek and its community have forged. This historical paradigm shift is explored further in the next section.

5.1.1. URBAN WATERWAYS´PARADIGM SHIFT. FROM DRAINAGE TO COMMON ASSET

The "Urban Waterways Paradigm Shift. From Drainage to Common Asset" sub-theme brings together and synthesises Victoria's most significant water-related policy documents that signal the paradigm shift between community, government and environment mentioned in the previous paragraph. These are detailed and analysed in Box 5.5 below.

In addition, this institutional paradigm shift at the policy level also has its correlate in the Stony Creek's historical process and the local environmental volunteer movements gestation. This is detailed in Box 5.6 and synthesised in Figure 5.5. Box 5.6 describes the historical and social process that Stony Creek went through prior to the pollution event described in Box 5.1. It is this process, corresponding to *time segment 1* in Figure 5.1, that sets the stage for the triggering event to have as its corollary a plan that combines rehabilitation with co-design.

• BOX 5.5 •

URBAN WATER PARADIGM CHANGE IN VICTORIAN REGULATION

Table 5.3 summarises and arranges the main Victorian regulations related to waterways and their ecosystems, reflecting the transition in the way they are perceived and the role given to the community in their management. It cites those parts related to both issues from the 1989 Water Act to the present day. This document is considered "the most powerful piece of legislation in use in Victoria impacting on rivers, streams and groundwater" (EV, n.d.) and it is the foundation regulation on which contemporary regulation is based and developed. These fragments point out a sustainable, ecosystemic and community-based vision of Victoria's water management that is transitioning towards a Water Sensitive City vision (see Chapter 3. Section 3.1.1). They recognise the value of waterways and the benefits that a thriving freshwater ecosystem brings. Already in the most recent regulations (VSG, 2016b), it is suggested that waterways should not be modified as much as possible, so that they can flood naturally. Indeed, the most contemporary regulations (DELWP, 2019), directly discourage the transformation of waterways into linear concrete channels. It is worth noting that the strategy under which the SCRP is framed (VSG, 2018), is the first milestone where water regulations refer to and conceive waterways as community assets and promote genuine collaborative design.

Guidelines for Development in Flood Affected Areas	2019	Guidelines for assessment and orientation for developments in potential flood risk areas in Victoria. "Past practices of converting minor drainage lines into straight-line concrete channels are no longer an appropriate design solution. Constructed waterways, that slow water down, meander, preserve or enhance remnant vegetation and allow public access are preferred."(DELWP, 2019:44)
Healthy Waterways Strategy	2018	10-year strategy, co-designed with the community, for the management, protection and enhancement of rivers, wetlands and estuaries in the Port Phillip and Westernport region of Victoria. "The region's waterways are important community assets providing opportunities for recreation, to enjoy amenity, and for people to connect with nature and with each other" (VSG, 2018:31) "Collaborative design is a key strength of this Strategy, which has gone beyond traditional consultation approaches and has empowered the community and

		stakeholders to genuinely be involved in its creation and design." (VSG, 2018:44)
Climate Change Act	2017	Victoria's Climate Change Risk Management and Adaptation Base Act, which aims to achieve net emissions by 2050 along with building a resilient community and economy. "Principle of community engagement: (a) providing appropriate information to the community; and (b) providing opportunities for the community to be involved in the decision, policy, program or process; and (c) providing for appropriate and adequate public consultation with the community." (CCA 2017, 2020:24) "(i) balance economic, social and environmental considerations relevant to the land; (…) (iv) plan for the sustainable management of water and biodiversity in the relevant catchment; " (CCA 2017, 2020:60)
Victorian Floodplain Management Strategy	2016	Strategy for flood risk assessment and management in Victoria. "Local knowledge is invaluable in helping understand flood behaviour and the options for flood mitigation infrastructure. It helps identify gaps in warning systems and provides a reality check when validating information on flood behaviour. It is government's role to provide opportunities to capture local knowledge." (VSG, 2016a:14) "this Strategy adopts the principle that waterways should, wherever possible, be allowed to flood naturally, maintaining connectivity to floodplains and their associated wetlands. (…) By allowing waterways to flood naturally, floodplain management can help improve riparian ecosystems" (VSG, 2016c:22) "The Australian and Victorian Governments recognise that healthy waterways and healthy floodplain ecosystems provide significant public benefits. In that context they have made large investments in restoring waterway and floodplain health." (VSG, 2016b:68)

Victorian Waterway Management Strategy	2013	Government strategy, in partnership with the community, for the management, maintenance and improvement of the environmental condition of Victoria's waterways and riparian lands. "The overarching management objective of the strategy is to maintain or improve the environmental condition of waterways to support environmental, social, cultural and economic values. Management activities will focus on maintaining or improving the environmental condition of priority waterways to provide public benefits." (DELWP, 2013:7) "The Victorian Government will continue to promote local action by supporting the work of individuals, community-based natural resource management groups and other volunteer groups to maintain or improve the environmental condition of catchments and waterways." (DELWP, 2013:11)
Water Act	1989	Law for the conservation and proper management of Victoria's water resources in conjunction with community participation. "This Act has the following purposes— (…) (d) to make sure that water resources are conserved and properly managed for sustainable use for the benefit of present and future Victorians; (e) to maximise community involvement in the making and implementation of arrangements relating to the use, conservation or management of water resources; (…) (ea) to ensure that Victoria's water resources and waterways are managed in a way that considers— (…) (j) to provide formal means for the protection and enhancement of the environmental qualities of waterways and their in-stream uses; (k) to provide for the protection of catchment conditions;" (VSG, 2022:1-2)

Table 5.3: Victoria's regulation related to urban waters

• BOX 5.6 •

STONY CREEK TIMELINE PRIOR TO THE 2018 POLLUTING EVENT

Figure 5.5 summarises in a timeline those milestones that represent significant changes in the use of and linkages with the watercourse and its environment. The areas around Stony Creek have their background as quarrying area. Subsequently, the watercourse and its ecosystem suffered serious ecological damage following industrialisation and urbanisation, given its use as a drainage and waste disposal site. From the beginning to the last third of the 20th century, the area was transformed into a landfill of informal residential and industrial waste. It was not until 1971 that the gradual process of transforming the area into a community park began. This process was led by the community and the Maribyrnong City Council. In 1990, after 20 years of rehabilitation and environmental regeneration of the ecosystem, the area corresponding to the mouth of Stony Creek became a nature reserve thanks to the Friends of Stony Creek and the local council (FOSC, n.d.-a; MC, 2014; MW et al., 2019).

The process of transforming part of Sony Creek into a nature reserve marks a turning point, a net paradigm shift in the way the watercourse and its ecosystem are perceived and valued. This correlates with a significant change in the water regulation (VSG, 2022) described in Table 5.3, which is enacted close in time to a set of other environmentally related laws at the state and national level (DCCEEW, n.d.; EV, n.d.; PEA 1987, 2022; VCA, n.d.-b, n.d.-a). Moreover, simultaneously and correlatively, this period corresponds with the beginning of what would become a strong history of environmental volunteering at the national and state level, the epicentre of which is the partnership between the Australian government, the business sector and the national volunteer movement, Landcare. Landcare is a bottom-up philosophy´s movement of communities working together to solve local environmental problems. In fact, it is to this day one of the largest volunteer groups in Australia. This movement has evolved into other community groups involved in the restoration and protection of their local environment, including Coastcare, Rivercare and 'Friends of' groups, among many others (Ciccone, 2021; DELWP, n.d.; EV, 2019; Landcare Australia, n.d., 2019a, 2019b). This has its local correlate in the creation of the Friends of Stony Creek group in 1993 (FOSC, n.d.-a).

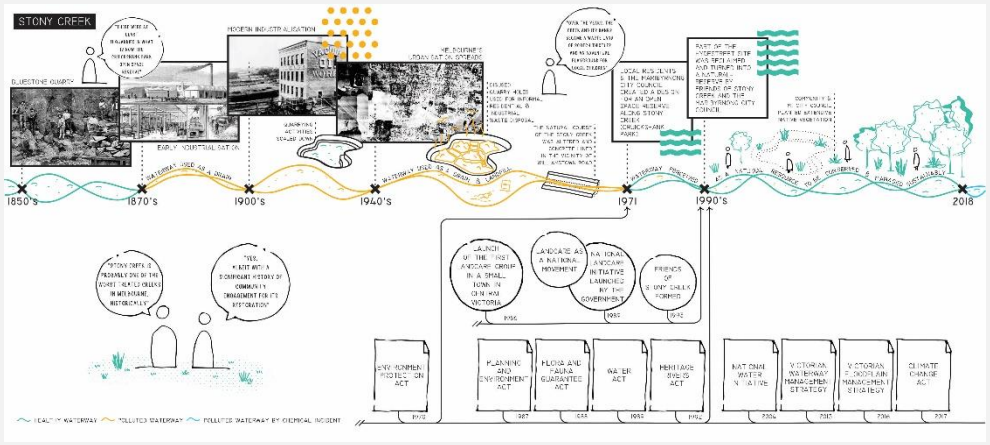


Figure 5.5: Stony Creek Timeline Prior to the 2018 Polluting Event*

* see the figure with better resolution in the Annex (0.5.19)

To conclude, prior to the environmental factor that triggers the Stony Creek Rehabilitation Plan, there is a previous gradual process of rehabilitation and action at a community level in conjunction with the Local Council that lays the foundation for the success of the Plan. In fact, the major polluting event takes place in a historical context and time where there is a tripartite positive feedback situation. At a regulatory level, this incident coincides with the Healthy Waterways Strategy, which promotes a co-designed rehabilitation with a sustainable ecosystemic vision from governmental institutions. Whereas, at a social level, this event is taking place in a place where there are solid, long-standing environmental volunteer groups that have also been strengthened in terms of participation due to the pandemic. Lastly, and not least, this event is taking place in a context where budget is not a major constraint.

6

IYUÍ STREAM
LESSONS LEARNED FROM STONY CREEK

Chapter 6. Iyuí Stream. Lessons Learned from Stony Creek narrates the results obtained after the application of the methods described in Chapter 4. Methodology together with the lessons learned from the analysis done in Chapter 5. Stony Creek Case Study, Victoria, Australia, thus answering the Objective's n°2 question.

This chapter takes the same narrative analysis structure as **Chapter 5. Stony Creek Case Study, Victoria, Australia,** both of which are based on Braun & Clarke (2022). Two overarching themes, and three sub-themes, are then used as discussion points in this chapter. Each of these makes up the central idea, described in the body of the main text, with the information within the boxes being the analyses in detail. Within this framework, research question 2 is answered (see Chapter 4. Section 4.3).

6.1 CAUSAL FACTORS INVOLVED IN IYUÍ STREAM'S REHABILITATION

As a result of the analysis in Chapter 5 in which the factors for the success of Stony Creek were identified as a result of a historical process, the themes identified in this chapter are then based on a historical approach to the Iyuí Creek watercourse up to its current state. Thus, identifying possible causal factors within a process inherent to a given context. Within this historical framework, this theme brings together and synthesises, the historical causal factors involved in the gestation of the urban operation for the Iyuí Stream together with changes in society's perception and use of urban waters and the associated normative documents. In conjunction with this, their linkages and influences (inputs and outputs) are also traced. Finally, the main factors that

currently have a significant impact on the potential rehabilitation of the Iyuí Stream are identified and summarised.

Thus, the current state of Iyuí Stream is understood and represented as a process in a single timeline that is synthesised and divided into two-time segments represented in Figure 6.1, each synthesised in a different rich picture. These are elaborated from both, the contents of Chapter 2 and the literature review together with the symbolic contents that emerged in the interviews described in Chapter 3. Figure 6.2, corresponding to *time segment 1*, is located and described in Box 6.1. It summarises the historical process of the Iyuí urban stream and its surroundings, which form the genesis of the Casavalle Plan. While Figure 6.3 corresponding to *time segment 2*, is located and described in Box 6.2. It depicts both a synthesis of the document's elaboration process containing the urban operation associated with the Iyuí Stream and its first section's current state (to understand the difference between Iyuí Stream's sections see Chapter 2, Section 2.4).

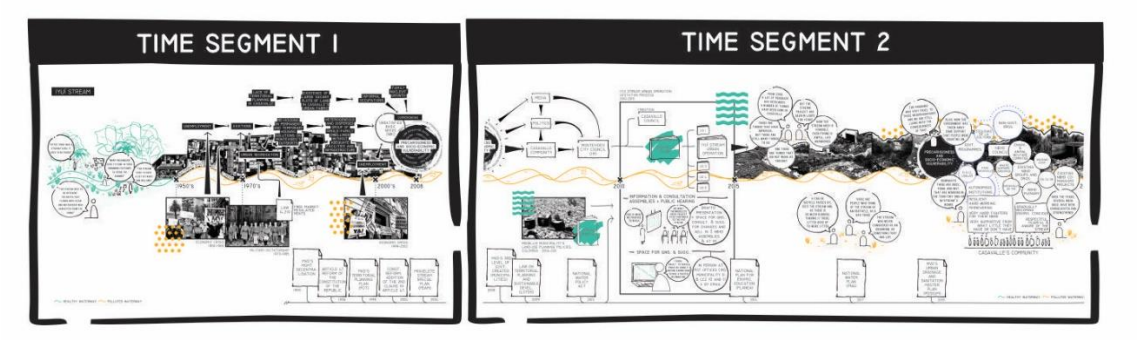


Figure 6.1: Time segments in which Iyuí Stream's historical process is divided into

In addition, after each temporal segment analysis and in order to establish the basis for a comparative analysis between the two cases (see Chapter 4, Section 4.4.3); Section 6.1.1 analyses the succession of regulations that established the legal framework for the Casavalle Plan gestation. As in the Stony Creek case, the regulatory framework is a key factor in the face of an Iyuí Stream future co-designed rehabilitation.

• BOX 6.1 •

CASAVALLE PLAN'S BACKGROUND AND TRIGGERS

The Casavalle Plan has its antecedents in Figure 6.2, whose triggering element is largely due to a synergistic reaction resulting from a cumulative succession of negative events' positive feedback. Over a period of 80 years, these events, (described in Chapter 2. Section 2.3), generated a significant change in the linkage and use of Iyuí's urban watercourse.

Figure 6.2 represents, firstly, a healthy freshwater ecosystem associated with rural land use and the area's low density. At that time the link with the watercourse was recreational. Next, the image depicts the progressive deterioration process suffered by the watercourse and its ecosystem, as a result of the negative feedback processes that the peripheries of Montevideo have experienced, and continue to experience to this day. This represents a system whose main triggering factors are the socio-economic crises experienced by Uruguay in the mid and late 20th century-early 21st century. This system finds its end in a harmful feedback loop. It is there where the Unsatisfied Basic Needs (UBN), and within these, overcrowding, are potentiated both by the consequences of the economic crises and urban processes as well as by the passage of time; resulting in a conglomerate of problematic factors that deepen the precariousness and socio-economic vulnerability of the population that experiences them both. This is materialised in Iyuí in the informal and precarious occupations of people with low incomes, settled on its flood-prone margins. They not only perceive and use the watercourse as open sewage but also use it as a landfill for domestic and industrial waste. This type of use and vision is perpetuated over time, reproducing and consolidating itself in many of the territory's inhabitants.

In addition, the long-term compendium of socio-economic problems meant both a structural reproduction of poverty and the reproduction of internal and external stigmatisation mechanisms that were amplified through the mass media. This led to a positive feedback loop that strengthens and reproduces the internal and external mechanisms of marginalisation and social exclusion of this population. This cumulative succession of negative events' positive feedback resulted in a detonating synergistic reaction that originated, among other things, the Iyuí Stream's urban plan.

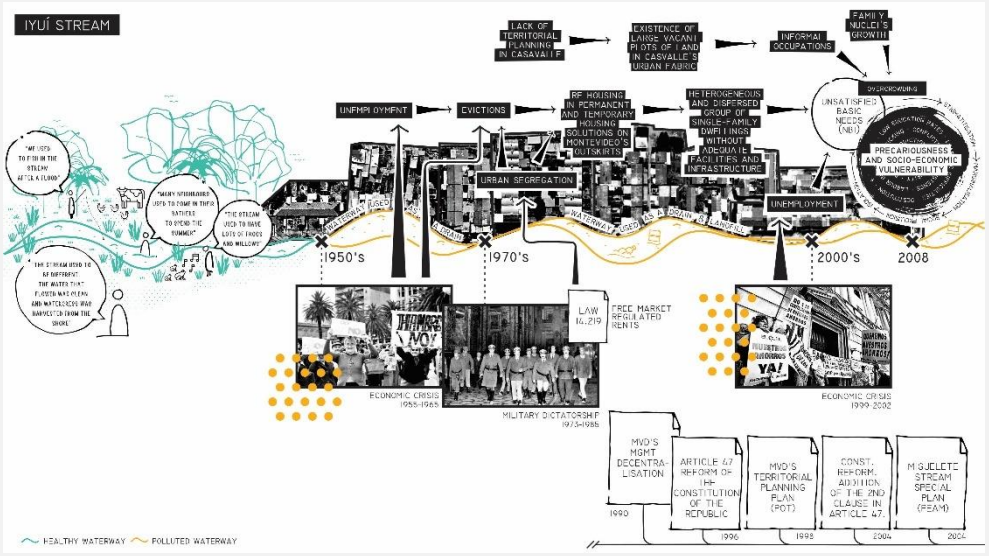


Figure 6.2: Casavalle Plan's background and triggers. Population's uses and links with the Iyuí Stream*

* see the figure with better resolution in the Annex (Figure 0.6.20)

• BOX 6.2 •

CASAVALLE PLAN'S DEVELOPMENT AND IYUÍ STREAM'S CURRENT STATUS

Figure 6.3 as a continuation of Figure 6.2 summarises the reactions and repercussions that the succession of events described above had on the Iyuí Stream up to the present day, as well as their correlation with environmental regulations. Figure 6.3 represents how the community has a great direct influence on the city council government, which created the Casavalle Council. This Council is in charge of carrying out the integral transformation plan for the entire Casavalle Basin in a coordinated manner among all the institutions that make it up (see Chapter 2. Section 2.4) The Casavalle Plan is thus elaborated under a process that involves multiple instances of traditional participation (instances of presentation and public consultation in neighbourhood assemblies and public hearings). This Plan proposes, within a multiplicity of approaches, five urban operations, one of them linked to the Iyuí Stream.

Figure's 6.3 timeline ends with the representation of the urban watercourse's current state. As well, it reproduces some fragments of the interviews that convey some perspectives of its inhabitants today. The image represents a public space project that has not yet begun, with only a few specific road and sanitation actions carried out. It also depicts that the urban watercourse's link as a drainage and landfill still persists in its inhabitants. Nonetheless, also represents a significant change in some community members. The illustration depicts the resilience and empowerment that the community has built up over the years, with a set of characteristics that are now favourable to incipient change. Indeed, this is reinforced by some interview fragments by the community that denote an ecosystemic vision of the watercourse. Thus, this is representative of a paradigm shift in some sectors of the community. In addition, all those organisations or community groups existing in the territory are depicted. They are current or potential actors of direct environmental action in the territory. Lastly, stitching together the two realities that Casavalle still experiences today, are the non-governmental organisations, autonomous institutions and government programmes. These are currently generating multiple initiatives for participatory action in the territory and/or actions to transform individual and/or collective realities (Casavalle de Pie 2020; Esquinas de la Cultura n.d.; NAU n.d.; FADU n.d.).

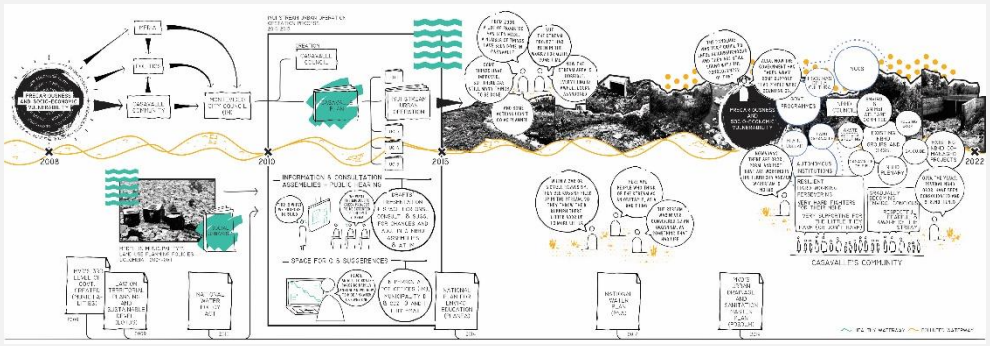


Figure 6.3: Casavalle Plan's development and Iyuí Stream's current status*
* see the figure with better resolution in the Annex (Figures 0.6.21 to 0.6.23)

6.1.1 URUGUAYAN NORMATIVE FRAMEWORK FOR IYUÍ STREAM'S PARTICIPATORY REHABILITATION

The "Uruguayan normative framework for Iyuí Stream's participatory rehabilitation" sub-theme, brings together and synthesises, those documents linked to the Uruguayan regulations which have their correlate in the Iyuí Stream process. Additionally, deals with regulations subsequent to the Casavalle Plan's approval. These indicate a transition and a paradigm change in them, as detailed and described in Box 6.3.

If Figures 6.2 and 6.3 are analysed together with the information in Box 6.3, it can be seen that the urban planning proposal for Arroyo Iyuí and the associated public consultation processes take this form given the incipient national and state regulations at both the environmental and citizen participation levels. Regarding the environment, as mentioned in Chapter 2. Section 2.4, although there is a will to achieve urban-environmental approaches, promoting and valuing the natural support as an opportunity, neither the Iyuí's urban operation nor the Casavalle Plan have a sustainable ecosystemic or integral approach to urban waters. This perception is materialised in a type of proposal that rectifies the streambed and its banks, proposing an open channel with a linear public space whose green area can be interpreted as the space generated as a result of a *tabula rasa*[1] of the existing topography and vegetation. Whereas as far as citizen participation is concerned, the Casavalle Plan is developed in conjunction with several instances of traditional public consultation. In fact, the Plan has a participatory vision that promotes traditional citizen participation in each of the narratives that make up the structure of the actions, encouraging it throughout the entire process. Nevertheless, according to the data obtained in the interviews, the instances of participation linked to the progress of other urban operations of the Casavalle Plan have been mostly within the range of public participation with a low decision impact (inform, consult, involve). Thus, incorporating community concerns into already established designs or frameworks.

1 The concept of *Tabula Rasa* in the architectural context infers radical renewal. The opportunity to start again without register or history with a new and better proposal.

In addition to this incipient environmental-participatory regulation, other symbolic factors clearly influential in Plan Casavalle were both a paradigm shift in the capital's territorial planning and the Montevideo City Council's approach to urban waters at that time. Although the actions in Casavalle and in the Iyuí Stream were already indicated in the POT (IM 1998) and the Miguelete Plan (PEAM) (IM 2015), the Casavalle Plan's urban development model has a regional antecedent and inspiration in the land-use planning policies with a high impact on the peripheries of Medellín carried out by its Municipality between 2004 and 2011 under the "Social Urbanism" label. These policies propose powerful architectural and urban operations in informal peripheral areas of the city, reconnecting them with the city centre. This model is established under a legal framework that obliges the state to consult citizens during the conceptualisation and implementation of urban projects, thus legitimising the projects (Jaramillo et al. n.d.; Bustillo et al. 2018). As far as the water proposal is concerned, the Montevideo City Council had already been implementing canalisations as the prevailing hydraulic model in other urban watercourses as a way to mitigate the flooding that the urbanisation process generates (see Chapter 2. Sections 2.1 and 2.4) (IM n.d.; Martínez 2011; IM 2019a, 2014, 2003, 2006).

• BOX 6.3 •

URUGUAYAN REGULATORY FRAMEWORK LINKABLE TO IYUÍ STREAM'S PARTICIPATORY REHABILITATION

Although Uruguayan environmental normative law had its origins only at the end of the 1990s (IMPO n.d.) as a result of the ratification of environmental treaties; it is only just the constitutional reform of 2004 that marks a milestone in water resources management, establishing the bases and principles for the formulation of subsequent policies. (IMPO n.d.). This had an impact on the creation of the current National Water Directorate (DINAGUA), as well as on the succession of subsequent regulations related to water and the environment (MA 2017). Contemporary to the Casavalle Council's creation and the Plan's elaboration, the National Water Policy Law was passed. This is a milestone in the sustainable and integral development of water in our country. Nonetheless, this law considers a system to be sustainable when it is in a condition that "minimises" the present and future degradation processes of the system. A vision of sustainability that differs from the contemporary one (see Chapter 1. Section 1.1.2). It was also from this perspective that the LOTDS was approved (IMPO 2009), a fundamental basis for the elaboration of the Casavalle Plan. Although both regulations promote citizen participation, they have little impact on the power of users and civil society to influence and make decisions. Only those members of the community who have become "fundamental actors" through a "democratic process" can have a greater impact (IMPO 2010).

Consequently, from the approval of the Casavalle Plan to the present day, the regulatory framework has been gradually changing and aligning itself with current international sustainable development treaties and contemporary ecosystemic visions of urban water management. As can be seen in Table 6.1, there has been an evolutionary change in regulations from the National Water Law onwards. A major regulatory milestone is the National Water Plan (MA 2017). This proposes a sustainable, integral and ecosystemic water vision, which incorporates risk management, social participation and environmental education. The latter promotes, through local strategies, equity and social and environmental justice, considering the link between education and environmental management to be especially relevant (ReNEA 2014) Through Uruguay's ratification of international treaties on environmental matters (United Nations n.d.), Uruguayan legislation is aligned with the international context and trends, such as the Sustainable Development Goals mentioned in Chapter 1, Section 1.1.2, among others.

This paradigmatic shift towards sustainable development can also be seen and made explicit in the new regulations that will govern urban drainage in Montevideo until 2050 (IM 2019b). Montevideo's Urban Drainage and Sanitation Master Plan proposes urban water's adaptive and sustainable management. This means that urban water is integrated into the urban landscape and its hydrological cycle is enhanced through the "construction of adaptive and multifunctional infrastructure that contributes to a water-sensitive city" (Guido et al. 2019:3). Albeit, this master plan does not define the concept "water-sensitive city" at any point (see WSC

definition at Chapter 3. Section 3.1.1), so it is not transparent towards which vision the contributions go. On the other side, a notable aspect is that, unlike other regulations, the master plan revalorises urban waterways by incorporating "heritage" and "assets" in its terminology (IM 2019b:40,47). In addition, while the plan proposes participatory management of water assets, it actually refers to starting to consider participatory approaches, with a view to participation and/or empowerment through consensus building. Thus, the new plan is not determinative and does not advocate for high-impact instances in the spectrum of public participation. On a separate issue, although aspects related to environmental education appear in the volumes that formulate the plan, they are not part of the official publication (Artelia et al. 2019; IM 2019b).

Montevideo's Urban Drainage and Sanitation Master Plan (PDSDUM)	2019	Strategic and adaptive planning tool of the Montevideo City Council for the Sanitation Sector with a planning horizon to the year 2050, aligned with the international context and trends. It promotes the sustainable, integrated and participatory management of "Montevideo's water heritage and urban hydrological cycle" (Guido et al. 2019:2), considering water as "physical and natural assets of the city" (IM 2019b:47). Strategic line 4 stands out, which has a focus on the revaluation and integration of urban waters with a vision towards a water-sensitive city in the search for a cultural change. (Guido et al. 2019; IM 2019b) "4.4 Strategic Line 4: Green Montevideo aims to valorise the elements of the urban water cycle, integrating them into the urban landscape, with participatory, cross-cutting and long-term approaches. It proposes the construction of adaptive and multifunctional infrastructure that contributes to a water-sensitive city and complements the traditional strategies of sanitation, water risk mitigation and systems operation, integrating the social dimension in the water management process. It is a Strategic Line to be implemented in the First Stage, which seeks to generate a cultural change at a social and institutional level (...) The strategy consists of modifying the way watercourses are managed, revaluing urban watercourses, promoting green measures, (...)" (Guido et al. 2019:3) About the path towards a new paradigm of management, sanitation and city vision: *"(...) the need to involve society in the decision-making process, addressing their demands and achieving consensus on the proposals that are embodied in the plan."*(IM 2019b:43) About the basis of which the guidelines and management

		pillars of the Plan are outlined: "the importance of participatory and consensus-building approaches that empower society in the definition of the service standards of all public services" (IM 2019b:46)
National Water Plan (PNA)	2017	Technical policy instrument for integrated planning and management of national waters for sustainable development with an ecosystemic vision, considering access as a human right and addressing risk management. Proposes the conservation of biodiversity linked to water and the proper functioning of its ecosystems through integrated and participatory management together with civil society and a governance of consensus or agreement between the different actors involved and between the different levels of decision-making. It promotes environmental education with reference to PLANEA (MA 2017)
National Plan for Environmental Education (PLANEA)	2014	A plan that identifies a series of recognisable environmental problems in our country, including water pollution linked to problems of marginality and social inequality and territorial imbalances. It promotes programmes and defines strategies for the local and contextualised implementation of the plan based on equity and social justice in pursuit of environmental protection, recovery, conservation and care of biodiversity and ecosystems, within the framework of social commitment to sustainable human development. It points out that the transformative educational effort must be accompanied by changes in current practices and an important aspect to consider is the link between education and environmental management.(ReNEA 2014) "Sustainable human development means a paradigm shift that implies the well-being of society in harmony with its environment, the common good, justice, equitable distribution, sovereignty and environmental citizenship, so that societies are able to manage their environment and administer their assets with environmental rationality and a contextual understanding across successive territorial scales, for the sake of life in all its dimensions" (ReNEA 2014:4)

National Water Policy Act	2010	Law covering the management of water resources and water-related services and uses. Its principles are the integrated sustainable management of water resources and the preservation of the hydrological cycle, taking into account social, economic and environmental aspects. It indicates the abstention of people from negative or harmful environmental impacts on water resources. Another principle indicates environmental education as a social tool for the promotion of the use of the resource in its social, environmental, cultural, economic and productive dimensions. It also grants civil society the right to participate in the formulation, implementation and evaluation of the plans and policies that are established. (see Articles 7, 8, 11, 18 and 19) (IMPO 2010) Article 11: "Sustainable means the condition of the environmental system at the time of production, renewal and mobilisation of substances or elements of nature that minimises the generation of present and future degradation processes. " Article 18: "Participation is understood as the democratic process through which users and civil society become key actors in the planning, management and control of water resources, environment and territory." (IMPO 2010)
Law on Territorial Planning and Sustainable Developmen t (LOTDS)	2009	A national law that establishes the regulatory framework for the maintenance and improvement of the population's quality of life, social integration in the territory and the environmentally sustainable and democratic use and exploitation of natural and cultural resources. This law disallows activities that cause water degradation or are incompatible with water or biota. It also promotes social participation by public institutions and accepts the reception of substantiated proposals from civil society. (see Articles 49 and 72) (IMPO 2009)
Constitution al reform. Addition of the second clause in Article 47.	2004	In addition to the environmental protection law of 1996 a new clause related to water. The waters of the territory are conceived as a unitary resource of general interest and public domain. (see the second clause) (IMPO n.d.)

Montevideo's Territorial Planning Plan (POT)	1998	An instrument that comprehensively addresses the territory of Montevideo, outlining an integral plan made up of territorial systems, zoning and promotion areas and special plans of strategic value. It mentions Casavalle and the Iyuí Stream as a place of transcendental action given the environmental deterioration and the water risk suffered by the people who live along its banks. (IM 1998:168)
Article 47 reform of the Constitution of the Republic	1996	Law for the protection of the environment that initiates environmental law in Uruguay. It indicates the sustainable management of water resources and the restoration of nature, establishing river basins as basic units. It also establishes civil society as a participating actor in all instances of planning, management and control of water resources. (see sections 1 a and b) (IMPO n.d.)

Table 6.1: Uruguayan regulatory framework linkable to Iyuí Stream's participatory rehabilitation

In essence, the factors that are incident to a possible co-designed rehabilitation for Iyuí Stream are extracted from the process synthesised in Figures 6.2 and 6.3 and divided into symbolic and latent factors (as described in Chapter 4. Section 4.6). The symbolic factors for Iyuí are primarily those actors involved in the process. Being, the Montevideo City Council is the main actor, together with the Casavalle community. The latter is made up of a plurality of individuals who possess a set of characteristics favourable to incipient change and who are members or potential members of community organisations or groups with current or potential direct environmental action in the territory. Besides, the community is also made up of all those people who still suffer from this conglomerate of problematic factors that deepen their current situations of precariousness and socio-economic vulnerability. The latter, to a lesser extent than in 2008, but nevertheless persistent and also increased post-COVID. The third fundamental actor, mediating between these two, is the Casavalle Council. Another symbolic factor in the process is the budget as a conditioning factor, currently absent for the development of this project.

As far as latent factors are concerned, the "agenda" of the Montevideo City Council is designated as the primary factor directly influencing a possible rehabilitation. This arises as a result of the Montevideo City Council's existing budgetary limitation, which obliges it to establish priority actions and associated deadlines. This is done through what this work synthesised as an "agenda". In fact, this agenda is subject to a multiplicity of elements and actors that influence its actions. Among the influential actors, as in the genesis of the Casavalle Plan, the community and the event factor reappear. The latter can be the product of a synergistic reaction resulting from an accumulated succession of events (such as what happened in Casavalle), or the product of a specific trigger (as in the Stony Creek case). In addition to the two previous actors, advocacy and political interest is also determining factor for both case studies. Finally, as a particularly important agenda-setting factor, there is the international agenda dictated by international organisations. This is one of the main influences on the global environmental paradigm shift and has influenced both the history of environmentalism in Uruguay and the actors who were, are and will be part of this process.

Based on the above, a new sub-theme and rich picture (Figure 6.4) is then developed, which brings together and synthesises the current system of actors, linkages, influences and determining critical nodes[2] in the face of an Iyuí Stream's co-designed rehabilitation. In addition, Figure 6.4 is the basis on which the lessons learned from the Stony Creek case study are applied to the Casavalle study.

6.1.2 CURRENT DYNAMICS AND POSSIBLE FUTURES. SYSTEM FOR THE IYUI STREAM CO-DESIGNED REHABILITATION

The "Current dynamics and possible futures. System for the Iyuí stream co-designed rehabilitation" sub-theme brings together and synthesises the actors, factors, their links and influences that make up the system that would enable an Iyuí Stream co-designed rehabilitation from its current state. It also identifies a succession of nodes as critical system points. This is represented in Figure 6.4 and described in Box 6.4. Both are the

[2] Point where several elements that converge in the same place are interlinked.

result both of the previous analysis and of new semantic and latent factors that emerge from the interviews described in Chapter 4. Section 4.4.2.

In essence, Figure 6.4 recreates Iyuí´s current system where, although it is possible to achieve co-designed rehabilitation, this is significantly contingent on three major factors. These are the available budget, the priorities of City Council and the negotiations determined by the actors currently managing this process.

Moreover, Iyuí's current system finds new factors and new nodes of incidence after the lessons learned from the Stony Creek case, which are described and represented in the following section (see Section 6.2).

• BOX 6.4 •

IYUÍ STREAM'S CO-DESIGNED REHABILITATION SYSTEM

As can be seen in Figure 6.4, an intervention in the current Iyuí Stream has as a starting factor the Montevideo City Council. It currently has a limited budget in terms of loans from international organisations restricted by the central government (IM 2022). The existing budget is mainly earmarked for two broad plans (IM n.d., n.d.), which are represented linked to the budget by a symbol of an electrical circuit breaker. These address both the management of the negative impacts of an impoverished post-COVID socio-economic environment and inclusive and participatory waste management (IM 2021a, 2021b). These plans, although they address some specific issues linked to the urban operation of Iyuí Stream (cleaning of bulky waste and debris in the watercourse and its banks and building the García Lagos Street) it is not planned, in the short term, to allocate funds for the intervention in the Stream described in Chapter 2. Section 2.4. Therefore, the Iyuí Stream's urban operation is represented, together with the ongoing plans of the Municipality, without access to funds. The switch that activates the destination of the funds is the first critical node of this system.

Also, Figure 6.4 represents the Montevideo City Council's agenda as a main influencing factor in Node 1, which has multiple factors and actors that have an impact on it. The figure synthesises, only the most significant ones for the Iyuí Stream Urban Operation. Prominent among these, at the local scale, is the current community of Casavalle along with various levels of government. Also appears the Casavalle Council at a scale that includes the local and departmental. Additionally, the political factor, represented only at the departmental level for this analysis. Finally, the international agenda as an absolute influential actor. Separate from the stratification, the "event" factor is represented as an external influencing factor. This can have a punctual origin (as in the case of Stony Creek) or it can be a reaction resulting from a cumulative succession of events (as in the case of the Casavalle Plan).

In case Node 1 is activated and funds can be allocated for the Iyuí Stream's urban operation, the system represents two possible viable paths that constitute Node 2. This node represents two viable alternatives in terms of the different roles that could be given to citizens towards a plan's possible implementation. Although there are nuances in terms of citizen participation, two poles are defined for this system. The first pole of the system enables instances of public participation with less citizen impact (e.g., inform and consult). These are the instances that, at the very least, the City Council carries out. Whereas the second pole, enables instances of public participation with a greater impact on citizens (e.g., involve, collaborate, empower), which includes co-design. Both alternatives have associated requirements and benefits. At the same time, this node also points out the factors that currently influence this decision. Among these are Casavalle Council and City Hall technicians

linked to the project, who define it in negotiation.

Node 3, on the other hand, is made up of both, two possible project paths for the Iyuí Stream and the main influencing factors of this decision. This node represents the possibility of building the current plan by the City Council (see Chapter 2. Section 2.4.) with the addition of some specific interventions resulting from the previous participatory processes. As well as the possibility of implementing a watercourse rehabilitation co-designed with the Casavalle community. Both alternatives also have associated requirements and benefits. The factors currently influencing this decision are the same as in Node 2.

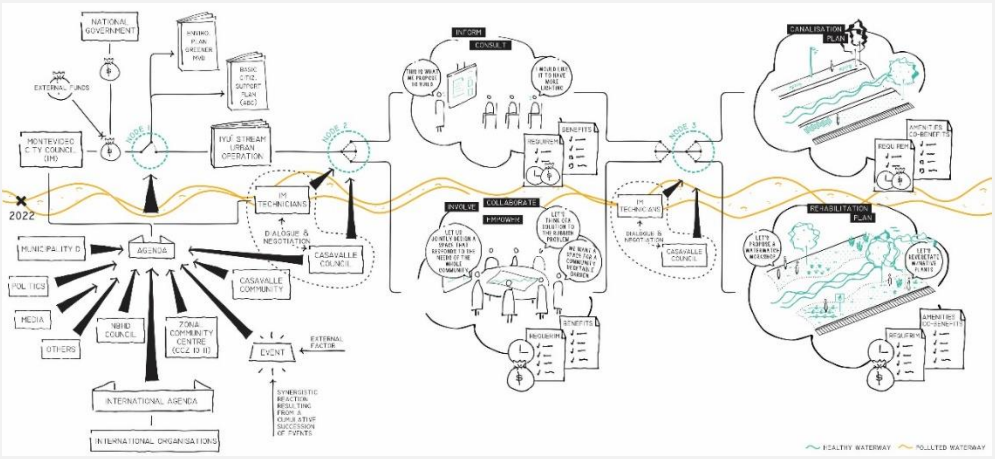


Figure 6.4: System of actors, linkages, influences and determining nodes in the face of an Iyuí Stream's co-designed rehabilitation*

* see the figure with better resolution in the Annex (Figure 0.6.24)

6.2 POSSIBLE LESSONS FROM THE STONY CASE TO THE IYUI CASE

This theme exhibits how some of the factors that are considered to make the Stony Creek case's successful rehabilitation (see Chapter 5) could be a transfer of knowledge to the Iyuí case, leading to a change in its current system (shown in Figure 6.4).

Given that each case has had distinctly different processes, corresponding to distinctly different contexts, and given that the success of the current Stony Creek rehabilitation process is underpinned by a prior construction that lays the foundation for that process to succeed; the transfers of knowledge from the Stony case to the Iyuí case are largely focused on building that necessary prior foundation with a jointly constructed vision of a sustainable future. Looking at Figures 5.5 and 5.3 (Chapter 5) and 6.2 and 6.3 (or Figures 0.5.19, 0.5.16, 0.6.20 and 0.6.21 in Annex) together and comparatively, the Casavalle process in comparison to Stony Creek is a very deep process of environmental, economic and social degradation, which has become structural. In addition, the limited budget availability and the urgent priorities to be addressed in Montevideo, among other factors, make it impossible to finance a rehabilitation like Stony Creek. Meanwhile, although incipient, there is a favourable Uruguayan regulation that incorporates some paradigm shifts linked to sustainable development and ecosystemic valorisation and recovery co-managed with the community. In this, there are some commonalities that can be associated with the vision presented in the Healthy Waterways Strategy (VSG 2018) and the previous regulation. However, there is not yet a consolidated and strengthened environmental group in Iyuí that devotes substantial time to the waterway's environmental management. Nor is there a fruitful and strong link with the relevant government institutions to make such a change a reality.

In short, if the budget issue is removed from the analysis, there are a number of causal factors that make the success of Stony Creek, which could influence the key nodes of the Iyuí Stream case. This new system is depicted in Figure 6.5. This is the pictorial basis on which the strategic recommendations for an Iyuí Stream's rehabilitation, described in the next chapter, are established.

The first input from the Stony Creek case to the Iyuí case involves the gestation and consolidation of environmental social capital in the Iyuí community. Stony Creek currently enjoys a very valuable social capital from which it builds and transforms its environmentally degraded territory into a space with a sustainable and ecosystemic vision. This is the result of the gradual and sustained construction of the community's environmental awareness, perpetuated and amplified after its strengthening. Seen from a systemic point of view, this allows a new factor of incidence of direct action in the territory. It is from the existence of this factor, together with government action, that the transformation of the system begins. This is incorporated in Figure 6.5 as a new node. Node no.4 allows direct-action input from the community towards the rehabilitation of the existing watercourse. The driving factor of this node is the organised local civil society, fighter and protector of their environment and living beings' rights. This is synthesised by the allegory "Friends of Iyuí Stream" (FoIS), from which a bond involves, within the Casavalle community, the potential members of this possible group or set of associated groups.

In fact, the existence of a community group that fights for the environment in terms of human rights, such as FoIS, would become a factor of influence in nodes 1, 2 and 3, when the time to implement and/or make decisions from the Montevideo City Council comes. This community group could substantially influence the choice of the type of project to be implemented and/or modifications that it considers most appropriate for its needs and interests (Node 3). Also, the existence of FoIS could have an impact on the role to be assumed both in the design process and in the subsequent processes of management and maintenance of the space (Node 2). Finally, the community can demand and influence certain influencing factors on the City Council's agenda, thus prioritising the project (Node no.1).

In addition, the second input from the Stony case to the Iyuí case refers to a set of paradigm shifts necessary for a co-designed rehabilitation to be viable. These are associated with each node of Figure 6.4, and it is essential that they are conceived by all the actors involved as well as by the governing regulations. Each of these is detailed in the following section.

6.2.1 PARADIGMS SHIFTS FOR IYUÍ'S CO-DESIGNED REHABILITATION

The "Paradigms Shifts for Iyuí's Co-Designed Rehabilitation" sub-theme takes the symbolic and latent paradigm shifts from Chapter 5 and links them to the nodes of the Iyuí system (Figure 6.4); thus, redefining the basic underlying principles that structure it towards the feasibility of co-designed rehabilitation.

As can be seen in Figure 6.5, the *first paradigm shift* corresponds to *Node 4* and needs to take place both in the local community and in those organisations and institutions that are also active in that node. There is a latent paradigm shift inherent in activism in Stony Creek that enables it to go beyond being aware of environmental problems. This change implies conceiving citizen action as a legitimate agent of change, transforming realities and influencing local public policies in pursuit of the protection and promotion of their rights, interests and needs. It implies, on the one hand, taking on the time, responsibility and commitment of being directly involved in the monitoring, design, management and control of the asset. On the other hand, perceiving the benefits associated with social action, both as a potential cross-cutting educational tool and as a means to achieve social and environmental justice (FOSC n.d.; Landcare Australia n.d.).

The *second paradigm shift* corresponds to *Node 3*. and implies that all actors linked to this node conceive urban waterways as an asset. There is a paradigm shift described in Chapter 5, which is embodied in the Healthy Waterways Strategy that involves identifying the waterway as an asset and a system of great ecological, recreational and landscape value from which future benefits derive. It also involves understanding that it is part of a network that has the potential to provide ecosystem services for the city that help both to mitigate and adapt to climate change and to achieve a sustainable future (AG n.d.; VSG 2018).

The *third paradigm shift* corresponds to *Node 2* and implies that all the actors linked to this node conceive co-design as a priority tool when making decisions involving urban waterways with local communities. This perspective also stems from the vision of the Healthy Waterways Strategy and is what promotes and enables co-design as a participatory tool in the Stony Creek rehabilitation process. This change implies going

beyond conceiving citizen participation as an essential right. It means conceiving it as a valid horizontal educational tool for citizen empowerment. As well, it means visualising the multiple social, environmental and economic benefits it brings in the long term, as well as the positive repercussions of a legitimate and representative public programme and/or policy. Lastly, to believe that this type of tool is a practical example of representative and participatory democracy.

The *fourth and final paradigm* shift is overarching and involves all stakeholders conceiving water assets as a shared responsibility between civil society, government and the private sector. Based on the objectives of the Healthy Waterway Strategy (VSG 2018), this shift corresponds both to the three previous nodes and to the three paradigm shifts mentioned above. It involves sharing responsibility for a common asset, fostering collaboration between actors, which will be positively reflected in the results.

Lastly, and linked to the previous paragraph, the *third input from the Stony case* to the Iyuí case is the construction and consolidation of a positive feedback loop between actors. This implies the gradual construction of a virtuous link between actors through a compendium of values (honesty, transparency, good dialogue, support and collaboration, high level of trust, among others), which will be reflected positively both in the process and in the results.

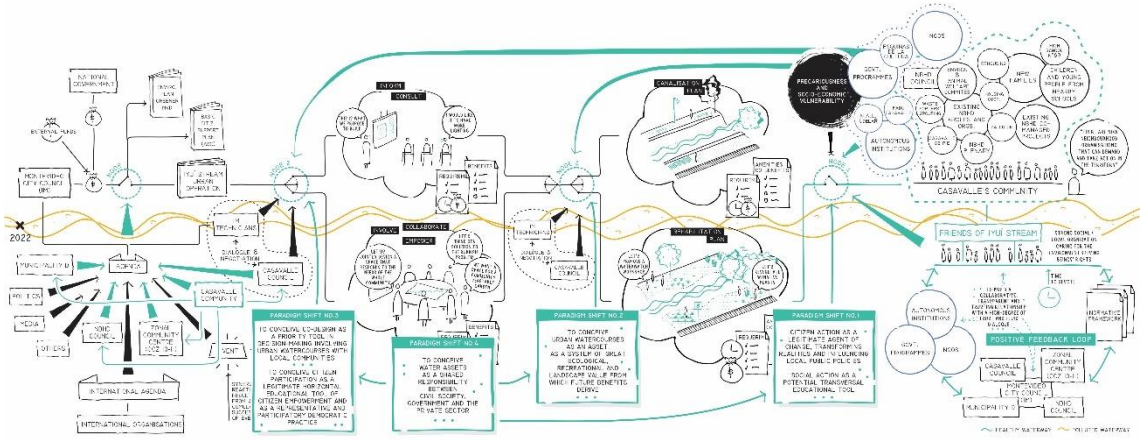


Figure 6.5: Possible lessons learned from the Stony Creek Case to the Iyuí Stream Case's System*

* see the figure with better resolution in the Annex (Figures 0.6.25 to 0.6.27)

7

DISCUSSION AND CONCLUSIONS

Chapter 7. Discussion and Conclusions initially make a summary of the results obtained in Chapter 5. Stony Creek Case Study, Victoria, Australia and Chapter 6. Iyuí Stream. Lessons Learned from Stony Creek drawing a link with the research questions of this study. Subsequently, the results obtained are discussed. Further, the aim of this thesis is reached after suggesting some recommendations for the Iyuí Stream case. In addition, contributions to the field are indicated, relating them to the research mentioned in Chapter 3. Literature Review. Next, the main limitations of this study are discussed. Afterwards, conclusions and implications are drawn from this study. Finally, some possible future research directions are suggested.

Following the co-designed rehabilitation project's case study analysis of Stony Creek, several factors that made the process and implementation successful were identified. These results were obtained in *Chapter 5. Case Study Stony Creek, Victoria, Australia* and provided an answer to research question 1 depicted in Table 7.1, below. Subsequently, in *Chapter 6. Iyuí Stream. Lessons Learned from Stony Creek,* a similar thematic analysis was generated for the Iyuí case. In this way, after a comparative case study, some possible success factors from Stony Creek were transferred to the current Iyuí system, suggesting some possible pathways toward co-designed rehabilitation. The possible lessons learnt from one case to the other answer research question n°2. The results obtained and the answers to both questions are summarised below.

AIM	To identify causal attributions for the success of co-design with local communities in urban watercourse rehabilitation in Victoria, Australia to generate strategic recommendations for Iyuí Stream´s co-designed rehabilitation in Montevideo, Uruguay.

OBJECTIVE 1	To identify and analyse causal attributions for the success of the co-designed rehabilitation of the Stony Creek urban watercourse in Victoria Australia.
OBJECTIVE 2	To Identify, select and analyse those causal components of the success of the Stony Creek co-designed rehabilitation case that could be transferable to the Iyuí Stream case in pursuit of a co-designed rehabilitation.
RESEARCH QUESTION 1	What were the causal factors that led to the effective rehabilitation of Stony Creek?
RESEARCH QUESTION 2	Which causal attributions of success from the Stony Creek case might be transferable to the Iyuí Stream case in pursuit of co-designed rehabilitation?

Table 7.1: Aim, objectives and research questions

7.1 SUMMARY

7.1.1 CAUSAL FACTORS FOR STONY CREEK'S SUCESSFULL REHABILITATION

It is estimated that the success of the co-designed rehabilitation of Stony Creek is largely due to two factors. First and foremost, to a process that steadily and gradually builds in key enabling factors (e.g., change in the perception of what an urban waterway symbolizes and represents to society, as well as change in the role and rights of the community in the care and management of its assets). In these, the foundations are laid for the second factor, the trigger that enables both the community and stakeholders to act in pursuit of a co-designed rehabilitation.

The process itself can be divided into four-time segments, which are depicted in Figure 7.1 and detailed in Table 7.2. Time segments 1 and 2 are the least obvious and most relevant factors for this thesis. In *time segment 1* are the historical enabling factors prior to the genesis of the co-designed rehabilitation of an urban waterway. While in *time segment 2* are the causal factors that emerge after a triggering event and enable actors to collectively construct a co-designed rehabilitation for Stony Creek. As for *time segments*

3 and 4, these are the factors inherent to the co-designed remediation process and those related to the success of site implementation and maintenance, respectively.

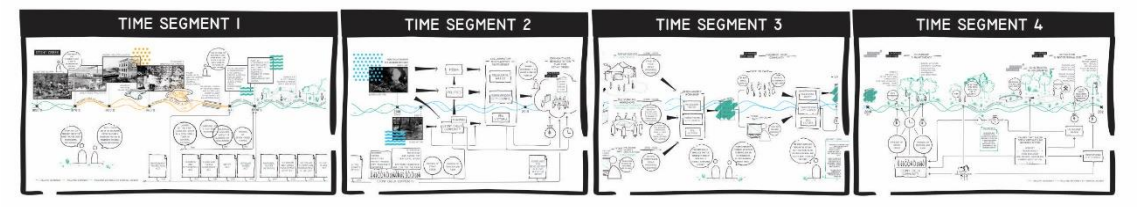
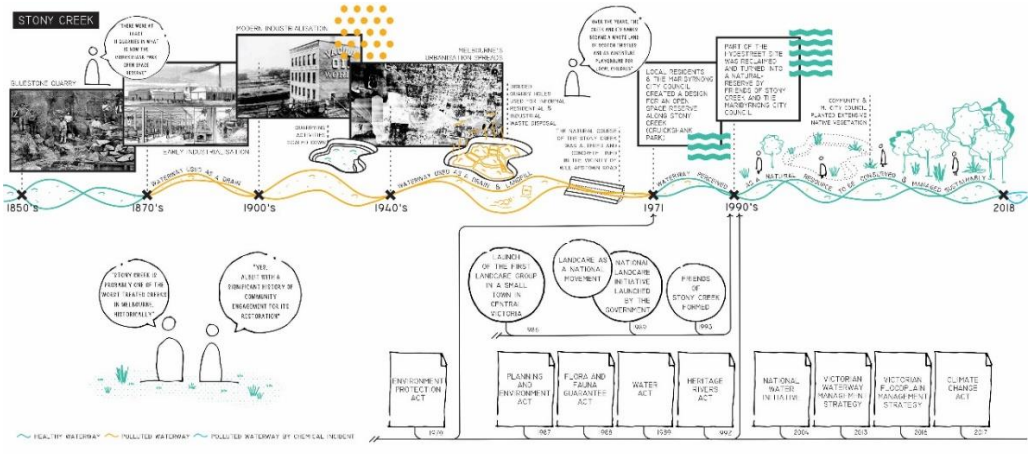
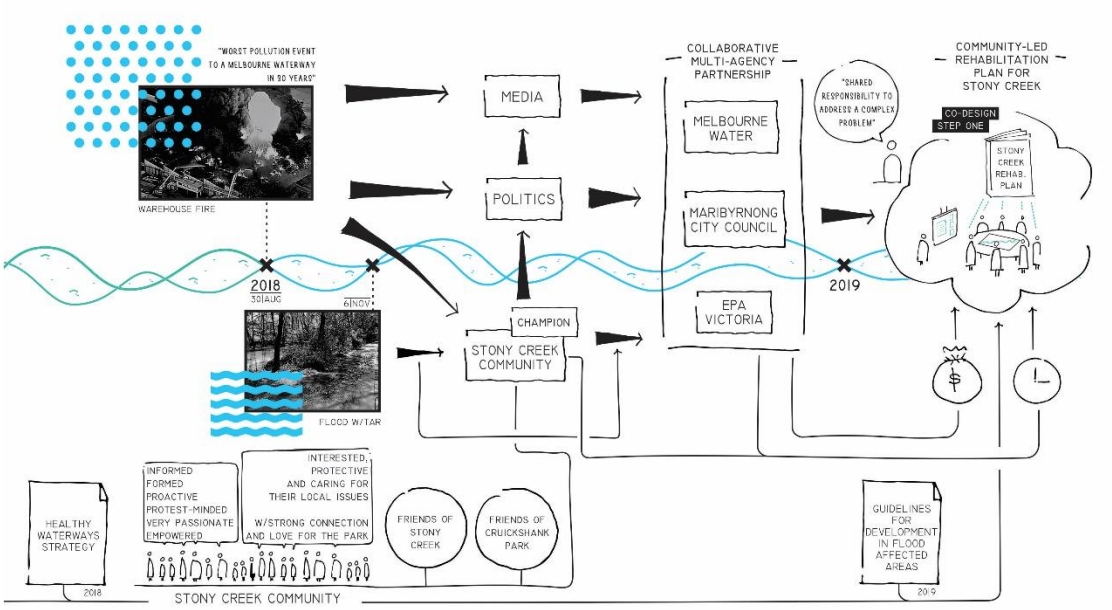


Figure 7.1: Time segments in which the Stony Creek co-designed rehabilitation process is divided into



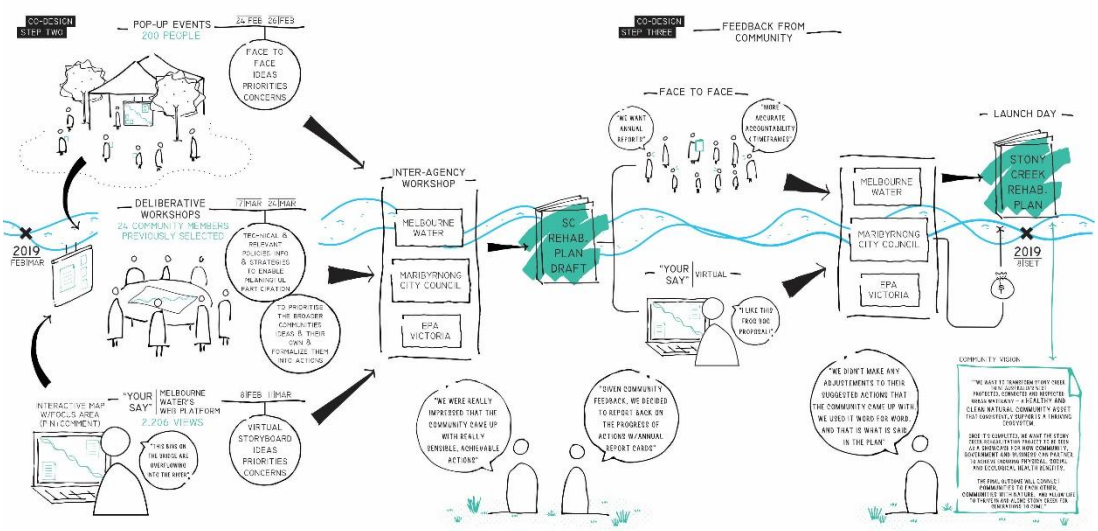
Time segment 1

This time segment lays the groundwork for the following segments to succeed. Before the triggering event, there is a previous gradual process of rehabilitation and action at a community level in conjunction with the Local Council. This prior action is the materialisation of an additional latent factor, also present throughout the process. The analysis identified a cultural paradigm shift of stakeholders and the community in the perception and conception of urban waterways as well as in the link and role of the community with them. This implies a change in the perception of what an urban waterway symbolises and represents. It goes from being considered a drainage and/or landfill to being an ecosystemic value element with associated benefits, consolidating itself as an asset until today. Secondly, it represents a change in the role and rights of the community related to the care and management of its assets, transforming towards collective and horizontal management between government, business and community. This has its correlation at the regulatory level in the succession of regulations governing these changes in the State of Victoria. It also has its correlation at the social level in the historical processes of change and transformation that the Stony Creek community has forged based on and influenced by historical environmental volunteer movements in Victoria.

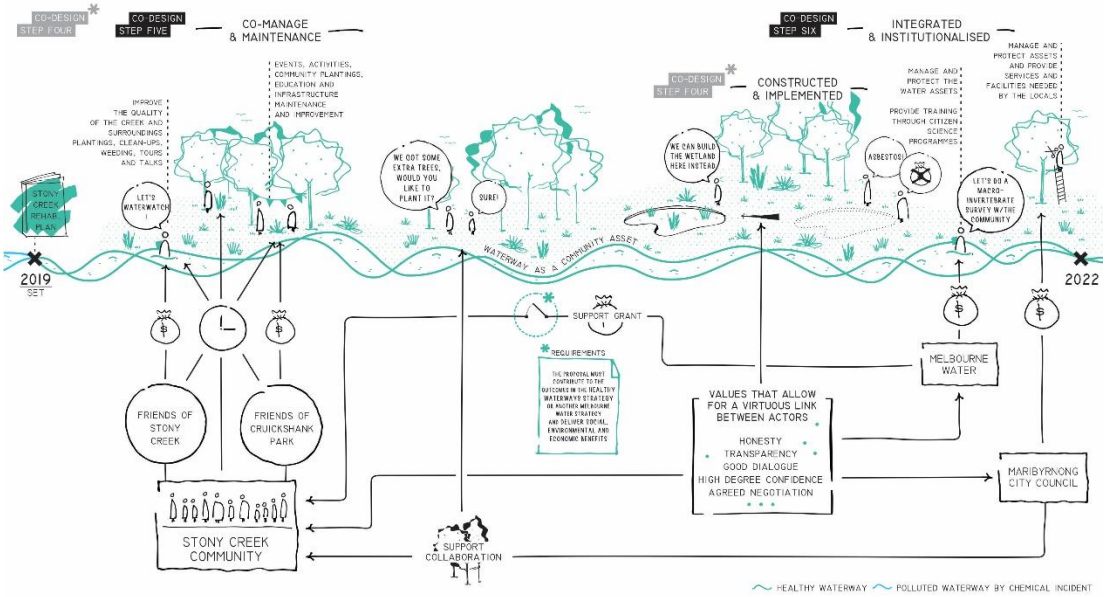


Time segment 2

This is the key point where the co-designed rehabilitation process for Stony Creek takes shape. The analysis identifies that the major contaminating event occurs in a historical context and time whose circumstantial factors generate positive feedback. Firstly, the normative level factor is discussed. This event coincides with the Healthy Waterways Strategy, which promotes a co-designed rehabilitation with a sustainable ecosystemic vision from governmental institutions. Also, an influential factor at the political level is the figure of the community ("champion"), who advocates for community interests and manages to put such a process on agenda. Secondly, the environmental social capital factor. This event takes place in an area where there is an organised community with strong and long-standing environmental volunteer groups. Likewise, this community has a series of characteristics that are very favourable for carrying out a co-management process (organised, informed, trained, empowered, proactive, caring for their environment and local surroundings, willing to claim, to be part of the process and to maintain and manage it as a long-term responsibility). Finally, this event takes place in a context where there is time available for dedication from all parties involved and where budget is not a major constraint.



Time segment 3



Time segment 4

These segments have as outstanding success factors, those inherent to a satisfactory co-design process as well as a set of values that need to be consolidated between the parties for a successful project's implementation and management. Among these, the horizontal and consensual collaborative participation throughout the whole process with prior training of its participants for this purpose stands out. Secondly, the construction of a set of certain values (honesty, transparency, good dialogue, support and collaboration, high level of trust, among others) that allow for a virtuous link between stakeholders and the community and are positively reflected in the results. Lastly, inherent to both segments are the aforementioned time and budget factors.

Table 7.2: Time segments that make up the successful process of Stony Creek's co-designed rehabilitation*

* see all figures with better resolution in the Annex (Figures 0.5.16 to 0.5.19)

7.1.2 LESSONS LEARNED FROM STONY CREEK

Given the significant difference between contexts and processes in each case, and the fact that there is currently no budget available for the planned project in Iyuí to be developed, the lessons learnt from the Stony case focus mainly on the casual factors linked to segment 1 but with an aim to building the factors for segments 2, 3 and 4. This is intended to generate the process base in Iyuí so that, when the budgetary and/or causal circumstances to undertake the project arise, the conditions are in place for a co-designed rehabilitation to take place. The lessons learned from Stony Creek are depicted in Figure 7.2.

The Stony Creek case's primary transfer of knowledge involves the need for the gestation and consolidation of environmental social capital in the Iyuí community. This implies primarily, the propagation, strengthening and consolidation of existing community groups involved in the environmental and human rights fight in Casavalle. These groups allow for a new factor that influences the current system through direct action in the territory. Thus, directly influencing the critical decision nodes at the moment of implementation by the Montevideo City Council and in the subsequent processes of the space's management and maintenance.

On the other hand, the Stony Creek case's second transfer of knowledge refers to a set of paradigm shifts necessary for a co-designed rehabilitation to be desired and feasible. Four paradigm shifts are identified to be conceived both in all actors involved in each critical decision node and in current and future governing regulations. The *first paradigm shift* involves conceiving citizen action as a legitimate agent of change, transforming realities and influencing local public policies in pursuit of the protection and promotion of their rights, interests and needs. This implies, firstly, taking on the time, responsibility and commitment required to get involved, and secondly, perceiving the benefits associated with social action. The *second paradigm shift* involves conceiving urban watercourses as an asset. That is, as an asset and a system of great ecological, recreational and landscape value from which future ecosystemic and socio-cultural benefits derive. The *third paradigm shift* implies that stakeholders conceive co-design as a priority tool when making decisions involving urban watercourses with local communities. This implies conceiving it as a legitimate horizontal educational and citizen empowerment tool, together with visualising the multiple social, environmental, economic and public policy benefits it

brings in the long term. Finally, to believe that such tools are a timely and practical example of a democratic participatory exercise. The *fourth paradigm shift* implies that all actors conceive water assets as a shared responsibility between civil society, government and the private sector, and that collaboration between actors is encouraged.

Lastly, Stony Creek case's third transfer of knowledge refers to the virtuous link's gradual construction between actors through a compendium of values (honesty, transparency, good dialogue, support and collaboration, high level of trust, among others), which will be positively reflected in a possible future process and its results.

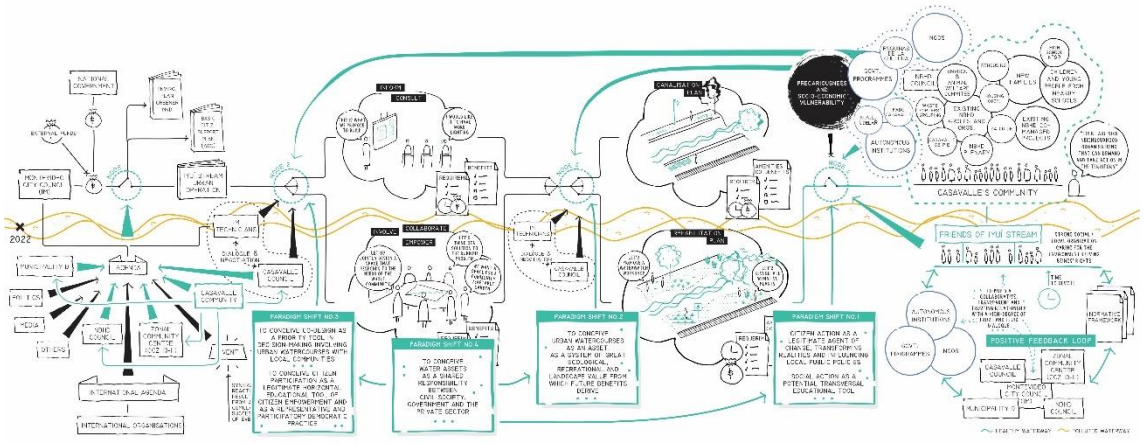


Figure 7.2: Lessons learned from the Stony Creek Case to the Iyuí Stream Case's System*

* see the figure with better resolution in the Annex (Figures 0.6.25 to 0.6.27)

7.2 DISCUSSION

First and foremost, the results suggest that given the current socio-economic and cultural conditions of the Iyuí Stream case, the transformation of the current project proposed by the Montevideo City Council into a co-designed rehabilitation is not feasible, but not utopian either. If there are no new factors or changes in the existing ones that directly influence the system's critical nodes under which the proposed plan for Iyuí is implemented (see Figure 6.4 in Chapter 6), the data points that the plan would be subordinated to both the original project intentions and to instances of public participation with low decision-making impact and incidence. This, coupled with the two cases' significant differences in the socio-economic contexts and in the cultural context in which each is currently located, makes it unfeasible to translate the Stony case's success factors literally to the Iyuí case. However, the results lean towards that commonalities were found between cases that would enable new possibilities in the current Iyuí system towards co-designed rehabilitation. Albeit, within these commonalities, there are singularities inherent to the Iyuí context that establish specific foci to be addressed. These commonalities and their differentials are detailed below.

The analysis revealed that, in terms of the use and symbolic value of the urban watercourse, the Iyuí case is in a cultural context similar to Stony Creek's time segment no.1. The latter, to achieve the successful co-designed rehabilitation it enjoys today, had a strong community and local environmental movement working together with its local council, which struggled for 30 years after 100 years of environmental deterioration. This implies that co-designed rehabilitation is a laborious, gradual and collaborative process. Indeed, it is only four years ago that the regulations governing Victoria's waters incorporated this cultural change in their valuation as co-design and co-management as the preferred participatory tools (VSG 2018). Thus, the key factors identified in the analysis correspond mostly to necessary cultural changes (also called "paradigm shift") to be materialised in both, each decision node's influential actors and in the governing regulations. The analysis suggests that it is these cultural changes that build the foundational basis that enables systemic change.

As well, the available data suggest that, like Victoria's current regulation, Montevideo's urban waters' current governing regulation has incorporated a cultural change in terms of its valorisation, given the international treaties to which it is subordinated (IM 2019a). Both regulations refer to urban watercourses as assets and as a system of great ecological, recreational and landscape value from which future benefits derive. Moreover, evidence suggests that some of the proposed new projects linked to urban watercourses already incorporate this new ecosystem vision (IM 2019a, 2019b). Nevertheless, in contrast to Victoria's regulations, Uruguay's regulations do not incorporate or envisage high-impact participation instances. Therefore, it remains to generate a transition towards legal regulations and institutional tools that propose the citizenry as a fundamental actor in decision-making and the management of the policies that concern them.

Albeit, although there is a regulation that would enable a participatory rehabilitation process, unlike in Stony Creek, the environmental community social organisations currently existing in Iyuí do not yet have the necessary social capital to articulate them in their territory. While an appropriate regulation is a fundamental element for the co-designed rehabilitation process in Iyuí to take place, "there is no right that survives the indifference of its beneficiaries" (Monzón 2018: Sec.II DESARROLLO. Par.19). This is why the key success factors subtracted from Stony Creek's success point to cultural changes in this process' actors with decision-making power; suggesting a simultaneous and sustained systemic change with emphasis on its beneficiaries, the community of Casavalle. The analysis suggests that it is from the community that the most significant systemic changes can be made in pursuit of a co-designed rehabilitation. To this end, it is necessary to strengthen and increase existing community organisations linked to environmental issues. In this way, they could have a real direct impact on the community management of their watercourse and ecosystem. According to the data obtained, they could potentially benefit from joining forces with other existing and strong neighbourhood organisations (cooperative associations, SA.CU.DE., among others). Potential members could also be the future families that will settle in the new cooperatives and resettlements around the Iyuí Stream and, above all, the children and young people of the existing and future educational centres nearby. Together with the increase in social capital and the necessary associated cultural changes, it is necessary to foster and build a virtuous link between actors for cooperative governance.

In addition, the results lean towards that given the incipient and reduced environmental movements in Casavalle, one way to contribute and help accelerate, develop and foster these internal cultural changes in the Casavalle community is through the non-governmental organisations, autonomous institutions and government programs that are already active in the territory. These could, working together and in a coordinated manner, form the external complement required for this cultural change to occur (Albó n.d.).

Lastly, the data points to that there is a substantial difference from the Stony Creek case in terms of the structural situation of precariousness and socio-economic vulnerability that the Casavalle community still experiences. This implies that all actions in pursuit of a co-designed rehabilitation must at all times contemplate this situation, generating comprehensive strategies that seek to remedy both this situation and the negative feedback synergies that they have with their environment.

As a corollary, to move towards the implementation of these cultural changes and the links between actors, a series of ad hoc recommendations for the Iyuí case are generated below through concrete actions articulated by the protagonists of this possible systemic change.

7.3 RECOMMENDATIONS TO IYUÍ STREAM CASE

To achieve this research's aim (see Table 7.1), a set of multiple comprehensive actions are set out below in an attempt to bring about systemic change to enable co-designed rehabilitation in Iyuí Stream.

The proposed tentative actions pursue Iyuí Stream's vision as a potential prototype co-managed space for activist environmental education through which Montevideo would manage to incorporate characteristics of a Water Sensitive City, also achieving several of the SDGs to which it is subscribed through international treaties. Given that Iyuí is a space with great educational potential, the actions proposed in Table 7.3, conceive the prototype's gestation through which to approach co-design through integral participatory

environmental education techniques with common action pedagogies[1] (Williams 2017; Morán et al. 2021; Puig 2021; Monzón 2018). Both actions linked to co-design and the space's ecosystemic rehabilitation and co-management, take the Healthy Waterways Strategy and the vision of Water Sensitive Cities as references (see Chapter 3. Section 3.1.1) (VSG 2018; ADB & MU 2021; CRC for WSC n.d.; Brown et al. 2016). Therefore, after implementing a co-designed and co-managed rehabilitation, many of the WSC indicators (ensure good water-sensitive governance, increase community capital, improve ecological health, ensure quality urban space) would be achieved (CRC 2019). In addition, this would enable it to contribute to almost all SDG targets (UN n.d.), thus also achieving some of the targets of the international treaties to which Uruguay is a signatory (UN n.d.).

Furthermore, the actions are both articulated by the actors who would be the protagonists of this change and are designed to address one, several or all the key factors and paradigm shifts necessary to generate the proposed systemic change (see Chapter 6 Section 6.2.1 and Chapter 7 Section 7.1.2). These prioritise at all times strengthening and reinforcing both community movements and the organisations and structures that are currently working in the territory. Community-focused actions mostly appeal to internal movements that foster the cultural changes necessary to build environmental social capital. The actions linked to existing social organisations contribute to this capital by trying to strengthen their educational role as external factors that contribute to the paradigmatic changes' generation necessary for this purpose. Finally, the actions concerning the governmental sphere mainly address the regulatory and institutional aspects and the promotion and generation of spaces for waterway asset co-management.

However, these tentative actions, being in the framework of a co-managed process and a context of socio-economic precariousness and vulnerability, require a series of additional general considerations. Coordinated proposals and actions are required within and between organisations to be developed preferably simultaneously, adaptively and equitably (with short, medium and long-term plans and actions). These should transversally generate solutions and/or strategies that contribute to achieving sustainable development (see Chapter 1. Section 1.1.2), minimising and/or eradicating the

1 The pedagogy of common action holds that personal development and citizenship training are achieved by acting in reality to transform it.

conglomerate of factors that deepen the current situations of precariousness and socio-economic vulnerability that Casavalle still experiences (see Chapter 2. Section 2.3 and Chapter 6. Section 6.1).

REFERENCES

KF1 (Key Factor 1): To gestate and consolidate an environmental social capital in the Iyuí´s community

PS1 (Paradigm Shift 1): Citizen action as a legitimate agent of change

PS2 (Paradigm Shift 2): Urban watercourses as an asset

PS3 (Paradigm Shift 3): Co-design as a priority decision-making tool

PS4 (Paradigm Shift 4): Urban waterways asset as a shared responsibility between civil society, government and private sector

KF1 (Key Factor 2): To build virtuous linkages between stakeholders and the community

ACTIONS TO BE IMPLEMENTED FROM AND IN THE COMMUNITY

To link and strengthen existing and potential future organisations	**KF1**
To incorporate and encourage participation, awareness raising and participatory environmental education at various local levels. To emphasise existing and future residents living near the Stream and local educational centres	**KF1** **PS1**
To generate adaptive action plans for the watercourse and its ecosystem's rehabilitation in the short, medium and long term To devise feasible actions that generate small victories and both strengthen the group and attract new supporters	**KF1** **PS1**

ACTIONS TO IMPLEMENT FROM AND IN NON-GOVERNMENTAL ORGANISATIONS, AUTONOMOUS INSTITUTIONS AND GOVERNMENTAL PROGRAMMES ALREADY OPERATING IN THE TERRITORY

To promote participatory environmental education and the strengthening of local environmental social capital among organisations through multi-, inter- and/or trans-disciplinary actions	**KF1** **PS1** KF2
To educate, encourage, raise awareness and incorporate more members of the community through existing and future participatory environmental actions in the territory	**KF1** **PS1** **PS2** **PS4** KF2
To incorporate and promote content related to environmental sustainability, social and environmental justice, ecosystem rehabilitation and high-impact citizen participation tools into curricula	**PS1** **PS2** **PS3** **PS4**
To train technicians and/or professionals and/or dependants to work as environmental co-educators	**PS1** **PS2** **PS3** **PS4**
To advocate environmental literacy through co-designed practices. To promote action pedagogy and learning-by-doing and gradual and sustained actions over time that take into account the changing demands of the population and foster an informed, educated, critical and proactive citizenry (Puig 2021; Williams 2017)	**PS1** **PS2** **PS3** **PS4**
To promote joint actions with the community to identify and analyse existing socio-environmental problems and generate potential proposals for co-designed rehabilitation To contribute with local environmental organisations to the elaboration of a joint agenda of feasible actions that generate small victories and allow both to strengthen these groups and to attract new supporters	**KF1** **PS1** **PS2** **PS3** **PS4**

ACTIONS TO BE IMPLEMENTED BY AND IN GOVERNMENT AND STAKEHOLDERS	
To strengthen those points where institutions currently exist and through them, reinforce and improve links with the community and the non-governmental organisations and autonomous institutions currently operating in the territory	**KF2**
To incorporate representative-participatory clauses into laws, instruments and government actions that conceive water assets as a shared responsibility between civil society, government and the private sector and encourage high-impact community participation in their design, management and implementation as a way of legitimising government plans, projects and policies	**PS3** **PS4**
To incorporate into laws, instruments and government actions clauses that prioritise the rehabilitation of urban watercourses and their ecosystems and promote these spaces as potential ecosystemic spaces for cross-cutting environmental education	**PS2** **PS4**
To generate and reinforce inclusive, horizontal and transparent spaces for shared governance between civil society, government and the private sector of common natural assets and reposition the community as powerful agents in the planning, management and maintenance processes	**PS4** **KF2**
To implement co-design processes with flexible proposals that allow incorporating people's needs, desires and creativities both in the initial design and after implementation (Hertzberger, Herringer & Vassal 2013; Parsons School of Design 2017)	**PS3** **KF2**
To promote participatory environmental education across the design, management and implementation of government projects linked to urban watercourses	**PS2** **PS3** **KF2**
To train skilled and qualified professional technicians to be able to implement co-design tools in different target audiences	**PS3** **PS4** **KF2**

Table 7.3: List of actions to be implemented by Iyuí's community and stakeholders to achieve a co-designed rehabilitation at Iyuí Stream

7.4 CONTRIBUTIONS TO KNOWLEDGE

In terms of existing scientific research, this study succeeds in contributing to the scientific literature on the co-designed rehabilitation-tiny niche on which it is situated. As identified in Chapter 3. Section 3.1, although ecosystem-based rehabilitation is a trendy topic in the scientific literature, the literature that addresses co-design and rehabilitation concepts together is extremely scarce. It is even scarcer in global south's countries. As detailed in Section 7.1.2, the results obtained in this study focus on the *ad hoc* socio-cultural aspects necessary to implement a systemic change to enable co-designed rehabilitation. In contrast, existing research approaches it from the implementation stage. Some from a general theoretical approach (ADB & MU 2021) or from technical solutions, which hardly address the issue of participation (Rubi & Hack 2021; Dobbs et al. 2018; Veról et al. 2020). Nevertheless, these coincide with this study's results in their brief general mentions of the need to take into account Latin America's socio-ecological particularities (Rubi & Hack 2021; Dobbs et al. 2018) and the possibility of their viability and usefulness only if they are accepted by the population (Veról et al. 2020).

At the same time, this study could theoretically contribute to the elaboration of possible prototypes of plans and proposals to be developed by governmental and non-governmental organisations, autonomous institutions and government programmes that are already working in the territory. Furthermore, the existence of Rich Pictures generated in Chapters 5 and 6 are a possible pictorial basis for working with all those people who are linked to the case of Iyuí, given their easy understanding.

7.5 STUDY LIMITATIONS

This study went through a series of limitations both inherent to the methodological framework and the methods are chosen to conduct it, as well as to internal and external factors that occurred throughout the research process.

As far as the methodological framework is concerned, to have chosen to carry out a single case study from which to identify the co-designed rehabilitation’s success keys, reduces

the results, to some extent, to the Stony Creek case's local and individual context. Thus, the results obtained can neither be verified nor contrasted. Thus, they are less consistent than if a multi-case study had been carried out (Altamirano & Martínez 2011; Yin 2003). In fact, adding another case study from a similar context of urban periphery in the global south and/or from a context of socioeconomic precariousness and vulnerability would have been appropriate and meaningful.

In terms of the implications of the methods themselves, to have chosen to conduct interviews with qualified informants and about events that took place in the past implied a series of limitations. Initially, given the passage of time since the implementation of both plans, some of the protagonists were no longer part of the organisations or institutions that were part of the processes, and some did not remember some events with precision. In addition, there were protagonists who, for various reasons, could not be interviewed. One of the reasons was due to external factors, such as the time it took to obtain ethical approval to conduct the interviews. This impacted internal factors, such as the lack of additional time to extend the interviews to other actors due to delays in the thesis schedule. This meant that these absences were not covered and the analysis relied on information provided by alternate actors, leaving even the perspectives of key actors uncovered. These information gaps were made up from the input of the other actors and information provided by the literature.

In addition, another method's implication concerns the choice of qualitative methods for analysis. These, despite they were protocolised for replicability and validity (Yin 2003), were carried out under the lens of my interpretation which responds to my own limiting beliefs, my ideology, my social positioning and my academic knowledge, among others. Thus, although the position on which I approach the data is explicit (see Chapter 4. Section 4.6), it is nonetheless a subjective approach. Thus, the same data could have been interpreted differently by another person, obtaining different results (Braun & Clarke 2022).

7.6 CONCLUSIONS

To achieve the aim of this study, commonalities between the two cases were identified, as well as specific focuses to be addressed based on the Iyuí context's inherent uniqueness. It was identified that a laborious, gradual and collaborative process of all stakeholders is required to achieve systemic change toward co-designed rehabilitation. Such a process involves both cultural and linkage changes among key actors, as well as changes in governing regulations and institutions. It also implies a special emphasis on increasing and reinforcing high-impact citizen participation sites and the need to generate powerful enough environmental social capital to drive and fight for systemic change. This requires strengthening and increasing both existing community organisations and the organisations, institutions and programmes that are currently active in the territory. This is proposed by aiming for Iyuí as a prototype of a co-managed space for activist environmental education that works in a transversal way towards sustainable development, combating the structural situation of precariousness and socio-economic vulnerability that the community of Casavalle is still experiencing.

The findings obtained in this study are relevant for both public policy and civil society because they advocate that successful cases of sustainable and collaborative public policies can be achieved through laborious and gradual processes through all citizens working together. They also imply that organised local communities can achieve significant local changes of planetary and humanitarian significance, through acquiring both the responsibilities and the benefits that come with it. In fact, they enable us to conceive that a shift towards a co-designed rehabilitation of Iyuí Stream from the current structure of the system that governs it is admissible. It also reveals that there are disputable decision-making spaces that can be occupied by civil society. As well, there are currently community groups with an interest in environmental issues and others with a history of successful co-management, which have the potential for the feat of that change. But for this to happen, society first needs to visualise and aspire to the possibility of such change and to be strengthened and empowered for this dispute. This is where the role of the organisations and educational institutions involved becomes relevant, as activists, educators and promoters of this change, with integral environmental education as a

possible tool for transversal change. Moreover, the Uruguayan State must see the benefits of ceding these decision-making and management spaces as spaces that legitimise public policies, and deepen and broaden democracy from representative to representative and participatory democracy (Achugar 2019; MEN 2021; Monzón 2018).

7.7 POSSIBLE FURTHER STUDIES

Considering some of the limitations of this research (see Section 7.5) and the suggestions made for its implementation (see Section 7.3), some recommendations are set out for possible future research that could both complement and extend this study.

Primarily, given that this study was based on a single case study located in the global north, it would contribute to its comprehensiveness to conduct a multi-case analysis incorporating other case studies of co-designed rehabilitations in urban peripheral contexts in the global south, preferably in Latin America. In this way, the new data obtained would ratify or overturn the assumptions made in this research. This would then allow for the initiation of new theories and associated research or the beginning of a possible general theory on possible ways to implement co-designed rehabilitations on a local scale in urban peripheries.

Furthermore, given that this study refers to and advocates for co-design with local actors, it would be consistent and would contribute to the obtained results' plausibility, to design, together with the Iyuí system's actors network, comprehensive and transversal prototypical environmental educational practices based on common action pedagogies. This could form part of new research that evaluates these proposals and elaborates from them new theories to identify and consolidate possible practices to be implemented in contexts of precariousness and socio-economic vulnerability in the global south's countries.

0

ANNEX

ANNEX'S STRUCTURE

This annex is structured according to each chapter of the thesis. Given that the number assigned to the annex is "0", the titles, subtitles as well as images and tables' titles are preceded by a "0". This is followed by the chapter's number to which each one corresponds and then by this annex's numerical order.

4 · METHODOLOGY

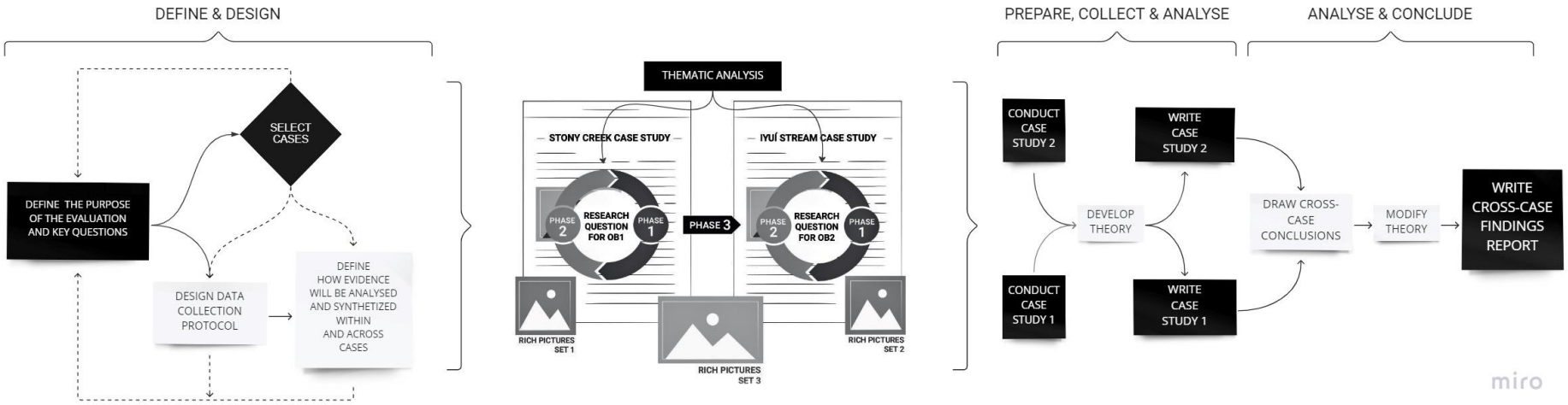


Figure 0.4.1: Research's comparative case study framework

Source: Adapted from (Goodrick 2014; Yin 2003)

0.4.1 STUDY CASES' GENERAL DESCRIPTION

0.4.1.1 ARNOLDS CREEK

Figure 0.4.2: Arnolds Creek's detailed plan

Source: Shinkfield et al. (2018)

Figure 0.4.3: Arnolds Creek's community education node

Source: REALMstudios (n.d.)

Title	Arnolds Creek
Location	Melton West, Victoria
Travel time to the site by public transport	77 min
Percentage of people living in poverty	17% (Melton's LGA). (Tanton et al. 2018)
Construction year	2019 – 21 (REALMstudios n.d.)
Status	Completed (REALMstudios n.d.)
Dimensions	1.4km section of creek (Shinkfield et al. 2018)
Designers	REALMstudios Collaborators: E2DesignLab, Alluvium Consulting

	(REALMstudios n.d.)
Stakeholders	Melbourne Water Melton City Council Greater Western Water Department of Environment, Land, Water and Planning (DELWP) Representatives from community groups and residents (PP & WPRCS n.d.; MW 2018a)
Aboriginal and Torres Strait Islander people involved	No
Communities' involvement in project design	From March to August 2018 there were the following community engagement events: - 7 face-to-face participatory activities where information about the project was provided and feedback was obtained. -46 people completed the online survey. - 12 people were recruited to make up the Community Advisory Group. (MW n.d.)
Brief description	The Project is a linear open space that forms part of Melbourne Water's 'Reimagining Your Creek' project to transform waterways into desirable natural spaces where people can interact with nature (MW, n.d.-c). It is an urban design and landscaping project that naturalises the environment of the stream and revitalises it by creating a natural channel and an urban forest with native plants, thus creating wet habitat areas. The design converts the space into an activated node that, through bicycle and pedestrian paths, improves the connection between the various schools and services and other key points in the neighbourhood. The project also incorporates furniture and an outdoor community education node (REALMstudios n.d.; PP & WPRCS n.d.).
Project analysis	An interesting project that removes a previous concrete canalisation, naturalising the stream and generating, through the proposal, a greater connection between its residents and nature in order to create an urban forest in the future. It has a comprehensive but minimal design with a focus on materialities. It has an architectural highlight that gives identity to the space. The design interacts with the stream through platforms and concrete stepping structures. Prior to its implementation, many face-to-face participatory instances were generated, as well as virtual feedback from the community. Some relevant elements of the participatory workshops are the photomontage designs generated together with the community. A community advisory group was promoted, who had the greatest impact on the improvement and development of the design. I consider it a desirable intervention but outside the budget of something imaginable for Iyuí in the first instance.

Table 0.4.1: Arnolds Creek case general description

0.4.1.2 BLIND CREEK

Figure 0.4.4: Blind Creek's site plan
Source: REALMstudios (n.d.)

Figure 0.4.5: Blind Creek's crossing point

Source: REALMstudios (n.d.)

Title	Blind Creek
Location	Boronia, Victoria
Travel time to the site by public transport	64 min
Percentage of people living in poverty	12% (Knox LGA) (Tanton et al. 2018)
Construction year	2019-2020 (MW 2020)
Status	Completed (MW 2020)
Dimensions	800m (REALMstudios n.d.)
Designers	REALMstudios
Stakeholders	Melbourne Water Knox City Council Department of Environment, Land, Water and Planning (DELWP) South East Water
Aboriginal and Torres Strait Islander people involved	No (MW 2018b)
Communities' involvement in project design	Two community workshops were organised with the community advisory group. The first workshops' outcomes provide the basis of the concept design. The second workshop worked on the design itself. The community provide feedback for improvement. (Melbourne Water 2018b)
Brief description	This project is part of MW's 'Reimagining Your Creek' programme which naturalises an 800-metre section of Blind Creek by creating an ecosystem, recreational and educational project with the aim of becoming an urban forest. Its design incorporates a variety of flexible spaces of minimal intervention that allow the community to interact with the creek (MW 2018b).
Project analysis	Small-scale project by the same designers as Arnolds Creek and with many similarities to it. A previous concrete channelling is removed, naturalizing the creek, generating, through the proposal, a greater connection of its residents with nature in order to create an urban forest in the future. It has an integral but minimal design with a focus on generating multiple spaces of greater contact with the Creek and with special attention to the materialities. Like Arnolds Creek, platforms and concrete stepping structures

	are incorporated. Prior to implementation, a Community Advisory Group was established and took part in two face-to-face participatory workshops. These influenced the design of the space. No other instances of participation were found. The project does not involve Aboriginal and Torres Strait Islander people, which makes it easier to obtain ethics committee approval for interviews. A suggestive intervention in its ecosystemic sensitivity and the educational character of the space. However, the stream intervention is far from the current Iyuí proposal as it is in a stage of naturalisation.

Table 0.4.2: Blind Creek case general description

0.4.1.3 DANDENONG CREEK

Figure 0.4.6: Dandenong Creek

Source: (CRC for WSC n.d.)

Title	Dandenong Creek
Location	Dandenong
Travel time to the site by public transport	90 min
Percentage of people living in poverty	21% (Greater Dandenong LGA) (Tanton et al. 2018)
Construction year	2013-2018 (Phase 1) 2018 up to now (Phase 2) (FFDC n.d.)
Status	Phase 1 completed. Phase 2 under construction (FFDC n.d.)
Dimensions	N/D
Designers	N/D
Stakeholders	Melbourne Water EPA Victoria Knox City Council South East Water

Aboriginal and Torres Strait Islander people involved	No
Communities' involvement in project design	The improvement project was driven by the community. The community contributed to the prioritisation of projects and the transmission of the waterway's values (CRC for WSC n.d.)
Brief description	An ecosystemic project that naturalises a section of Dandenong Creek. It creates new habitats for local wildlife and incorporates public services for the local community.
Project analysis	Although it is an ecosystemic project that arises from the initiative of the community, there is no additional information related to the project nor the participation's instances that would allow a more in-depth evaluation of it.

Table 0.4.3: Dandenong Creek case general description

0.4.1.4 EDGARS CREEK

Figure 0.4.7: Merri and Edgars Creek wetland concept design (proposed work n°8)

Source: Melbourne Water (n.d.)

Figure 0.4.8: Edgars Creek reintroduction of a range of locally native plants

Source: Friends of Edgars Creek (n.d.)

Title	Edgars Creek
Location	Epping, Thomastown and Reservoir
Travel time to the site by public transport	60 min
Percentage of people living in poverty	17% (Whittlesea LGA) (Tanton et al. 2018)
Construction year	2013 to 2023/2028 (Moreland City Council 2013)
Status	General Plan: N/D. Wetland completed 2015-2016 (MW n.d.)
Dimensions	17 km (Moreland City Council 2013)
Designers	Thompson Berril Landscape Design
Stakeholders	Melbourne Water Moreland City Council in consultation with Darebin City Council (Moreland City Council 2013)
Aboriginal and Torres Strait	No

Islander people involved	
Communities' involvement in project design	First community consultation following research and background analysis to develop the draft plan: - 153 questionnaires were completed by residents of Moreland Town Council. - 53 questionnaires were completed by residents of Darebin Town Council - A community briefing session was held and attended by 45 people. - A community meeting was held and attended by 10 people. Second community consultation following the development of the draft master plan to produce the final plan - 85 questionnaires were completed - Community briefing session held and attended by 20-25 people Some members of the community belong to the following active environmental groups that manage and maintain the area: Friends of Edgars Creek and Merri Creek Management Committee (Moreland City Council 2013).
Brief description	Semi-natural watercourse containing several sites of geological and geomorphological significance, with land pressures linked to residential development and industrial use. The latter contributes to the poor water quality of the stream. A participatory Conservation and Development Plan was developed in 2013, envisioning the area linked to Edgars Creek as a waterway habitat and biodiversity corridor that is also functional for drainage and a public space for the local community (Moreland City Council 2013) In 2016, a wetland was built as part of MW's Living Rivers programme to reintroduce local flora and fauna, filter stormwater prior to creek inflow and enhance the recreational value of the space. The wetland is maintained by community environmental groups (MW n.d.).
Project analysis	An ecosystemic project with a strong landscaping and highly participatory approach with a 10-15 year vision. Much larger in scale than Iyuí. It has community groups associated with the conservation and maintenance of the space. The plan attempts to naturalise a creek that has been modified and channelled in some of its sections and is polluted by sewerage discharge, detergents, animal waste and industrial wastes discharged via the stormwater system. The project does not involve Aboriginal and Torres Strait Islander people, which makes it easier to obtain ethics committee approval for interviews. It is a potential reference project for Iyuí with the exception of its scale and geologically significant sites.

Table 0.4.4: Edgars Creek case general description

0.4.1.5 JAN JUC CREEK

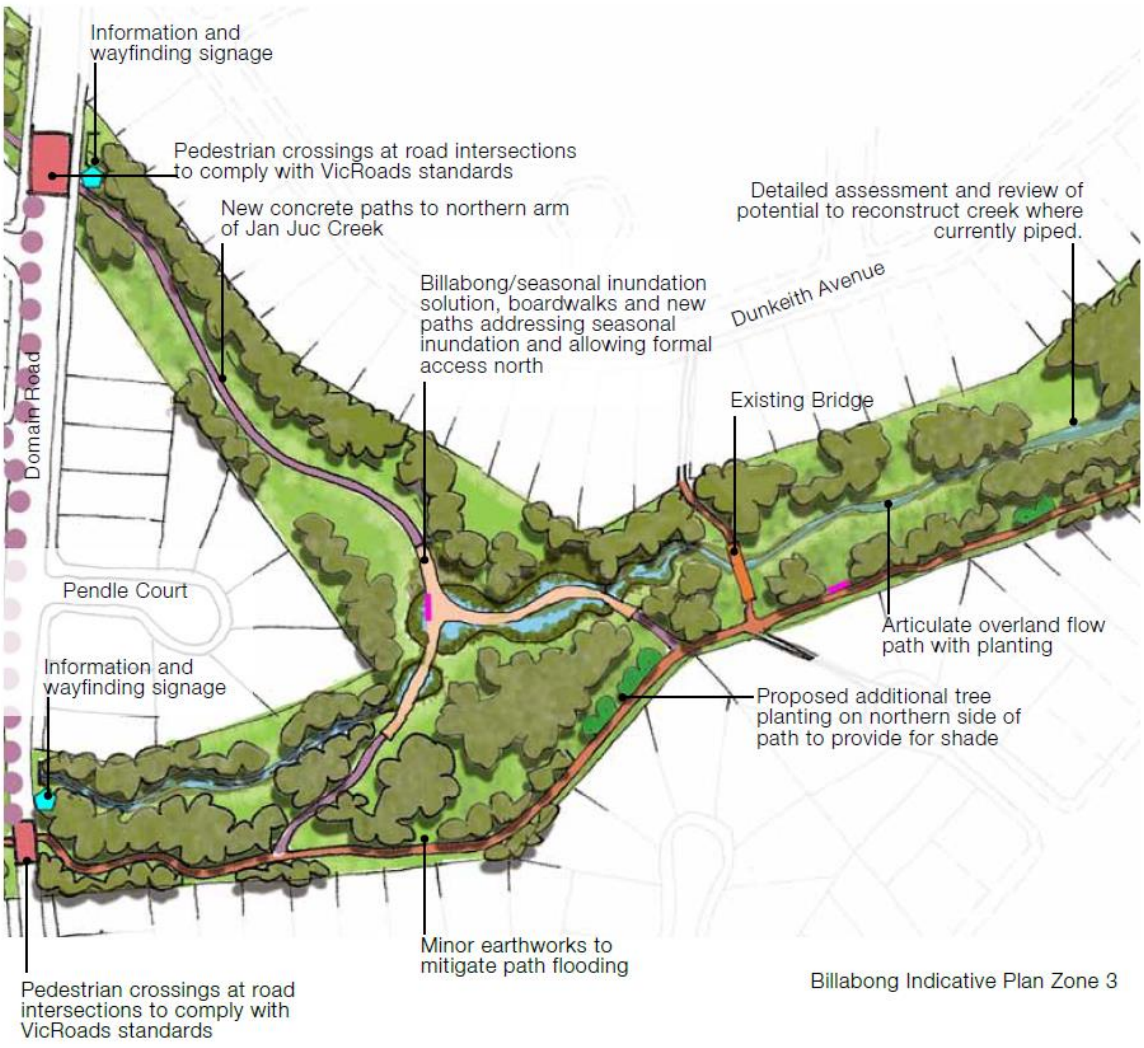


Figure 0.4.9: Jan Juc Creek Linear Reserve Plan Zone 3
Source: SCS & GHD Pty Ltd (2012)

Figure 0.4.10: Jan Juc Creek Daylighting Project

Source: CW (2017a)

Title	Jan Juc Creek
Location	Jan Juc, Surf Coast Shire, Victoria
Travel time to the site by public transport	150 min
Percentage of people living in poverty	10% (Surf Coast LGA) (Tanton et al. 2018)
Construction year	2012 to 2022
Status	Master Plan: N/D. Daylighting project completed 2015-2016 (CWV 2017)
Dimensions	N/D
Designers	Surf Coast Shire Council
Stakeholders	Surf Coast Shire Council Friends of Jan Juc Creek Reserve (FJJCR) Corangamite CMA Department of Environment, Land, Water and Planning Wathaurong Aboriginal Corporate Surfers Appreciating the Natural Environment community group Wathaurung (cultural heritage approvals) (CW 2017b)

Aboriginal and Torres Strait Islander people involved	No
Communities' involvement in project design	For the draft´s plan elaboration: - conducted through listening post-sessions to give feedback and also to ask questions. - through direct contact with nominated user groups -via public display and feedback for an 8-week period - via phone and email Some members of the community belong to the following active environmental groups that manage and maintain the area: Friends of Jan Juc Creek Reserve, Torquay Landcare and Surf Coast Action Group (SCS & GHD Pty Ltd 2012)
Brief description	Heavily modified watercourse, piped and used as drainage. In 2012, a 10-year participatory master plan was created by the community group "Friends of Jan Juc Creek Reserve", which aims to enhance the environmental value of Jan Juc Creek and to be a re-creative public space for the community. A public space is planned with a strong landscape design that seeks to recreate the natural habitats through native plants revegetation. The project also proposes both naturalising sections of the creek by removing underground drainage infrastructure and recreating the creek channel and the installation of several WSUD interventions. One of its priority focuses is raising community awareness of the ecological, indigenous heritage and landscape management issues linked to the creek and the planned space (SCS & GHD Pty Ltd 2012; CWV 2017) .
Project analysis	Participatory 10-year project with an ecosystemic vision that arose through the initiative of the local community. It has three community groups associated with the conservation and maintenance of the space. The time to travel to the site is significant, so visits would be limited. The project does not involve Aboriginal and Torres Strait Islander people, which makes it easier to obtain ethics committee approval for interviews. It is a potential reference project for Iyuí, although the intervention in the watercourse is more of a daylighting project, with no apparent previous pollution problems.

Table 0.4.5: Jan Juc Creek case general description

0.4.1.6 TARRALLA CREEK

Figure 0.4.11: Reimagining Tarralla Creek illustrative master plan
Source: GHD W. et al. (n.d.)

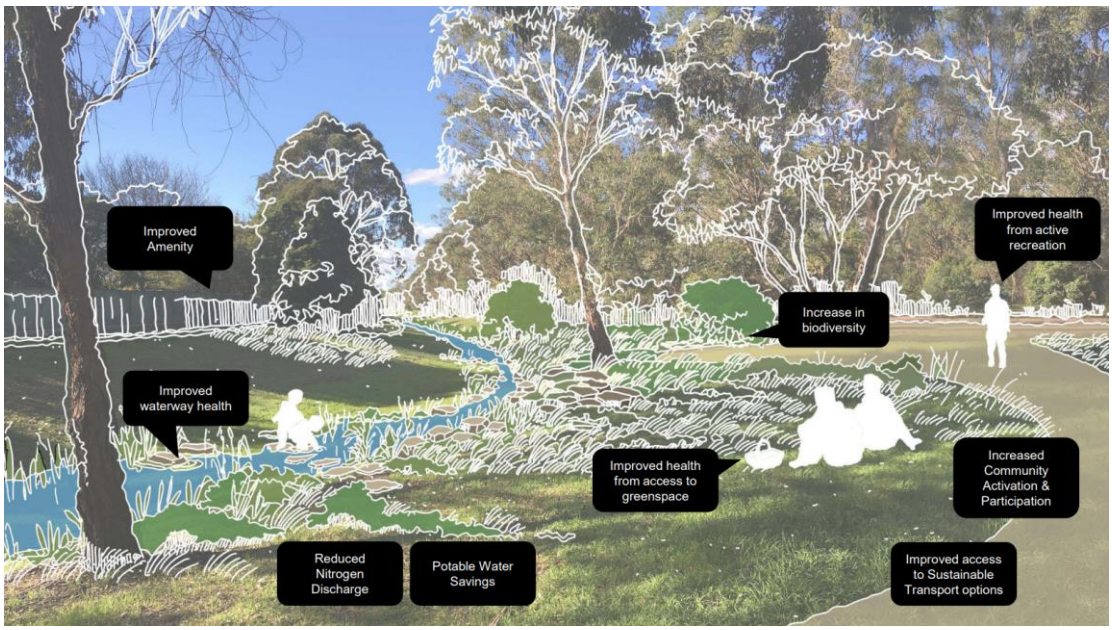


Figure 0.4.12: Upgraded sediment basin's concept design

Source: Chandra et al. (2019)

Title	Reimagining Tarralla Creek
Location	Croydon
Travel time to the site by public transport	73 min
Percentage of people living in poverty	12% (Maroondah LGA) (Tanton et al. 2018)
Construction year	2020 – n.d
Status	Stage 1 to be completed by end of march 2022 (Maroondah City Council n.d.)
Dimensions	2 km section of Tarralla Creek (Maroondah City Council n.d.)
Designers	GHD Woodhead
Stakeholders	Melbourne Water Corporation (MWC) Maroondah City Council (MCC) Department of Environment Land Water and Planning (DELWP) Yarra Valley Water (YVW) (GHD W. et al. 2018)
Aboriginal and Torres Strait Islander people involved	No
Communities' involvement in project design	- creation of a Community Advisory Group composed of 20 members in order to contribute to the project design. - 59 posts shared on YouSay with project ideas (GHD W. et al. 2018)
Brief description	A canalised watercourse whose park has abundant exotic vegetation throughout and other vegetation of high ecological value. It also has good access and recreational facilities. As of 2018, the participatory project "Reimagining Taralla Creek" is being developed within the MW programme. It aims to daylight the creek and create a new natural channel that will be the axis of a linear park with ecological, educational and recreational value for the local community. The project was developed through consultation with civil society via the web and through the creation of a community advisory group for the project that had direct input into the project (Maroondah City Council n.d.; GHD W. et al. 2018).

Project analysis	Although this is a relevant participatory project with an ecosystemic vision, the intervention responds to the problem of daylighting and exotic species, with no previous history of pollution in its waters. Nevertheless, the project does not involve Aboriginal and Torres Strait Islander people, which makes it easier to obtain ethics committee approval for interviews.

Table 0.4.6: Taralla Creek case general description

0.4.1.7 WANYARRAM DHELK—BENDIGO CREEK RESTORATION

Figure 0.4.13: Wanyarram Dhelk—Bendigo Creek restoration's concept design

Source: 3 ALA & DDWCAC (n.d.)

Figure 0.4.14: Djandak team members at Koomba Street's new project healing storm water before it flows into the Bendigo Creek.

Source: CRC for WSC (n.d.)

Title	Wanyarram Dhelk—Bendigo Creek restoration
Location	Bendigo
Travel time to the site by public transport	107 min
Percentage of people living in poverty	14% (Greater Bendigo LGA) (Tanton et al. 2018)
Construction year	2018 - N/D
Status	Phase 1 built. Phase 2 is currently being implemented (DDWE Pty Ltd n.d.)
Dimensions	N/D
Designers	3 Acres Ladscape Architecture
Stakeholders	Dja Dja Wurrung Clans Aboriginal Corporation North Central Catchment Management Authority (CRC for WSC n.d.)
Aboriginal and Torres Strait Islander people	Yes

involved	
Communities' involvement in project design	Project that, while focusing on local Aboriginal community participation, arises from an enterprise operated by the traditional owners of Dja Dja Wurrung who are working on development policies and strategies in terms of environmental development and applying Aboriginal law and culture (DDWE Pty Ltd n.d.)
Brief description	A case of restoring a degraded urban stream as a project that contributes to making the city of Bendigo a Water Sensitive City. It proposes a WSUD that incorporates the traditional ecological knowledge of the Dja Dja Wurrung Aboriginal clans to restore the cultural, social and environmental values of the urban stream. This was achieved through joint inter-agency work with support from Dja Dja Wurrung Enterprises and the North Central Catchment Management Authority. (WSCA 2021; CRC for WSC n.d.).
Project analysis	Small-scale participatory ecosystem restoration project that shows a successful inter-institutional-community partnership. Notwithstanding, there is not much information available on the web related to the project. Furthermore, the time to visit the site is significant, so visits would be limited. Lastly, even the project involves local Aboriginal people, which would make it difficult to obtain ethics committee approval for interviews.

Table 0.4.7: Bendigo Creek case general description

0.4.2 METHODS´ PROTOCOLS

0.4.2.1 SYSTEMATIC LITERATURE REVIEW (SLR) PROTOCOL

	RESEARCH QUESTION FOR OB1	RESEARCH QUESTION FOR OB2
	What were the causal factors that led to the effective rehabilitation of Stony Creek?	Which causal attributions of success from the Stony Creek case might be transferable to the Iyuí Stream case in pursuit of co-designed rehabilitation?
SLR RESEARCH OBJECTIVES	• To understand what the instances of co-design were in the Stony Creek Rehabilitation Plan. • To identify the processes to arrive at the plan. To contrast intentions and outcomes	• To understand whether co-design has existed/is foreseen in the Iyuí Stream Rehabilitation Plan. • To identify whether there are possibilities for incorporating co-design into the current plan. • To find successful elements of the Stony Creek Plan that can be referenced for Iyuí Stream.
SYSTEMATISATION OF INFORMATION	• Search Plan Template (SPT) • Table of Evidence (ToE)	
SEARCH PLAN TEMPLATE CATEGORIES	• Key words • Key word´s synonyms • Booleean search combinations • Research Database • Number of findings in total in that database (T N° Find) • Number of sources included (NSI) • Source title • Source author • Source link	

TABLE OF EVIDENCE CATEGORIES

- Source origin: research database from which I obtained the article
- Source type:
  - Blueprints
  - Book
  - Journal Article
  - News articles
  - Other sources
  - Reports
  - Videos / images
  - Web page
- Source title
- Source author
- Source year
- Source review: the entire source summarised in a sentence or two.
- Source Strengths/Limitations/Relevance: comments
- Source Comments: notes on specific ideas
- Link W/Other References (L w/o Ref): indicate whether there is a link to other references
- Useful Citation (UC): specific quotes that might be useful
- Useful Citation Page (UC pag): page from which I extracted the quote
- Possible useful references from this source (P Usfl Ref)
- Source link

KEY WORDS TO BE USED AT SPC

- Co-design
- Local Community
- Stony Creek
- Rehabilitation
- Plan
- Iyuí
- Cañada
- Rehabilitación
- Plan
- Co-diseño

KEY WORD´S SYNONYMS TO BE USED AT SPC	• Co-design o Participatory design o Collaborative design o Co-production o Co-planning o Community-led design o Transdisciplinary design • Local Community o People o Society o Residents o Locals • Stony Creek o Cruickshank Park • Rehabilitation o Recovery o Recuperation o Restoration o Naturalisation o Natural based solutions (NBS) • Plan o Project	• Iyuí o Iyui o Matilde Pacheco o Casavalle • Cañada o Arroyo • Rehabilitación o Recuperación o Restauración o Naturalización • Plan o Proyecto • Co-diseño o Diseño participativo o Diseño colaborativo o Coproducción o Co-gestión o Diseño dirigido por la comunidad o Diseño transdisciplinar
SEARCH STRATEGY (BOOLEAN SEARCH COMBINATIONS)	"Co-design" OR "Participatory design" OR "Collaborative design" OR "Co-production" OR "Co-planning" OR "Community-led design" OR "Transdisciplinary design" AND "Local Community" OR People OR Society OR Residents OR Locals AND "Stony Creek" OR "Cruickshank Park" AND Rehabilitation OR Recovery OR	• Iyuí OR Iyui OR "Matilde Pacheco" OR Casavalle AND Cañada OR Arroyo AND Rehabilita* OR Recupera* OR Restaura* OR Naturaliza* AND Plan OR Proyecto AND Co-diseño OR "Diseño participativo" OR "Diseño colaborativo" OR Co-producción OR Co-gestión OR Diseño

	Recuperation OR Restoration OR Naturalisation OR "Natural based solutions" OR NBS AND Plan OR Project	comuni* OR "Diseño transdisciplinary"
RESEARCH DATABASE	• Deakin Library • Google • Google Scholar • Scopus • Web of Science + • External recommendation • Taken from bibliography	• Google • Municipio D webpage • Intendencia de Montevideo webpage + • External recommendation • Taken from bibliography
INCLUSION AND EXCLUSION SOURCE CRITERA	• Main sources considered reliable to include: o materials published within last 10 years o government and local council websites o research articles, books, reports o blueprints, croquis, drawings, renders, sketchs o interviews with qualified experts o Field analysis data • Other sources that will be taken into consideration only for contextualization: o mass media o posts from social networks o blogs o websites • Sources to be excluded: o Sources unrelated to the research questions • Validity checks according to Bryman (2001): o authenticity (is the evidence genuine and of unquestionable origin?) o credibility (is the evidence-free from error and distortion?)	

- representativeness (is the evidence typical of a kind and if not, the extent of its untypicality known?)
- meaning (is the evidence clear and comprehensive?)

Table 0.4.8: Systematic literature review protocol

0.4.2.2 QUALITATIVE SEMI-STRUCTURED INTERVIEWS WITH INDIVIDUAL EXPERTS PROTOCOL

	RESEARCH QUESTION FOR OB1	RESEARCH QUESTION FOR OB2
	What were the causal factors that led to the effective rehabilitation of Stony Creek?	Which causal attributions of success from the Stony Creek case might be transferable to the Iyuí Stream case in pursuit of co-designed rehabilitation?

	STONY CREEK CASE	IYUI STREAM CASE
TARGET AUDIENCE TO BE INTERVIEWED	• Stakeholders • Designers • Community members	• Stakeholders • Professionals linked to the community and Casavalle • Community referents • Community members
INTERVIEW'S FORMAT (Yin 2003)	• Semi-structured • Focused o short period of time o open-ended questions o conversational manner o following certain set of questions derived from case study protocol	

THEMATIC AREAS / GUIDING TOPICS	• Interviewee's background • Link to the Creek (only for Community members) • Stony creek community • Stony creek rehabilitation plan 2019 – 2029 / Stony Creek Future Directions Plan 2020 o Project o Link/Role to the plan o Concepts o Co-design at stony creek o Design/implementation constraints o Implementation	• Interviewee's background • Link to the Stream/Casavalle (not for Stakeholders) • Iyuí Stream/Casavalle community • Stream improvement Initiatives • Plan Parcial Casavalle "Operación Urbana II – PUD Matilde Pacheco" o Project o Link/Role to the plan o Concepts o Co-design / community participation o Design/Implementation constraints (only for Stakeholders) o Opportunities o Expectations
FORMULATION OF QUESTIONS CRITERIA (Vargas 2012; Yin 2003; Turner 2010)	• primary questions as introductory to a new topic or to open new queries • secondary questions as structuring and deepening of the topic addressed in the primary question • precision (carefully worded), openness/no specificity and flexibility • if specific questions, must be carefully worded (appear genuinely naive about the topic and allow the interviewee to provide a fresh commentary about it) • no capticiousness / unbiased manner • friendly and nonthreatening • language understandable to the target audience	

NON-VERBAL ELEMENTS TO BE CONSIDERED	• Facial expressions • Visual language • Voice • Body movement and posture • Gestures • Space between objects and/or persons
PRIOR NECESSARY APPROVALS	• Low Risk Human Ethics approvals. SEBE. Deakin University
ETHICAL CONSIDERATIONS according to National Statement on Ethical Conduct in Human Research (2007)	• incorporate the values of merit and integrity of research, justice and beneficence • elaboration of procedures taking special care in the welfare, beliefs, perceptions, customs, cultural heritage (individual and collective) of the participants • special emphasis in the procedures and the conduct of the interviews in respect of the privacy, confidentiality and cultural sensitivities of the participants • protection of the identity and personal data of the interviewees • completely voluntary and honorary participation • About data storage: o elimination of all physical and virtual evidence related to the interviews o encrypted documents stored only at Deakin University for 5 years and accessible only to the researcher through the Cisco AnyConnect platform (VPN). After this period, all stored information will be permanently deleted.

Table 0.4.9: Qualitative Semi-Structured Interviews with Individual Experts Protocol

0.4.3 INTERVIEWS' QUESTIONNAIRES

Beau Beza & Agustina Laino Gonzalez
School of Life & Environmental Science
Adriana Piperno (ext)

2 August 2022

Dear Beau and research team

Re: SEBE-2022-36- titled *"Co-designed rehabilitation of an urban watercourse. Lessons learned from Victoria, Australia for Montevideo, Uruguay"*

Please quote this project ID in all future communications.

The Faculty of SEBE Human Ethics Advisory Group (HEAG) has reviewed this project and recognises that it complies with the *National Statement on Ethical Conduct in Human Research 2007* (Updated 2018).

The approval period is for four years until **02/08/2026**. It is your responsibility to contact the Faculty of SEBE HEAG immediately should any of the following occur:

- Serious or unexpected adverse effects on the participants
- Any proposed changes in the protocol, including extensions of time
- Any changes to the research team or changes to contact details
- Any events which might affect the continuing ethical acceptability of the project
- The project is discontinued before the expected date of completion.

You need to provide annual reports on the progress of your project and a final report when complete. We will email a reminder when the annual reports are due.

The Faculty HEAG and/or Deakin University Human Research Ethics Committee (DUHREC) may need to audit this project as part of the requirements for monitoring set out in the *National Statement on Ethical Conduct in Human Research 2007* (Updated 2018).

We wish you well with your research.

Kind regards

Fiona Murphy
Senior Research Administration Officer
Secretariat, Human Ethics Advisory Group (HEAG)
Faculty of Science Engineering & Built Environment
Deakin University
sciethic@deakin.edu.au
https://deakin365.sharepoint.com/sites/sebe/research/ethics

Deakin University CRICOS Provider Code 00113B

RITM0574768

Figure 0.4.15: Deakin University ethics committee approval for the conduct of interviews in this research

0.4.3.1 STONY CREEK CASE INTERVIEW: STAKEHOLDERS AND DESIGNERS

Interviewer:_____
Interview reference/coding number:_____
Date/time:_____
Place/ Setting:_____

Reminder: Consider at all times the current COVID-19 advice provided by the Victorian Government and Deakin University.

**Turn on the recorder*

PREAMBLE

Acknowledge and introduce myself
Explain the purpose of this interview and the research aim
Explain the interview´s format and indicate the approximate duration of the interview
Mention the terms of confidentiality and the honorary and voluntary nature of the interview

ABOUT THE INTERVIEWEE

Name:_____
Stony Creek Rehabilitation Plan Role:_____

ORIGIN, EDUCATION AND CURRENT JOB

1. Please, tell me a little about yourself, your origins and your educational background.

   The following guiding questions will be used if the respondent is not able to answer:

   1.1. What culture and/or place do you identify with?
   1.2. What has been your educational and professional background?
   1.3. Do you consider that other non-curricular experiences have contributed to your education?
      1.3.1. *If yes,* please tell me about these experiences and how they have contributed to your education?

2. Tell me about your career path, your current position and the path you have taken to get to where you are today professionally.

The following guiding questions will be used if the respondent is not able to answer:

2.1. How long have you been part of the company/company/organisation?
2.2. What were the reasons that prompted you to join this company/company/organisation?
2.3. Tell me about your current role. What do you do? What are your tasks and responsibilities? What is a typical day in your role like?
2.4. Have you always kept the same role or have you changed roles over time?

ABOUT STONY CREEK REHABILITATION PLAN 2019 – 2029

PROJECT

3. Please tell me about the Stony Creek Rehabilitation Plan.

The following guiding questions will be used if the respondent is not able to answer:

3.1. Who/whom are the authors of the initiative and how did the project come to be?
3.2. What was the process to achieve the Stony Creek Rehabilitation Plan?
3.3. Tell me about the actions and time horizons outlined in the Plan. How were they defined?
3.4. Do you consider that the project incorporates/considers the territorial characteristics of the creek and its surroundings?

3.4.1. *If yes:* How?
3.5. What was the process to rehabilitate the polluted Creek like?

STAKEHOLDERS' PROJECT BACKGROUND

4. Please tell me, have you carried out a similar project before?
(It can be about naturalisation, urban water course rehabilitation and/or linked to co-design with communities)
4.1. *If yes:* What were the processes and outcomes like?

MOTIVES and OTHER APPROACHES

5. I would be interested to know a little about the reasons that led you to decide to carry out a process of naturalisation and rehabilitation with community participation. What I mean is, why that and not rather piping of the watercourse or an open built canal? Or why not a direct implementation without community participation?

The following guiding questions will be used if the respondent is not able to answer:

5.1. Do you think that the effects and possible impacts of climate change have been considered in the design of the Rehabilitation Plan (please explain)?

5.1.1. Do you consider the rehabilitation plan as a climate change adaptation / mitigation project (please explain)?

5.2. Do you consider the project/plan to be sustainable (please explain)?
5.2.1. *If so,* what does "sustainability" mean to you?
5.2.2. *If yes,* do you think there are benefits for the ecosystem with this project (please explain)?

5.2.3. Do you consider that the plan and project contribute to making Victoria a Water Sensible City?
5.3. What do you see as the community benefits of this project?
5.4. Do you think the project/plan has a comprehensive gender, generational and rights-based approach (please explain)?
5.5. Do you think the plan/project has any other focus not mentioned before (please explain)?
5.6. What do you consider to be the benefits for stakeholders/designers with this project?

CO-DESIGN

6. Please tell me what "co-design" means to you.
7. In your opinion, are there projects where citizen participation, although incorporated, is only superficial or does not work?
   7.1. *If yes:* In your opinion, what is the difference between a project/plan that has real participation and one with superficial participation?
8. When and how do you think co-design/citizen participation should be applied to make it work?

CO-DESIGN AT STONY CREEK

9. Tell me a little bit about the instances of participation linked to the plan/project (workshop and information events) and about your impressions. What were they like? How did they turn out? Expectations, results, surprises?

   The following guiding questions will be used if the respondent is not able to answer:

   9.1. In terms of the design of the Stony Creek rehabilitation Plan/project itself. Which parts did you establish and structure beforehand and which parts did you leave open for the community to define?

   9.2. If you had to name those parts of the plan and project where the co-design had a noticeable impact and influence. What would they be?

   9.3. Do you think the citizen participation opportunities that were set up for the Stony Creek Project were sufficient (please explain)?

   9.4. Would you have liked that other participation opportunities or other techniques were used?

9.4.1. *If no:* How many more instances? Why?
9.4.2. Which additional techniques? Why?

10. Where did you incorporate the knowledge and/or technique to apply co-design in plans and projects?

DESIGN CONSTRAINTS

11. Were there any constraints (budget, staff, time, etc.) of any kind in designing the plan/project?
    11.1.*If yes:* How did you overcome them?

REFERRALS

12. For this plan/project, did you take any other project or plan as a reference either for the proposal, the design, the co-design applied or in any other area?

    12.1.*If yes:* which ones?
    12.2.*If yes:* why?

STONY CREEK COMMUNITY

13. How would you define the community that is part of the Stony Creek Rehabilitation Plan?

    The following guiding questions will be used if the respondent is not able to answer:

    13.1.1. Do you think they have any characteristics that make them unique/particular (please elaborate)?
    13.1.2. If you had to tell me one strength/weakness of the Stony Creek community, what would it be?
    13.1.3. Do you consider that there are differences between the community around the Stony Creek itself and the Maribyrnong community (please elaborate)?
    13.1.4. Did you consider these particularities at the time of designing or carrying out the participation instances or at any of the design stages (please explain)?

LINKS/BONDS

14. Do you think that the development of this Plan/project and the instances of co-design with the community modified your links with the other actors (please explain)?

The following guiding questions will be used if the respondent is not able to answer:

    14.1.With which actors were there links prior to this project?

    14.2.How would you currently rate the links with stakeholders after the completion of the Stony Creek Rehabilitation Plan?

14.3. How would you currently rate the links after having implemented some of the actions?

14.4. Do you think linkages with other stakeholders' impact on outcomes?
  14.4.1. *If yes:* why?

IMPLEMENTATION

15. Tell me a little about the process of implementing a 10-year plan. Challenges, modifications and outcomes.

The following guiding questions will be used if the respondent is not able to answer:

15.1. What are the challenges for a 10-year plan? / What challenges do you see ahead?

15.2. In trying to implement the initial actions proposed in the plan, do you consider that modifications had to be made?

  15.2.1. *If yes:* which ones?
  15.2.2. *If yes:* why?

15.3. How would you evaluate the implementation process? What would you consider as a gain and what as a loss?

Announce that the end is near (5/10 minutes).
Before I finish, I'm going to ask you these last two questions:

LEARNINGS

16. Do you consider that this Plan/Project has left you with a learning experience at a professional and/or personal level (please explain)?

Check that no relevant points have been left unaddressed.

CONCLUSION

Everything you have told me has been very interesting and enriching for me and this research.
I hope this instance has been fruitful for you too.

17. Is there anything else you think I didn't ask about or anything else you would like to talk about?

0.4.3.2 STONY CREEK CASE INTERVIEW: FOR COMMUNITY

Interviewer:_____
Interview reference/coding number:_____
Date/time:_____
Place/ Setting:_____

Reminder: Consider at all times the current COVID-19 advice provided by the Victorian Government and Deakin University.

**Turn on the recorder*

PREAMBLE

Acknowledge and introduce myself
Explain the purpose of this interview and the research aim
Explain the interview´s format and indicate the approximate duration of the interview
Mention the terms of confidentiality and the honorary and voluntary nature of the interview

ABOUT THE INTERVIEWEE

Name:_____
If relevant, role in a community-related organisation:_____
_____

ORIGIN, EDUCATION AND CURRENT EMPLOYMENT

1. Tell me a little bit about yourself, your background and how you came to be part of the Stony Creek community.

The following guiding questions will be used if the interviewee is not able to answer:

1.1. Do you have an educational/academic background?
  1.1.1. *If yes,* please tell me about your educational background.
1.2. Do you have any trade background?
  1.2.1. *If yes,* please tell me about your training in that trade and/or other trades.
1.3. Do you consider that other experiences not related to formal education have contributed to your education?

  1.3.1. *If yes,* please tell me about these experiences and how they have contributed to your education?

1.4. What is a typical week like at this point in your life?

2. Tell me about your journey to get to this community-based organisation

The following guiding questions will be used if the interviewee is not able to answer:

2.1. How long have you been linked to this organisation?
2.2. What were the reasons that made you want to be part of this organisation?
2.3. What are your tasks and responsibilities within the organisation? What is a typical day in your role like?
2.4. Have you always kept the same role within this organisation or have you changed roles or organisations linked to this community over time?

LINK TO THE CREEK

3. What is your link to Stony Creek?

The following guiding questions will be used if the interviewee is not able to answer:

3.1. What does Stony Creek mean to you?
3.2. How important is Stony creek to you?
3.3. Do you associate it with memories / moments in your life (please explain)?

4. What do you think the creek means to the Maribyrnong LGA community today?

5. Do you think the significance of the creek to the community has changed over the years (please explain)?

6. What is the link between the Maribyrnong LGA community and the creek?

The following guiding questions will be used if the interviewee is not able to answer:

6.1. Do you feel that the community views the creek as a positive or negative element?
6.1.1. Please elaborate, why is this a positive/negative element.

6.2. Do you recall any initiatives by the community to improve the creek prior to the Stony Creek Rehabilitation Plan 2019 – 2029 (please explain)?

STONY CREEK COMMUNITY*

**The section from the Yarra River to Pramount Road*

7. How would you define the Stony Creek community?

The following guiding questions will be used if the interviewee is not able to answer:

7.1. Do you think the Stony Creek community has any characteristics that make them unique (please explain)? Or any characteristic(s) that should be considered/taken into account?

7.2. If you had to tell me one strength and one weakness of the Stony Creek community, what would it be?

7.3. Do you consider that there are differences between the community around Stony Creek itself and the Maribyrnong LGA community*?

7.3.1. *If yes,* please elaborate.

STONY CREEK'S HEALTH

8. How would you describe the current state of health of Stony Creek?

The following guiding questions will be used if the interviewee is not able to answer:

8.1. Would you describe it as excellent, good, fair, poor, bad or deficient?

8.2. Why?

9. Why do you think the creek is in the state it is currently in?

ABOUT STONY CREEK REHABILITATION PLAN 2019 – 2029

PROJECT

10. Please tell me about the Stony Creek Rehabilitation Plan.

The following guiding questions will be used if the interviewee is not able to answer:

10.1. Who/whom are the authors of the initiative and how did the project come to be?
10.2. What was the process to achieve the Stony Creek Rehabilitation Plan?
10.3. Tell me about the actions and time horizons outlined in the Plan. How were they defined?

10.4. Do you consider that the plan/project incorporates/considers the characteristics and conditions of the territory in which it is implemented? *

10.4.1. *If yes:* How?

10.5. What was the process to rehabilitate the polluted Creek like? Tell me a little bit about it.

STAKEHOLDERS' PROJECT BACKGROUND

11. Tell me, have you been part of a similar project or plan before?
    (It can be about naturalisation, water course rehabilitation and/or linked to co-design with the community)

    11.1. *If yes:* What were the processes and outcomes like?

MOTIVES and OTHER APPROACHES

12. I would be interested to know a little bit about the reasons why you decided to take an active part in the naturalisation and rehabilitation process of Stony Creek. I mean why get involved and commit time and energy and not leave it all to the technicians to sort out.

The following guiding questions will be used if the interviewee is not able to answer:

    12.1. What motivated you to participate?

    12.2. Do you think that the motives you mention to me are also the motives of others, or do other people have other motives?

        12.2.1. What do you think their motives might be?

    12.3. Do you think that there could be elements or environmental factors that may affect Stony Creek and its community?

        12.3.1. Do you think that the effects and possible impacts of Climate Change have been considered in the design of the Rehabilitation Plan (please explain)?
        12.3.2. Do you think there are benefits for the ecosystem with this project (please explain)?

    12.4. Are you familiar with the "Water Sensible City" concept? / What does “Water Sensible City” mean to you?
        12.4.1. Do you consider that the plan and project contribute to making Victoria a Water Sensible City (please explain)?
    12.5. What do you see as the community benefits of this project?
    12.6. Do you think the project/plan has a comprehensive gender, generational and rights-based approach (please explain)?
    12.7. Do you think the plan/project has any other focus not mentioned before?
    12.8. What do you consider to be the benefits for stakeholders/designers with this project?

CO-DESIGN

13. Have you ever heard of the concept of "co-design"?

If no:

13.1. Have you ever heard of "community participation"?

13.2. Have you ever been involved in a neighbourhood project in which the community has been involved in its design, implementation or maintenance?

If yes:

13.3. Which one?

13.4. How do you remember the participation process?

13.5. What do you think would have happened if it had not involved community participation?

14. In your opinion, are there projects where citizen participation, although incorporated, is only superficial or does not work?
    14.1. *If yes:* In your opinion, what is the difference between a project/plan that has real participation and one with superficial participation?
15. When and how do you think co-design/citizen participation should be implemented to work well?

CO-DESIGN AT STONY CREEK

16. Tell me a little bit about the instances of participation linked to the plan/project (workshop and information events) and about your impressions. What were they like? How did they turn out? Expectations, results, surprises?

The following guiding questions will be used if the interviewee is not able to answer:

16.1. In terms of the design of the Stony Creek rehabilitation Plan/project itself. What parts did you feel the designers set up and structured beforehand and what parts did you feel they left open for the community to define?

16.2. If you had to name those parts of the plan and project where you believe that co-design (or citizen involvement) had a noticeable impact and influence. What would they be?

16.3. Do you think the citizen participation opportunities that were set up for the Stony Creek Project were sufficient (please explain)?

16.4. Would you have liked that other participation opportunities or other techniques were used?

16.4.1. *If no:* How many more instances? Why?

16.4.2. Which additional techniques? Why?

DESIGN CONSTRAINTS

17. Were there any constraints (budget, staff, time, etc.) of any kind in designing the plan/project?
    17.1. *If yes:* How did you overcome them?

REFERRALS/INTENTIONS

18. For the proposals made on behalf of the community for the plan/project, did you take any other project or plan as a reference?

If yes:

18.1. which ones?

18.2. why?

The following guiding questions will be used if the interviewee is not able to answer:

18.3. Are there any other public spaces similar to Stony Creek in Victoria that you have aspired to match in the Rehabilitation Plan to resemble?

18.3.1. *If yes:* please explain which ones and why did you like about them

19. If you had to choose your favourite public space/square / park in the city of Melbourne, which one would you choose?

19.1. Why?

19.2. What do you like about that space?

STONY CREEK COMMUNITY

22. How would you define the community that is part of the Stony Creek Rehabilitation Plan?

The following guiding questions will be used if the respondent is not able to answer:

22.1. Do you think they have any characteristics that make them unique/particular (please elaborate)?

22.2. If you had to tell me one strength/weakness of the Stony Creek community, what would it be?

22.3. Do you consider that there are differences between the community around the Stony Creek itself and the Maribyrnong LGA community (please elaborate)?

23. Do you think that these characteristics you mentioned have been taken into account in the participation stages and are they reflected in the outcome of the Rehabilitation Plan (please explain)?

LINKS/BONDS

25. Do you think that the development of this Plan/project and the instances of co-design with the community modified your links with the other actors (please explain)?

The following guiding questions will be used if the interviewee is not able to answer:

25.1. With which actors were there links prior to this project?

25.2. How would you rate the current links with stakeholders after the completion of the Stony Creek Rehabilitation Plan?

25.3. How would you currently rate the links after having implemented some of the actions?

25.4. Do you think this process has changed the links between you, the members of the community (please explain)?

25.5. Do you think linkages with other stakeholders and members' impact on outcomes (please explain)?

25.5.1. *If yes:* why?

IMPLEMENTATION

26. Tell me a little about the process of implementing a 10-year plan. Challenges, modifications and outcomes.

The following guiding questions will be used if the interviewee is not able to answer:

26.1. What are the challenges for a 10-year plan? / What challenges do you see ahead?

26.2. In trying to implement the initial actions proposed in the plan, do you consider that modifications had to be made?

If yes:

26.2.1. which ones?

26.2.2. why?

26.3. How would you evaluate the implementation process? What would you consider as a gain and what as a loss?

27. What are the other challenges for the creek, its environment and its community that are not in the framework of the plan and are relevant?

Announce that the end is near (5/10 minutes).
Before I finish, I'm going to ask you these last two questions:

LEARNINGS

28. Do you consider that this Plan/Project has left you with a learning experience at a personal level (please elaborate)?

**Check that no relevant points have been left unaddressed.*

CONCLUSION

Everything you have told me has been very interesting and enriching for me and this research.

I hope this instance has been fruitful for you too.

29. Is there anything else you think I didn't ask about or anything else you would like to talk about?

0.4.3.3 IYUÍ STREAM CASE INTERVIEW: PROFESSIONALS INVOLVED

Interview reference/coding number:_____
Date/time:_____

PREAMBLE

Acknowledge and introduce myself
Explain the purpose of the interview and the research aim.
Explain the format of the interview and indicate the approximate duration of the interview
Mention the terms of confidentiality and the honorary and voluntary nature of the interview

ABOUT THE INTERVIEWEE

Name:_____
Role in the Casavalle Partial Plan "Urban Operation II - PUD Matilde Pacheco":_____

ORIGIN, EDUCATION AND CURRENT EMPLOYMENT

1. Please, tell me a little about yourself, your origins and your educational background.

The following guiding questions will be used if the interviewee is not able to answer:

1.1. What has been your educational and professional background?

1.2. Do you consider that other non-curricular experiences have contributed to your education?
1.2.1. *If yes,* please tell me about these experiences and how they have contributed to your education?

2. Tell me about your career path, your current position and the path you have taken to get to where you are today professionally.

The following guiding questions will be used if the interviewee is not able to answer:

2.1. How long have you been working for your current organisation?
2.2. What were the reasons that made you want to join it?
2.3. What is your current job? What are its tasks and responsibilities? What is a typical day in your role like?

2.4. Have you always kept the same role or have you changed roles over time?

ABOUT THE CASAVALLE PLAN "URBAN OPERATION II - PUD MATILDE PACHECO"

PROJECT

3. Please tell me a little about the CASAVALLE PLAN "OPERACIÓN URBANA II - PUD MATILDE PACHECO".

The following guiding questions will be used if the interviewee is not able to answer:

- 3.1. Who/whom are the authors of the initiative and how did the project come to be?
- 3.2. What was the process to achieve the CASAVALLE PARTIAL PLAN "OPERACIÓN URBANA II - PUD MATILDE PACHECO"?

- 3.3. Tell me about the actions and time horizons for the Plan. How were they defined?
- 3.4. Do you consider that the plan/project incorporates/considers the territorial characteristics of the stream and its surroundings?

  - 3.4.1. *If yes:* How?
- 3.5. What is/will the rehabilitation process of the Iyuí/Maltilde Pacheco stream look like?

STAKEHOLDER PROJECT BACKGROUND

4. Tell me, have you carried out a similar project or plan before?
   - 4.1. *If so, what were* the processes and outcomes like?

MOTIVES and OTHER APPROACHES

5. Do you think that the effects and possible impacts of climate change have been considered in the design of the Rehabilitation Plan (please explain)?
   - 5.1. Do you consider the rehabilitation plan as a climate change adaptation / mitigation project (please explain)?
   - 5.2. Do you consider the project/plan to be sustainable (please explain)?
     - 5.2.1. *If so,* what does "sustainability" mean to you?
     - 5.2.2. *If yes,* do you think there are benefits for the ecosystem with this project (please explain)?

6. Do you think the project/plan has a comprehensive gender, generational and rights-based approach (please explain)?

7. Do you think the plan/project has any other focus not mentioned above (please explain)?
8. What do you see as the community benefits of this project?
9. What do you see as the benefits for stakeholders/designers with this project?

CO-DESIGN

10. Please tell me what “co-design” means to you.
11. In your opinion, are there projects in Uruguay in which citizen participation, although incorporated, is only superficial or does not work?

    11.1. *If yes:* In your opinion, what is the difference between a project/plan with real participation and one with superficial participation?

12. When and how do you think co-design/citizen participation should be applied to make it work?

CO-DESIGN AT THE IYUÍ STREAM

13. Do you consider that the CASAVALLE PARCIAL PLAN "OPERACIÓN URBANA II - PUD MATILDE PACHECO" has taken into account citizen participation?

The following questions will be used if the interviewee answers YES:

13.1. In which instances?
13.2. How have these instances of participation influenced the project?
13.3. Which parts have been established, structured and defined in advance and which parts have been left open for the community to define?

13.4. Do you think that the instances of citizen participation that were created for the Iyuí Stream plan/project were sufficient (please explain)?

13.5. Would you have liked to see other instances or other techniques used?
    13.5.1. *If no:* how many more? Why?
    13.5.2. What additional techniques? Why?
13.6. Where did you incorporate the knowledge and/or skills to apply co-design in plans and projects?

The following questions will be used if the interviewee answers NO:

13.7. Are there plans to incorporate citizen participation at any stage of the plan?

    13.7.1. *If yes*: Which ones?
    13.7.2. How do you plan to generate these stages of participation?
13.8. For which reasons do you think that citizen participation has not been contemplated in the Plan's elaboration?

14. Do you agree that this should have been the way it was or would you have preferred it to be otherwise (please explain)?

OPPORTUNITIES

15. Do you consider that there are areas of the plan/project that are not defined/do not yet have a planned program in which the community could participate (please explain)?

16. Do you consider that there are areas of the plan/project were the population could implement proposals?

    16.1.*If yes:* Which ones? Why?

DESIGN AND IMPLEMENTATION CONSTRAINTS

17. Were there any constraints (budget, staff, time, etc.) in the design of the plan?
    17.1.*If so,* how have they been overcome?

REFERENCES

18. For this plan/project, has any other project or plan been taken as a reference, either for the proposal, the design, the applied co-design or in any other field?

    18.1.*If so,* which ones?
    18.2.*If so,* why?

IYUÍ STREAM LOCAL COMMUNITY

19. How would you define the Casavalle community?

The following guiding questions will be used if the interviewee is not able to answer:

    19.1. Do you think they have any characteristics that make them unique/particular (please explain)?
    19.2. If you had to tell me one strength and one weakness of the Casavalle community, what would it be (please explain)?

    19.3. Do you consider that there are differences between the community of Casavalle and the stream itself adjacent community (please explain)?

    19.4. Do you consider that these particularities you mention have been taken into account in the design and/or implementation of the participation´s instances or in any of the design´s phases (please explain)?

LINKS

20. Do you think that the development and/or implementation of the CASAVALLE PARTIAL PLAN "OPERACIÓN URBANA II - PUD MATILDE PACHECO" modified your links with the other stakeholders (please explain)?

The following guiding questions will be used if the interviewee is not able to answer:

20.1. With which actors were there links prior to this project?

20.2. How would you rate the current links with other CASAVALLE PARCIAL PLAN "OPERACIÓN URBANA II - PUD MATILDE PACHECO"´s stakeholders?

20.3. How would you currently rate those links after having implemented some actions (please explain)?

20.4. Do you think that links with other stakeholders influence outcomes?

20.4.1. *If so,* why?

IMPLEMENTATION

21. Tell me a little about the implementation process of the CASAVALLE PARCIAL PLAN "OPERACIÓN URBANA II - PUD MATILDE PACHECO".

The following guiding questions will be used if the interviewee is not able to answer:

21.1. In trying to implement the plan, do you feel that modifications had to be made?

21.1.1. *If so,* which ones?
21.1.2. *If so,* why?

21.2. How would you evaluate the implementation process (please explain)? What would you consider a gain and what a loss?

21.3. What challenges do you see ahead?

Announcing that the end is near (5/10 minutes)
Before I finish, I would like to ask you these last two questions:

LEARNINGS

22. Do you consider that this Plan/Project has left you with a learning experience at a professional and/or personal level?

22.1.*If yes,* which one?

23. Do you have expectations for what remains to be implemented (please explain)?

Check that no relevant points have been left unaddressed.

CONCLUSION

Everything you have told me has been very interesting and enriching for me and for this research. I hope this instance has been fruitful for you too.

24. Is there anything else you think I haven't asked or anything else you think is relevant to mention?

0.4.3.4 IYUÍ STREAM CASE INTERVIEW: COMMUNITY MEMBERS

Interview reference/coding number:_____
Date/time:_____

PREAMBLE

Acknowledge and introduce myself
Explain the purpose of the interview and the research aim
Explain the interview´s format and indicate the approximate duration of the interview
Mention the terms of confidentiality and the honorary and voluntary nature of the interview

ABOUT THE INTERVIEWEE

Name:_____
If relevant, role in a community-related body:_____
_____

ORIGIN, EDUCATION AND CURRENT EMPLOYMENT

1. Tell me a little about yourself, your origins and how you came to be part of the Casavalle community.

The following guiding questions will be used if the interviewee is not able to answer:

1.1. Do you have an educational/academic background?
  1.1.1. *If yes,* tell me about your educational background.
1.2. Do you have any trade background?
  1.2.1. *If yes,* please tell me about your training in that trade and/or other trades.
1.3. Do you consider that other experiences not related to formal education have contributed to your education?
1.4. What is a typical week like at this point in your life?

TO ASK THE PERSON LINKED TO THE ORGANISATION LINKED TO THE COMMUNITY:

2. Tell me about your journey to get to this community-linked organisation / to be a community referent.

The following guiding questions will be used if the interviewee is not able to answer:

2.1. How long have you been linked with the organisation?

2.2. What were the reasons that made you want to be part of this organisation?
2.3. What are your tasks and responsibilities within the agency? What is a typical day in your role like?

2.4. Have you always kept the same role within this organisation or have you changed roles or organisations linked to this community over time?

TO ASK THE PERSON LINKED TO THE COMMUNITY:

2. What do you understand by the concept of "referent" for a community?

3. Tell me, why do you think that the COMMUNITY LINKED ORGANISATION has suggested you as a community spokesperson?

4. Do you see yourself as a reference for the Casavalle community? Why?

If yes:

4.1. How has it been your journey to become a reference in this community?

4.2. What were the reasons that motivated you to become a reference for the community?

LINK TO THE STREAM

5. What is your link to the Iyuí/Matilde Pacheco Stream?

The following guiding questions will be used if the interviewee is not able to answer:

5.1. What does the Stream mean to you?
5.2. How important is it?
5.3. Do you associate it with memories of your life (please, explain)?

6. What do you think the Stream means to the Casavalle's community today?

7. Do you think the Stream's significance for the community has changed over the years (please explain)?

8. What is the link between the Casavalle community and the Stream?

The following guiding questions will be used if the interviewee is not able to answer:

9. Do you consider that the community sees the Stream as a positive or negative element?
9.1. Please elaborate, why is this a positive/negative element.

10. Do you remember any initiatives in the past by the community for the improvement of the Stream (please explain)?

IYUÍ STREAM LOCAL COMMUNITY*

**comprised from Miguelete River to Teniente Rinaldi street*

11. How would you define the Casavalle's community?

The following guiding questions will be used if the interviewee is not able to answer:

11.1. Do you think the Casavalle's community has any characteristics that make them unique (please explain)? Or any characteristic(s) that should be considered/taken into account?
11.2. If you had to tell me one strength and one weakness of the Casavalle's community, what would it be?

11.3. Do you consider that there are differences between the Casavalle's community and the community adjacent to the Stream itself*?

11.3.1. *If yes,* please elaborate.

IYUÍ STREAM'S HEALTH

12. How would you describe the current state of health of Iyuí Stream?

The following guiding questions will be used if the interviewee is not able to answer:
12.1. Would you describe it as excellent, good, fair, poor, bad or deficient?
12.2. Why?

13. Why do you think the Stream is in the state it is in today?

If the answer is "bad" or "poor":

13.1. What do you think is/are the problem' source(s)?

13.2. Do you think there is a solution to the Stream's current problem(s)?

INTENTIONS

16. Do you consider that the Stream has the potential to be a public space for the Casavalle's community?

16.1. *If yes:* If it were possible to build a public space associated with the Stream, what do you think this space should have?

17. If you had to choose the public space/ square that you like the most in the city of Montevideo, which one would you choose? Why? What do you like about that space?

INITIATIVES

18. Do you remember any work(s) that has been done by public or private organisations to improve the Stream' situation?

    18.1.*If yes:* which ones?
    18.2.Who are/were the authors of these works?
        18.2.1. *If so,* what is your opinion about the work(s) that has been done?
        18.2.2. Do you think they have improved or worsened the situation (please explain)?

ABOUT THE CASAVALLE PARTIAL PLAN "URBAN OPERATION II - PUD MATILDE PACHECO".

PROJECT

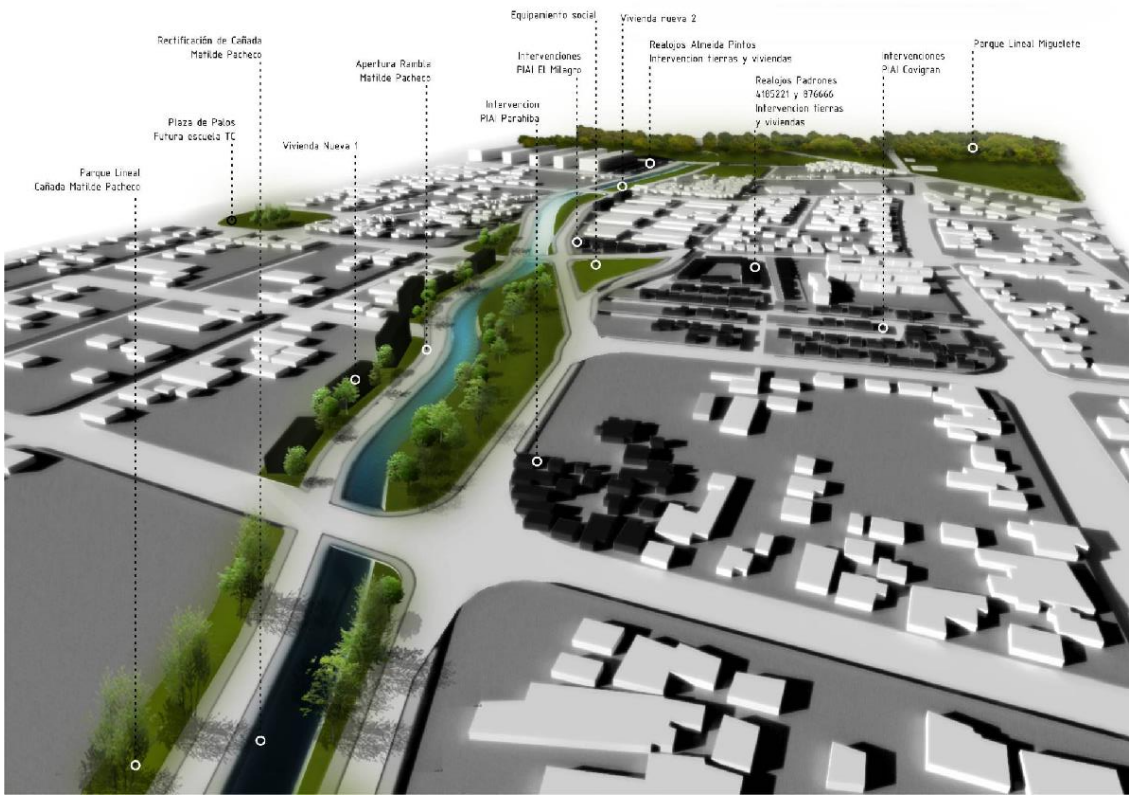
19. Do you know of any project that the municipality is planning to carry out in relation to the Stream?

    If yes:

    19.1.Which one(s)?
    19.2.Tell me what it is about.
    19.3.How did you hear about the project(s)?
    19.4.Have you been invited to take part in any of the project instances?
        19.4.1. *If yes*:
        19.4.2. Which ones?
        19.4.3. What were those instances like?
        19.4.4. What did you propose?
        19.4.5. What do you remember participants proposing?
        19.4.6. What do you think of what was proposed was actually done?

Next, I will show you an image and ask you some questions associated with each of them.

Image to be displayed:



20. Are you familiar with this image? Have you ever seen it before?
If yes:

20.1.What information do you have associated with this image?
20.2.What does it represent?
20.3.Do you know who the author/s are?

If yes, show the following two images:


JULIO FIGUEROA
RAMBLA MATILDE PACHECO NORTE
CANCHA FÚTBOL 5
DR JOSE MARTIRENE
HORACIO GARCÍA LAGOS


DR. JUSTO MONTES PAREJA
CALLE PROYECTADA
CANCHA FÚTBOL / VOLEY CÉSPED
CANCHA POLIDEPORTIVA
ALMEIDA PINTOS

21. Are you familiar with these other two images? Have you ever seen them before?

If yes:

21.1. What information do you have associated with this image?
21.2. What do they represent for you?

If no:

20.1. What does this image represent for you? What does it mean to you?
20.2. Do you recognise where it is?

Questions for both answers:

22. Do you like what is been proposed (please explain)?
23. Do you think it is possible to achieve that proposal (please explain)?
24. What do you think are the benefits for Casavalle's community if this project is implemented?
25. If the Municipality invite you to participate in any stage of the project, design or construction or maintenance, would you be interested in participating?

If yes:

25.1. How would you like to participate?
25.2. If you could choose, which stage would you like to participate in?

26. Do you think other members of the community would be interested in participating (please explain)?

CONCEPTS

13. Do you think that there could be elements or environmental factors that may affect Iyuí Stream and its community?

If yes:

13.1.1. Which ones? Why?
13.1.2. Do you think the effects of climate change have had or will have an impact on the Stream?
13.1.3. Do you think that a sustainable project could be carried out in the Stream?

14. Have you ever heard of the concept of "co-design" (please explain)?

If not:

14.1. Have you ever heard of "community participation"?

15. Have you been involved in any neighbourhood's projects in which the community has been involved in their design, implementation or maintenance?

If yes:

15.1. In which one?
15.2. How do you remember the participation process?
15.3. What do you think would have happened without community participation?

16. In your opinion, are there projects in Uruguay in which citizen participation, although incorporated, is only superficial or does not work?

16.1. *If yes:* In your opinion, what is the difference between a project/plan with real participation and one with superficial participation?

17. When and how do you think co-design/citizen participation should be applied to make it work?

LINKS

35. Do you consider that there are community links with the Municipality because of the projects implemented in the Stream (please explain) ?

35.1. *If yes*: How would you currently rate the links after they had implemented some actions? Why?

36. Do you think that links with other stakeholders influence outcomes (please explain)?

36.1.1. *If so,* why?

Announcing that the end is near (5/10 minutes)
Before I finish, I would like to ask you these last two questions:

FORWARD

37. What challenges do you see ahead for the Iyuí Stream, its environment and its community?

38. Do you have future expectations (please explain)?

Check that no relevant points have been left unaddressed.

CONCLUSION

Everything you have told me has been very interesting and enriching for me and for this research.
I hope this instance has been fruitful for you too.

39. Is there anything else you think I haven't asked or anything else you think is relevant to mention?

5 · CASE STUDY. STONY CREEK, VICTORIA, AUSTRALIA

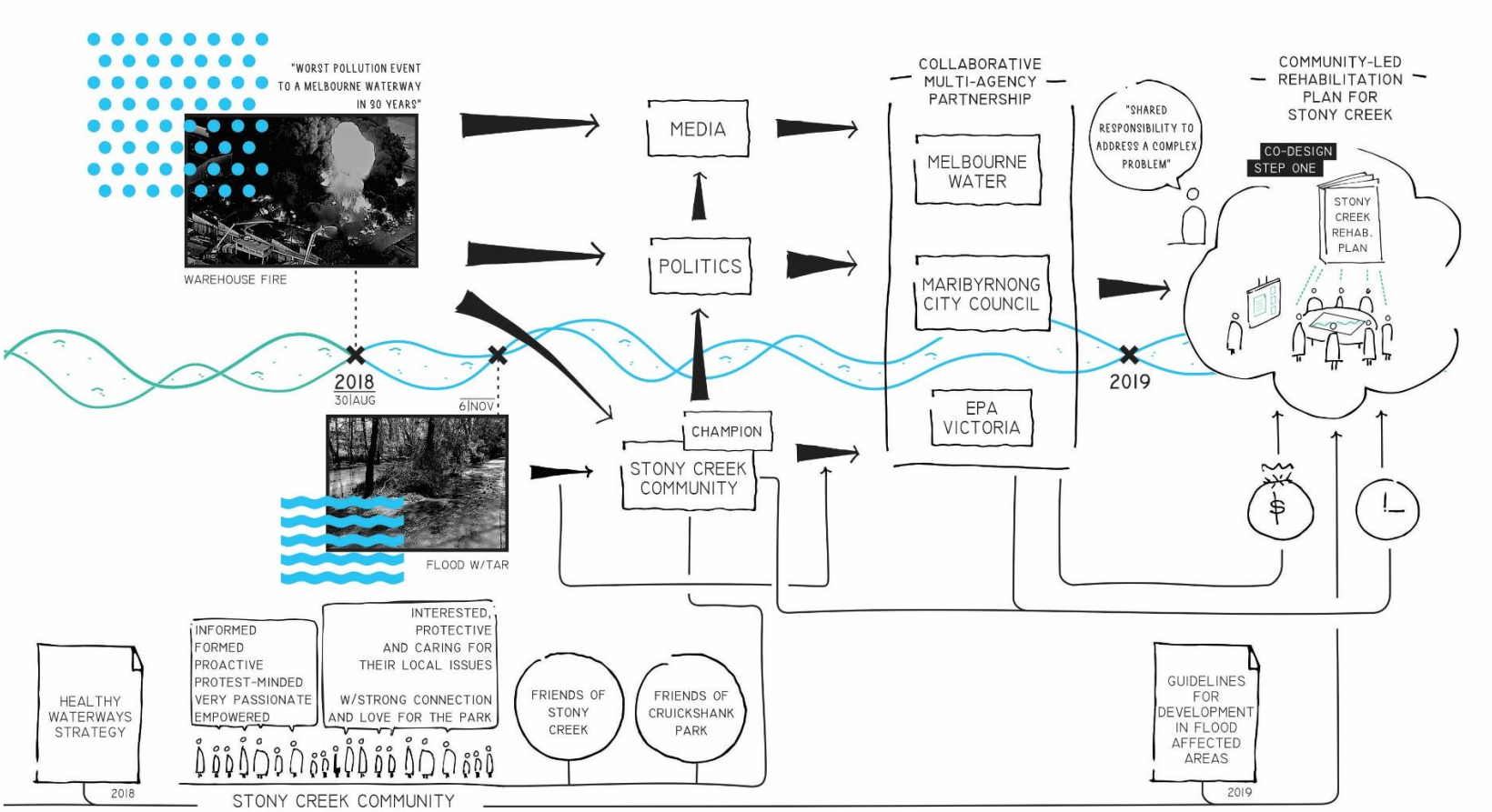


Figure 0.5.16: Stony Creek's community-led rehabilitation plan generation

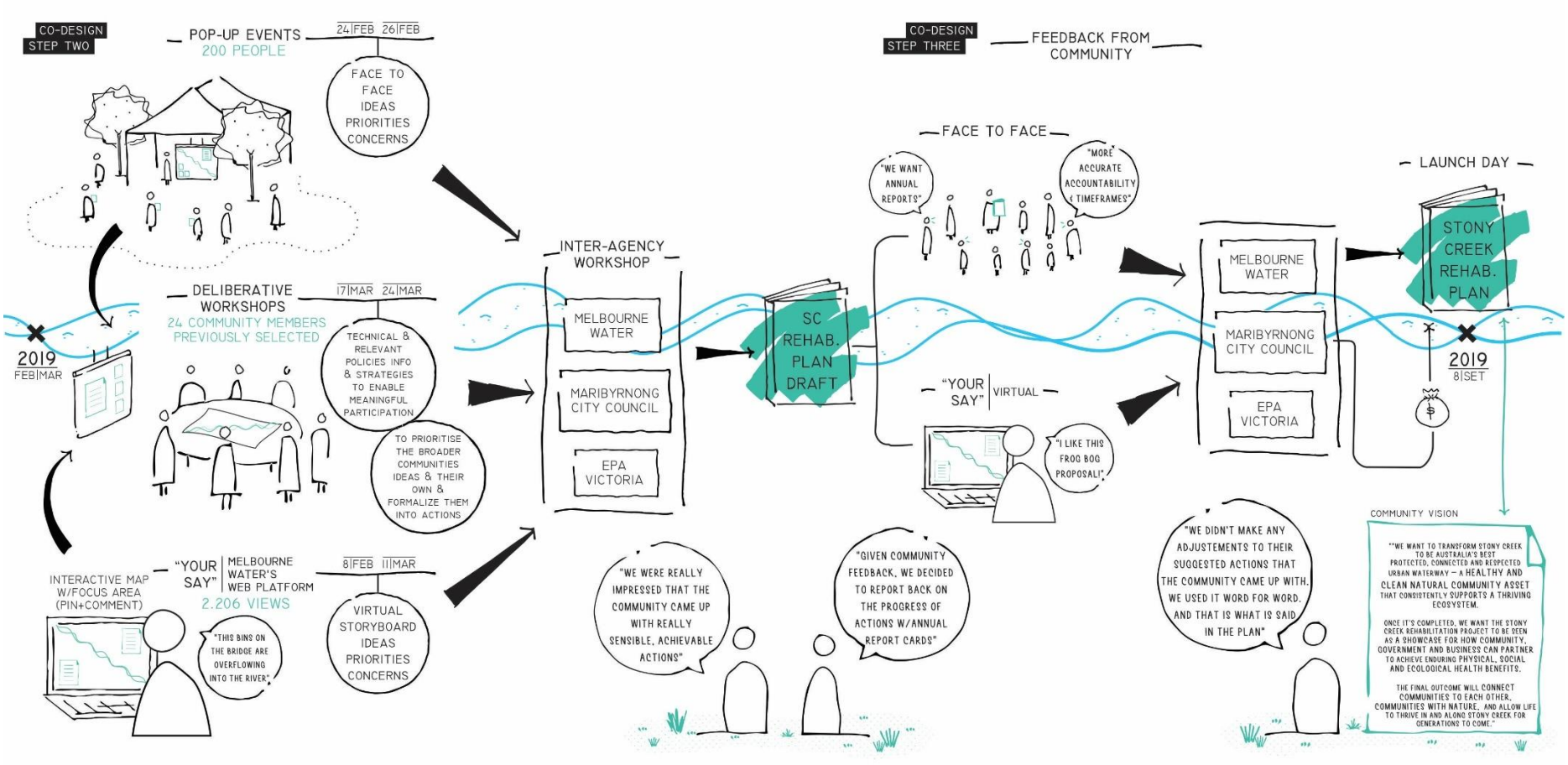


Figure 0.5.17: Stony Creek's Co-Designed Rehabilitation Plan Development

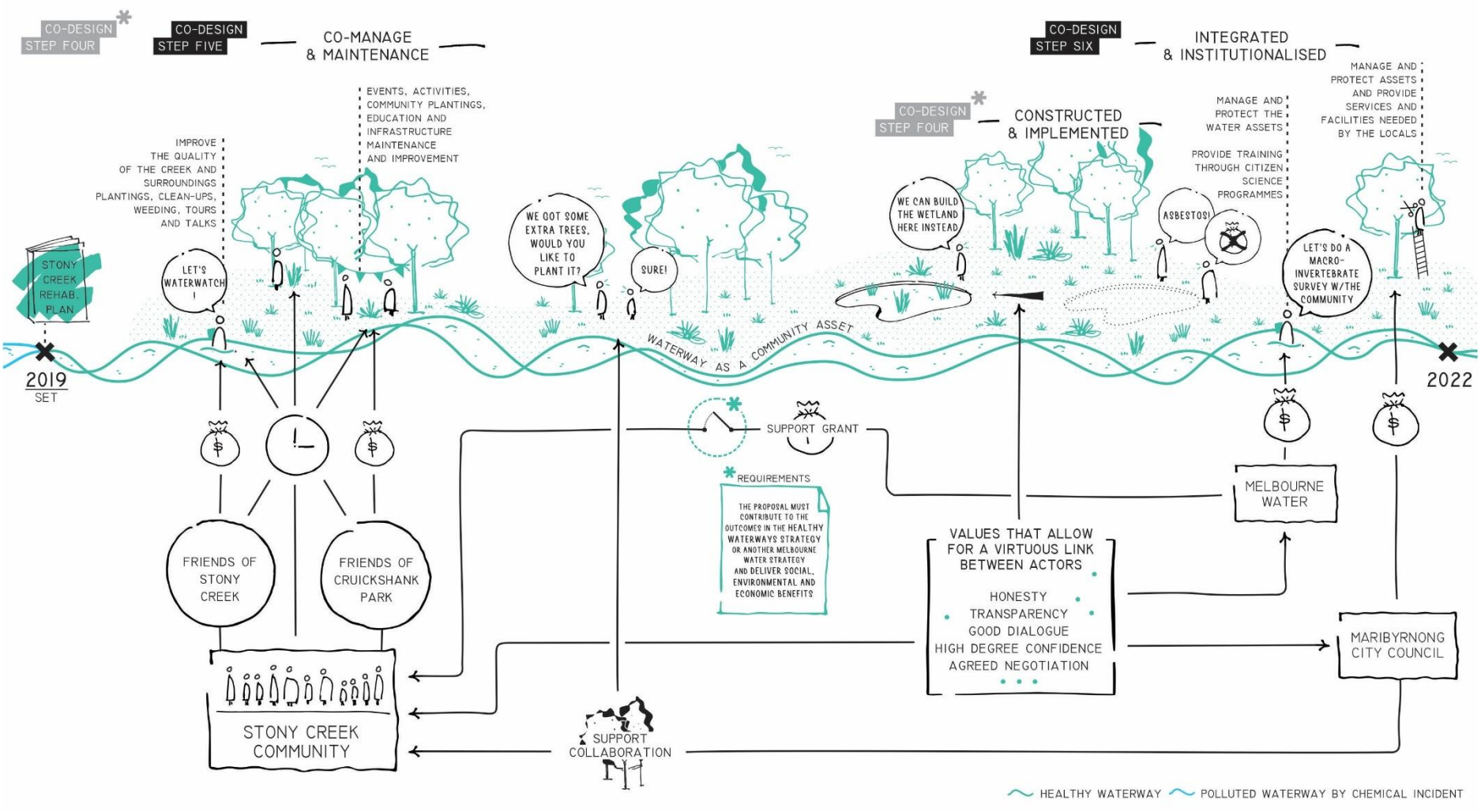


Figure 0.5.18: Stony Creek's Future Directions Plan and Rehabilitation Plan Implementation

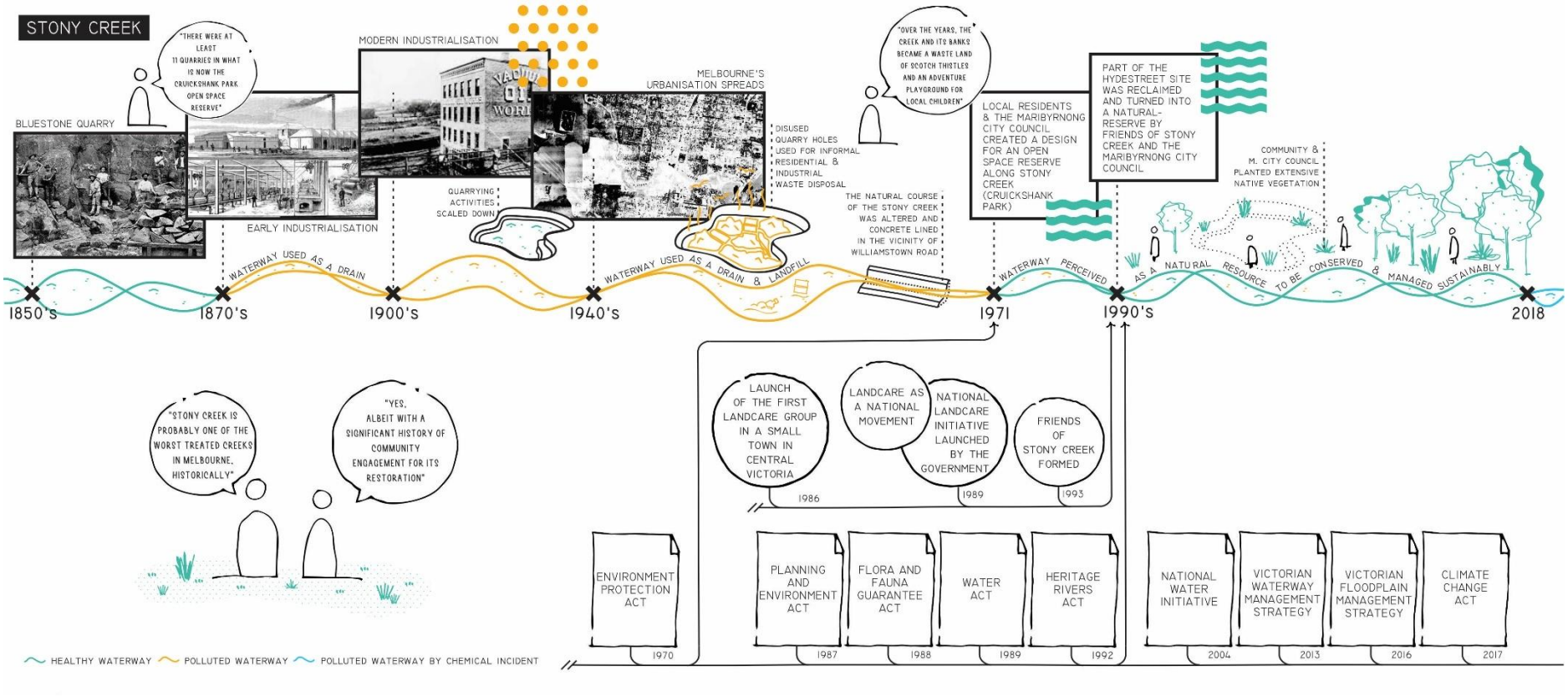


Figure 0.5.19: Stony Creek Timeline Prior to the 2018 Polluting Event

6 · IYUÍ STREAM. LESSONS LEARNED FROM STONY CREEK

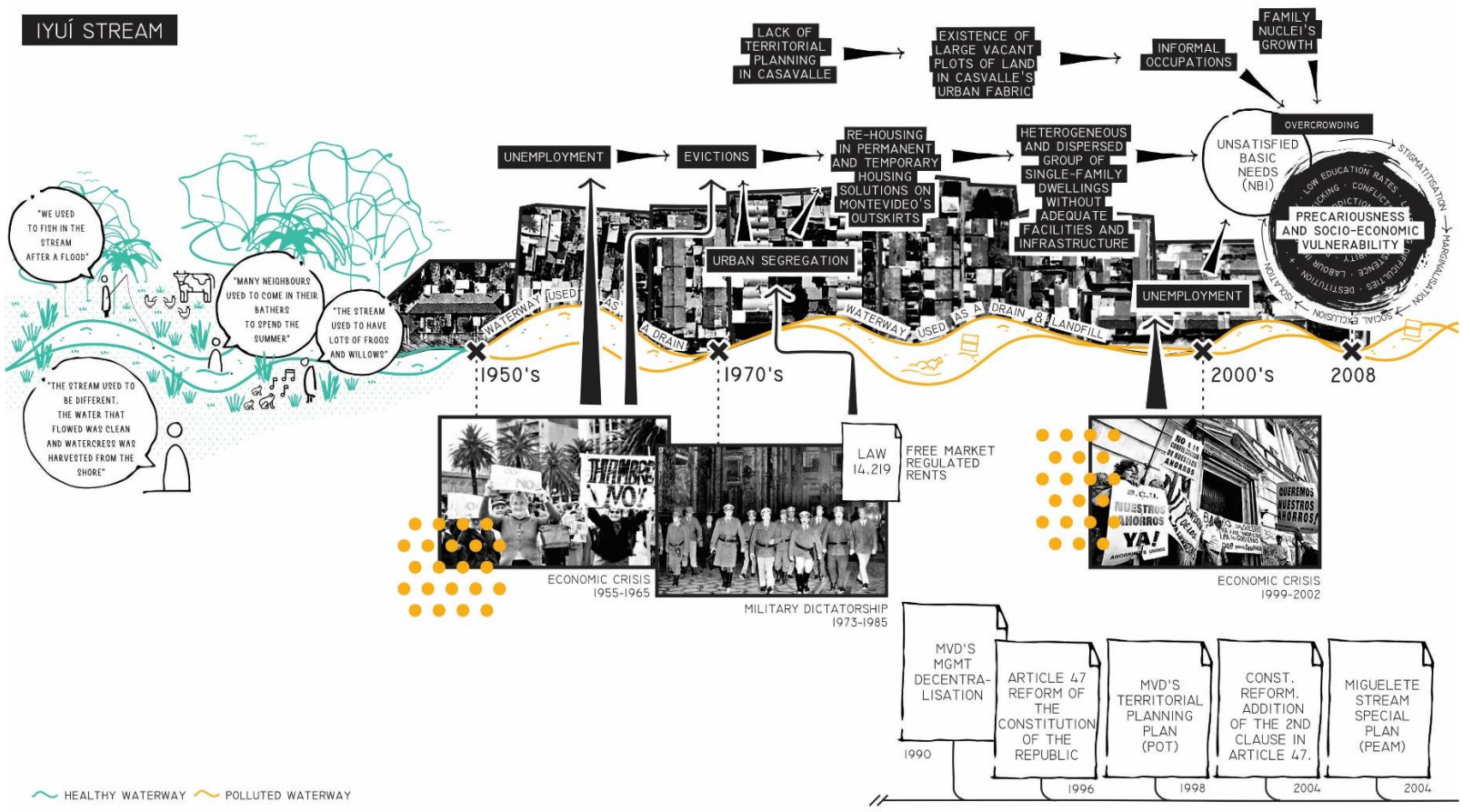


Figure 0.6.20: Casavalle Plan's background and triggers. Population's uses and links with the Iyuí Stream

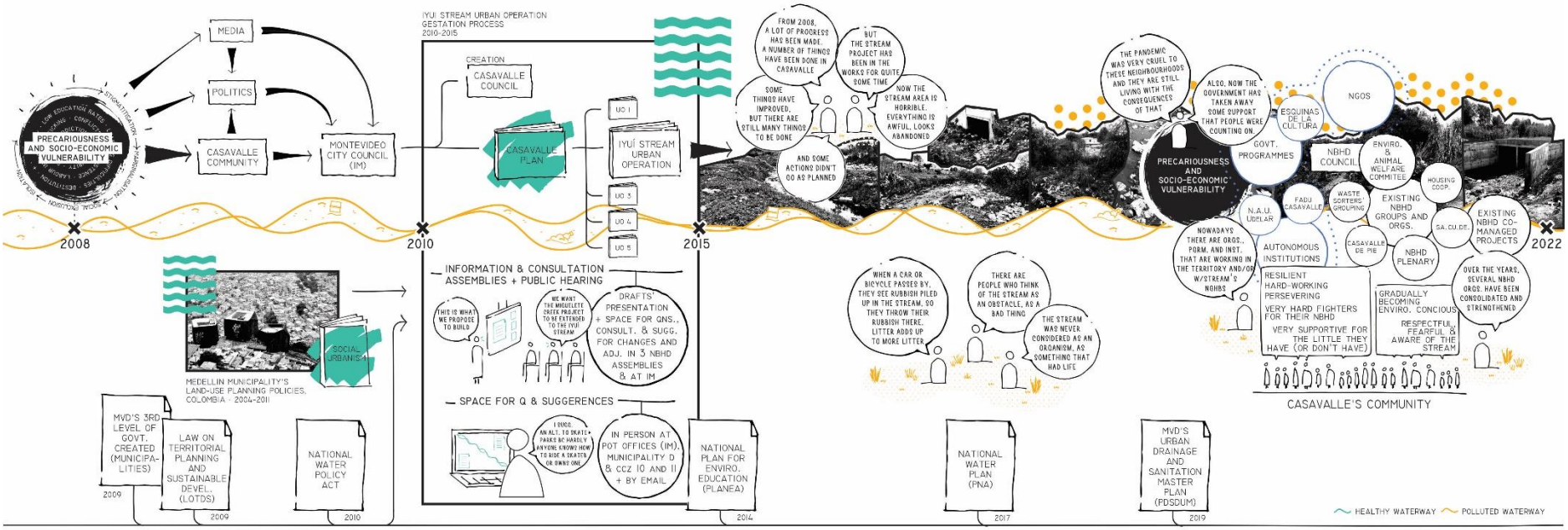


Figure 0.6.21: Casavalle Plan's development and Iyuí Stream's current status

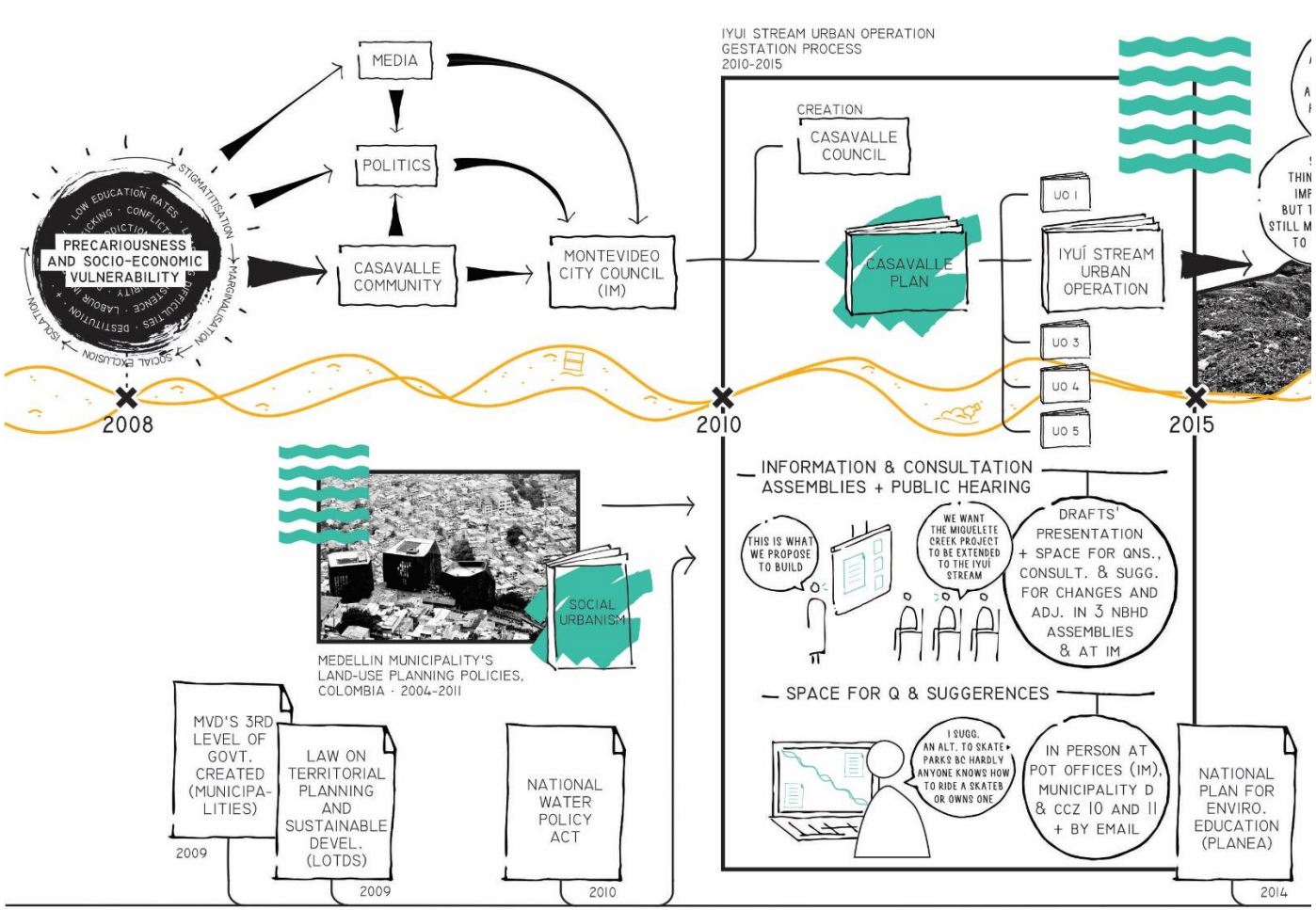


Figure 0.6.22: Casavalle Plan's development

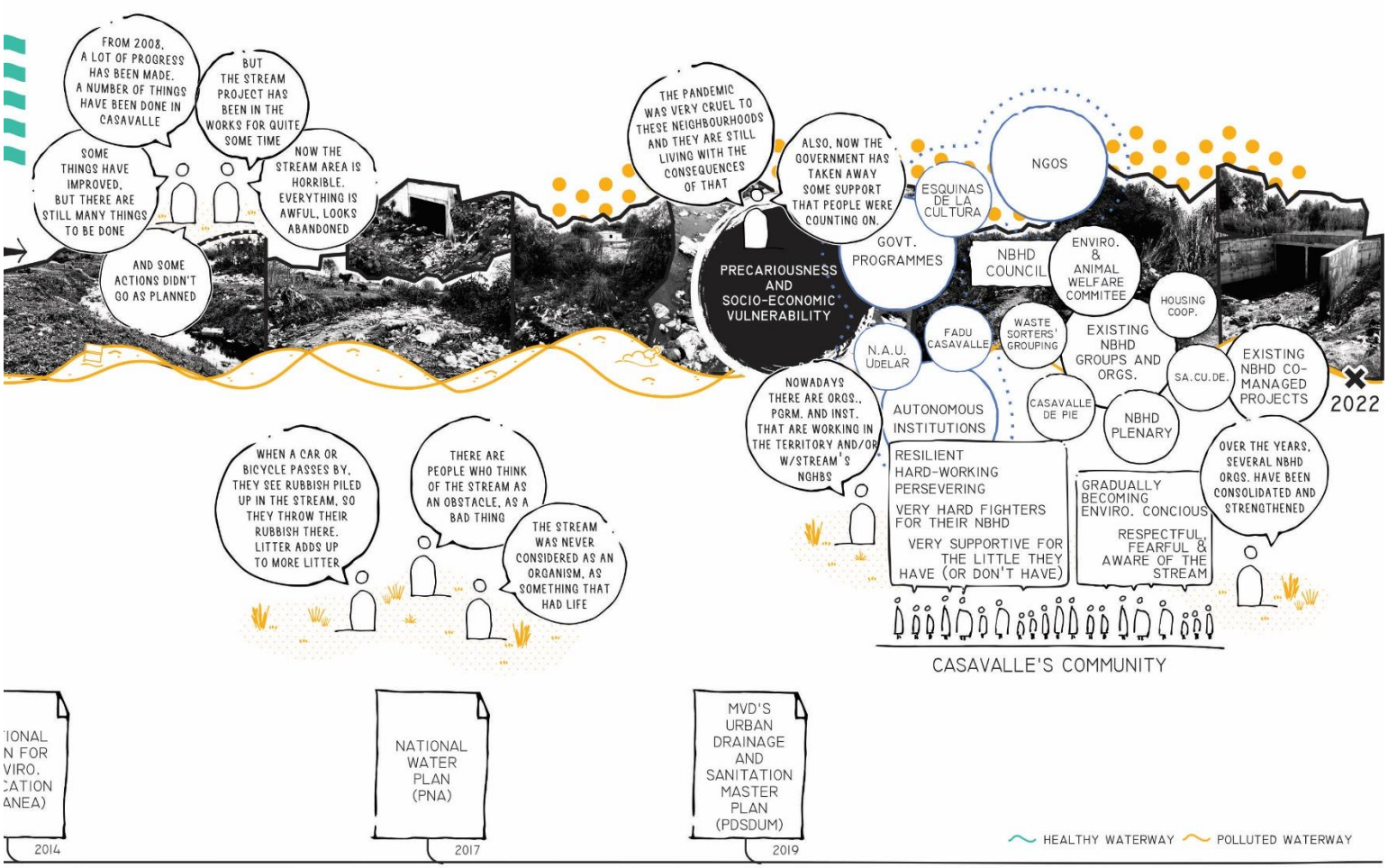


Figure 0.6.23: Iyuí Stream's current status

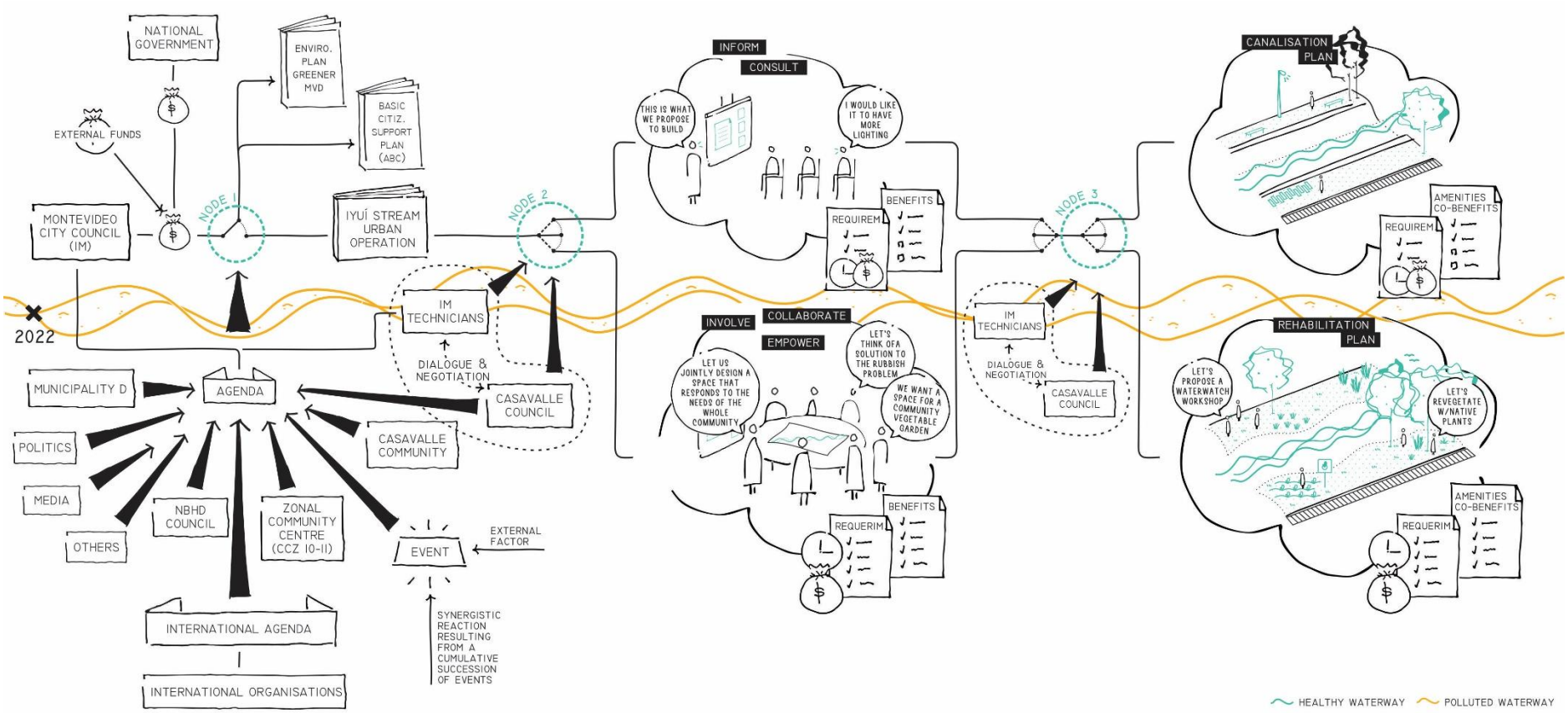


Figure 0.6.24: System of actors, linkages, influences and determining nodes in the face of an Iyuí Stream's co-designed rehabilitation

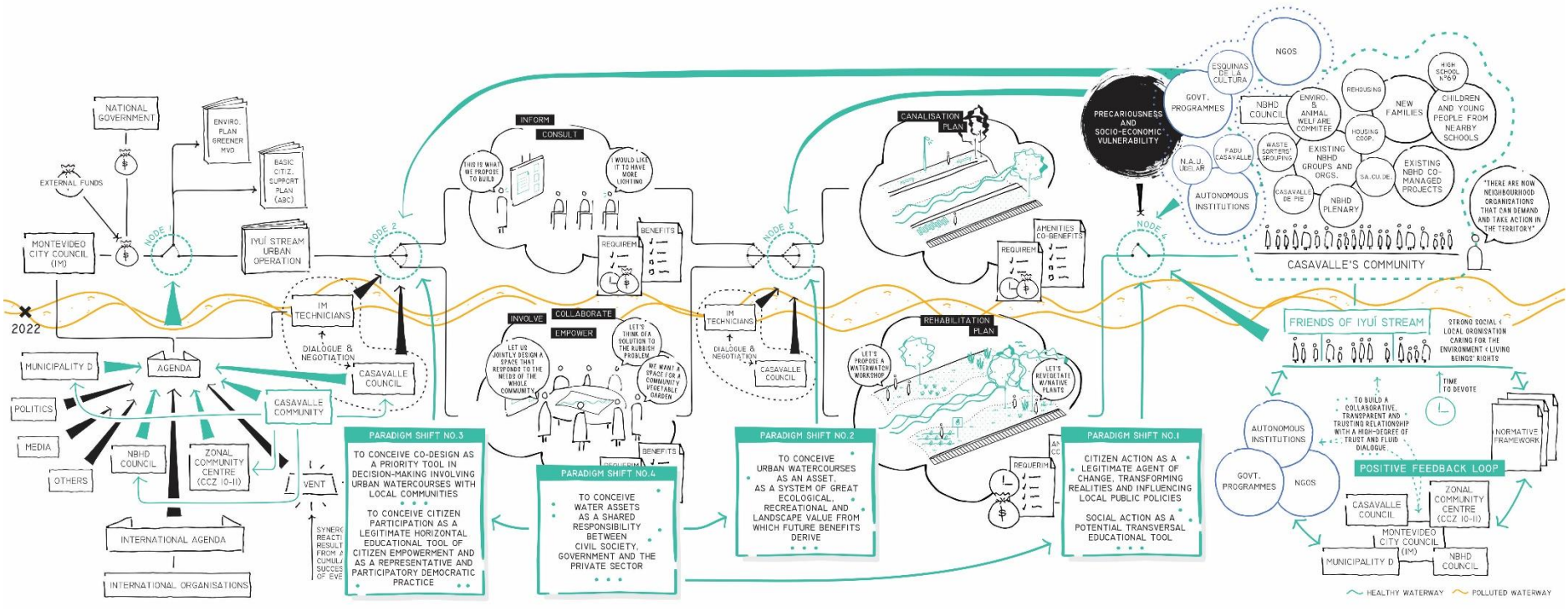


Figure 0.6.25: Lessons learnt from the Stony Creek Case to the Iyuí Stream Case's System

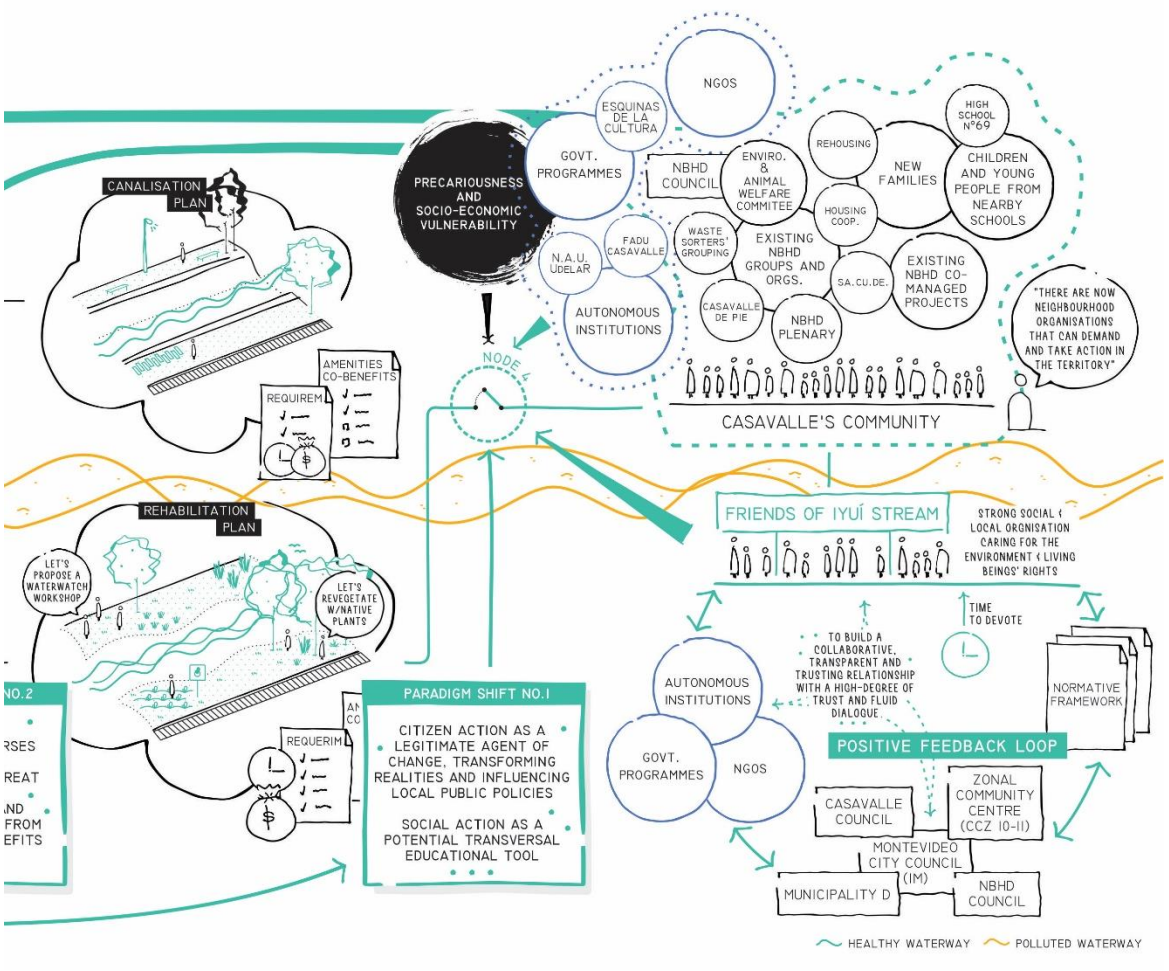


Figure 0.6.26: Lessons learnt from the Stony Creek Case to the Iyuí Stream Case's System. Right figure segment

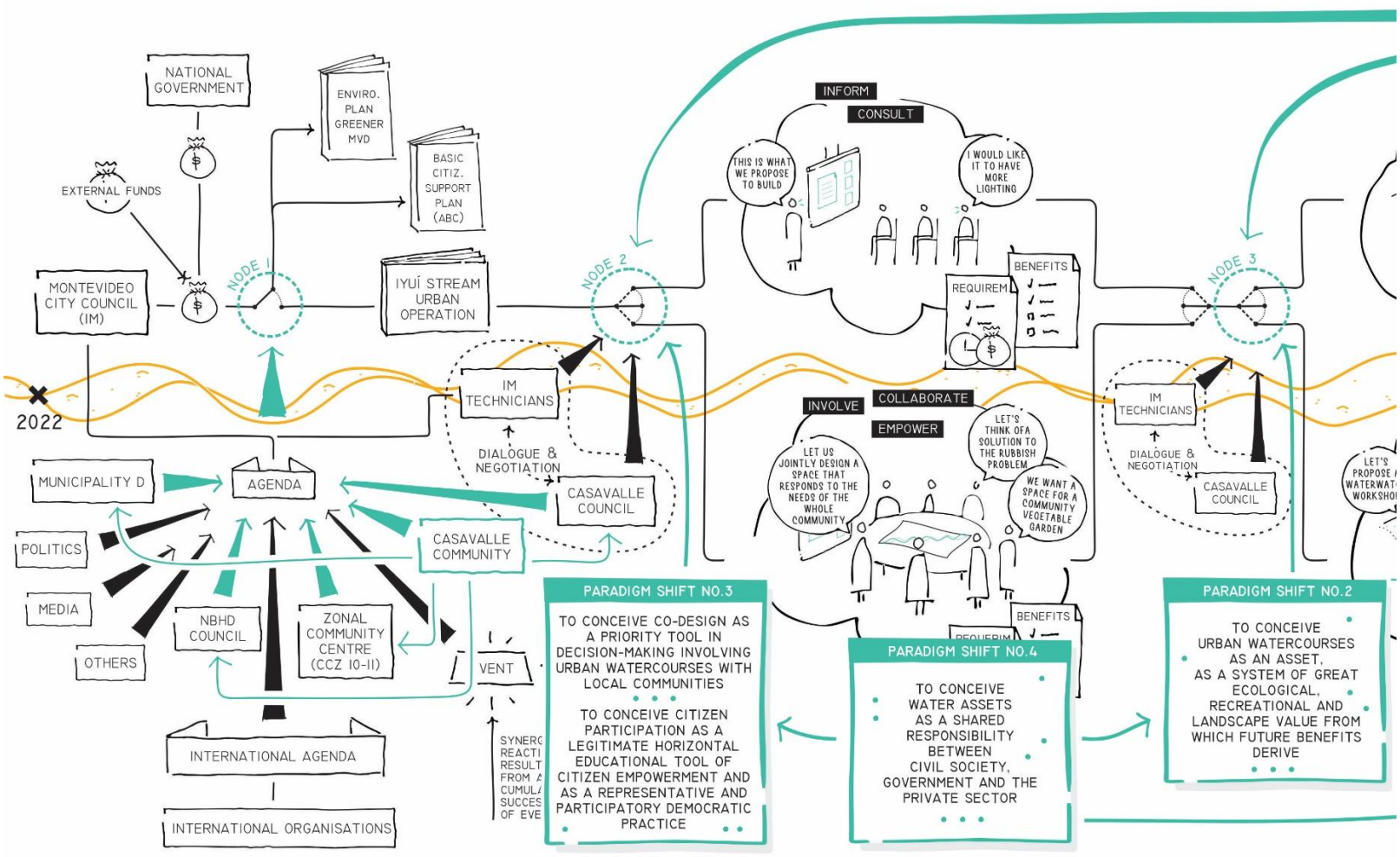


Figure 0.6.27: Lessons learnt from the Stony Creek Case to the Iyuí Stream Case's System. Left figure segment

*

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