TECHNISCHE UNIVERSITÄT DRESDEN

Faculty of Environmental Sciences, Chair of Tropical and International Forestry

MASTER THESIS

PUBLIC PARTICIPATION IN RIVER BASIN MANAGEMENT: THE CASE OF THE VELHAS RIVER BASIN COMMITTEE IN BRAZIL

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23 July 2021 Dresden

CONCEPTUAL FORMATION

TECHNISCHE UNIVERSITÄT DRESDEN

Fakultät Tropische Forstwirtschaft, Institut für Internationale Forst- und Holzwirtschaft

Master Thesis registration

Subject Area: Hydroscience and Engineering
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Topic: Public participation in River Basin Management: The case of the Velhas River Basin Committee in Brazil

1. Objectives

The overall aim of this master thesis research is to identify and analyze the current mechanisms of participation at the river basin level in the Velhas River Basin. Accordingly, it will focus on civic involvement in participatory processes at the Velhas River Basin committee. The objectives are:

- To identify and analyze the underlying legal and institutional structures and key stakeholders that are relevant to the Velhas River Basin Committee (CBH-Velhas);
- To determine and describe the current practice of public participation in river basin management in the Velhas river basin.

2. Work Plan

- Find relevant journal articles of the last 20 years of research in Public participation on natural resources management
- Literature review on public and stakeholder participation theories
- Background research and analysis on water policy and governance at national (Brazil) and local (Velhas river basin) and RBOs in a historical context
- Selection and analysis of variables related to participatory process design and outcome
- Interpretation and synthesis of the results

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First Supervisor

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Start Date: 21.01.2021

Anticipated End Date: 17.06.2021

STATEMENT OF ORIGINALITY

I hereby declare that this master thesis is my own work and that information that has been directly or indirectly taken from other sources has been noted as such. Neither this nor a similar work has been previously published or presented to an examination committee.

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Signature, Place and Date

ACKNOWLEDGEMENTS

First and foremost, I would like to express my gratitude to my family; Joana, Juliano, César, Paula, Mariana, Rodrigo, Alice and Maria Regina. Their constant support and understanding are the backbone for movement in my life. My parents are the utmost inspiration that I could have, and no words would describe good enough their meaning in my life.

I would like to thank Dr Sabrina Kirschke for the help and guidance in developing the research design and methodological framework. Her experience and knowledge of water governance research were essential to complete my master thesis on this topic. I would like to thank Prof. Dr Nilo de Oliveira for his profound knowledge of water governance and policy in Brazil and, more specifically, Minas Gerais. Finally, I would like to recognise the crucial importance of Professor Dr Pretzsch for initially sparking my interest in interdisciplinary research during his TU Dresden's Conflict and Communication Management course lectures. I am more than grateful for the opportunity to work under his guidance and instructions, and I am honoured to have him as my first supervisor.

I want to express my gratitude to DAAD to grant me the scholarship and continue to support me in pursue of my master degree in Germany. This academic period in Germany was supplied with knowledge and experience, shifts of paradigms and the construction of new perceptions and worldviews. It has been a long ride, but what a ride.

I would like to thank my friends here, there and everywhere. Your support helped me maintain my stability and mental health. In addition, I would like to highlight three friends who actively supported me in my thesis; Armin, for urging me to pursue a topic that would inspire me, and my two unofficial supervisors, Norma Pedroza Aceo and Tatiana Silva Santos. Your input and profound knowledge on the topic of governance and water stewardships and our brainstorms were very much appreciated.

I would like to acknowledge the CBH-Velhas members for their tireless effort and support in providing data for this research. Especially Poliana Valgas, who enabled my first contact to the Committee and linked us as partners on this research.

I would like to express what an honour it is to have the Velhas as my study area, a river that is part of my personal and, now, educational life.

ABSTRACT

The future of water resources is an increasing source of concern worldwide. The rise in environmental degradation and the menace of climate change as a threat multiplier are a hazard for water, food, and energy security. The search for efficient management to address these threats and comply with sustainable water resources development brought holistic and multidisciplinary approaches where both conservation and development goals are in place. The Integrated Water Resources Management (IWRM) places the river basin as the natural unit for water management. In this scenario, the River Basin Organizations (RBO) comes as institutional bodies created to manage the river basin, including all actors and stakeholders in its deliberatives processes. Using a single-case study approach, this thesis performed a multi-criteria analysis of the current state of public participation at the Velhas River Basin Committee. The underlying legal and institutional was analyzed and discussed. This research indicated that public participation at the Velhas River Basin Committee is not completely effective when tested against the evaluated criteria. Therefore, the Committee's participatory processes should focus on the improvement of representativeness, capacity building, and communication flows with a broader public. Public participation is a complex process and requires to be carefully planned and implemented. This research also concludes that more study is needed on public participation in water resources governance to evaluate this process better, and future studies would benefit from the inclusion of *in-situ* data collection.

Keywords

Public participation, River Basin Organization, participatory processes, sustainable development, Velhas River Basin Organization, water governance

KURZFASSUNG

Die Zukunft der Wasserressourcen gibt weltweit zunehmend Anlass zur Sorge. Die zunehmende Umweltzerstörung und der drohende Klimawandel stellen eine Gefahr für die Wasser-, Lebensmittel- und Energiesicherheit dar. Ein effizientes Management, um diesen Bedrohungen zu begegnen und eine nachhaltige Entwicklung der Wasserressourcen einzuhalten, benötigt ganzheitliche und multidisziplinäre Ansätze, bei denen sowohl Schutz- als auch Entwicklungsziele verfolgt werden. Das Integrierte Wasserressourcen-Management (IWRM) stellt das Flusseinzugsgebiet als natürliche Einheit für das Wassermanagement dar. In diesem Szenario werden die Flussgebietsorganisationen (River Basin Organizations, RBO) als institutionelle Einrichtungen geschaffen, um das Flussgebiet zu verwalten und alle Akteure und Interessengruppen in die Entscheidungsprozesse einzubeziehen. Unter Verwendung eines Einzelfallstudienansatzes wurde in dieser Arbeitn eine Multi-Kriterien-Analyse durchgeführt, um herauszufinden, wie die derzeitige Öffentlichkeitsbeteiligung im Velhas River Basin Committee aufgebaut ist. Hierfür wurden die zugrunde liegenden rechtlichen und institutionellen Rahmenbedingungen analysiert und diskutiert. Die Untersuchung ergab, dass die Öffentlichkeitsbeteiligung im Velhas River Basin Committee nicht vollständig effektiv ist, als sie anhand der evaluierten Kriterien getestet wurde. Daher sollten sich die Partizipationsprozesse des Komitees auf die Verbesserung der Repräsentativität, den Aufbau von Kapazitäten und den Kommunikationsfluss mit einer breiteren Öffentlichkeit konzentrieren. Die Beteiligung der Öffentlichkeit ist ein komplexer Prozess und muss sorgfältig geplant und umgesetzt werden. Diese Untersuchung kommt auch zu dem Schluss, dass weitere Studien zur Beteiligung der Öffentlichkeit an der Bewirtschaftung von Wasserressourcen erforderlich sind, um diesen Prozess besser bewerten zu können, und dass künftige Studien von der Einbeziehung von In-situ-Datenerhebungen profitieren würden.

Schlüsselwörter

Öffentlichkeitsbeteiligung, Flussgebietsorganisation, partizipative Prozesse, nachhaltige Entwicklung, Velhas River Basin Organization, Wasserverwaltung

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LIST OF ABBREVIATIONS AND SYMBOLS

AGBPV	Basin Agency Peixe Vivo
ANA	National Water Agency
CBH	River Basin Committee
CBH-Velhas	Velhas River Basin Committee
CEEIBH	Special Committee for Integrated River Basin Studies
DNAE	National Department of Water and Energy
EMATER	Technical Assistance and Rural Extension Company
EU-WFD	European Union Water Framework Directive
GDP	Gross domestic product
IWRM	Integrated Water Resources Management
MME	Ministry of Mining and Energy
MMA	Ministry of Environment
OECD	Organisation for Economic Co-operation and Development
PDRH	River Basin Plan
PND	National Development Plan
PNRH	National Water Resources Plan
RMBH	Greater Belo Horizonte
SEMA	Special Secretariat for the Environment
SINGREH	National Water Resource Management System
UN	United Nations
UTE	Territorial Strategic Unity
WCED	World Commission on Environment and Development

1 INTRODUCTION

1.1 STATEMENT OF THE PROBLEM

Worldwide, water resources' future is an increasing source of concern for governments, nongovernmental organizations (NGOs), and local communities. Freshwater scarcity and quality degradation are major water problems worldwide and represent a threat to human health, ecosystem's integrity. Furthermore, as the population exponentially grows, water resources become more stretchy, harming its many uses such as food and energy production. Therefore, water security is food and energy security (UN-Water). According to WHO, one in every three people does not have access to safe drinking water, and 4.2 billion people do not have safe sanitation services. Brazil also faces these wicked problems; with 211 million people, 54,1% of the population has no access to sanitation, and 16,3% has no access to safe drinking water (IBGE, 2017).

Centralized and technocratic decision-making has proved ineffective in tackling anthropogenic water-related problems in extreme social disparity contexts (Abers and Keck 2006). Researchers and policymakers agree that governance with the dominance of specific stakeholders is still problematic, mainly because it disempowers people and ignores local realities. Poor water governance is claimed as one of the roots of water insecurity in some regions in the world ((Pahl-Wostl 2007). The concept of Integrated Water Resources Management (IWRM) copes with this fragmented water management, with a conceptual framework based on the principles of social equity, economic efficiency, and environmental sustainability. One of the key elements of IWRM to achieve better governance is the participatory approach; a multi-stakeholder approach can lead to holistic and integrated coordination and ensure more equity in water management (UN-Water 2008). Therefore, the application of IWRM results in the application of participatory approaches in the decision-making process.

Historically, water management in Brazil has been centralized and fragmented; fragmented according to each sector (energy, irrigated agriculture, sanitation) carried out its planning and measure, and centralized because of state and federal government disregarding municipal, users and civil society participation in the policymaking process. However, by following guidelines of IWRM such as transparency, accountability, and democratic decision-making, the Brazilian Federal law n° 9.433 (The Water Law) was signed in 1997- This law introduced specific institutional arrangements to incorporate public participation through the creation of River Basin Organizations (RBO) (Lemos and Oliveira 2004; Silva 2013). In this context, river basin organizations (RBO) come as a decentralized arena, incorporating public and private stakeholders in its processes and integrating policymaking from different policy areas.

The establishment of RBO is important for more participatory and integrative water governance, transferring power from central to local governing and including water users and civil society in the decision-making process (Lemos and Oliveira 2004; Silva 2013). Broad stakeholder participation is argued to have many theoretical advantages in the water resources field and has

gained more prominence over recent decades (Pahl-Wostl 2002; Stringer et al. 2006; Reed 2008; Carr 2015). Still, research on the mechanism to enable public engagement and participation in river basin organizations in the global south is relatively limited compared to the global north.

In a research network on water management at the river-basin level in Brazil, the Watermark Project, the results suggested a great variety in how state and society relationships operate, bringing different outcomes in the decision-making process. In a sample size with more than 20 basin committees, the group collected and interpreted data of the Velhas River Basin Committee (CBH-Velhas) and, as a result, they highlighted that collaboration was led by the work of civil society organizations (Abers 2007; Abers and Keck 2009; Abers et al. 2009). However, the project timeline covered the years between 1998 to 2010, leaving an information vacuum on the more current public participation practice at the CBH-Velhas after the researched period. Therefore, an ongoing evaluation during participation processes is crucial to reflect and clarify how participation has been done, to overcome challenges and achieve high-quality decisions (Carr 2015).

1.2 OBJECTIVES

This master thesis research aims to identify and analyse the current mechanisms of participation at the catchment level in the Velhas River Basin. Accordingly, it will focus on civic involvement in participatory processes at the Velhas River Basin Committee. The objectives are:

1. To identify and analyse the underlying legal and institutional structures and key stakeholders that are relevant to the Velhas River Basin Committee (CBH-Velhas);
2. To determine and describe the current practice of public participation in river basin management in the Velhas River Basin.

1.3 OUTLINE OF THE THESIS

This report is structured in 7 chapters. The thesis is structured as follows: Chapter 2 deals with the theoretical background and propositions and is the backbone for this research; it presents the Water governance in Brazil and the framework and indicators for analysis.

The third chapter describes this thesis research design and methodology and the ethics and limitations. The fourth chapter documents the case study, describing the historical and geographic complexity with which the Velhas River Basin Committee is inserted, with its institutional structure.

The fifth chapter presents the empirical results of this research, describing the contextual information and the outcomes of the applied methods. The sixth chapter discusses the previous results, highlighting the more relevant research outcomes and contrasting them with existing literature. Finally, the seventh and last chapter closes the thesis with an overall conclusion and an outlook for this research topic.

2 THEORETICAL FRAMEWORK

2.1 PUBLIC PARTICIPATION

2.1.1 Introduction

This chapter examines and presents the concepts of public participation underpinned by literature on environmental management and public and stakeholder participation literature. This theoretical framework comprises theoretical and practical literature on the involvement, inclusion and representation of the public in environmental and, more specifically, water management.

Public participation is a complex issue with diverse and multiple interpretations, which generates a large scope of literature. Therefore, it is necessary to discuss and develop public participation in natural resources to identify appropriate approaches to involve the public in river basin management decision-making. Next, this chapter explores the literature on participation meanings, typologies, processes, benefits, and barriers to effective participation. Finally, this chapter presents the conceptual framework applied in this research.

2.1.2 Definition of Public Participation

Public participation is embedded in many countries policy systems at the domestic and international level, but the understanding and implementation of this concept varied significantly (Renn, Webler, and Wiedemann 1995; Rowe and Frewer 2005; Reed 2008). Public participation is often linked to the idea of democracy as one of its features, and the proliferation of participation mechanisms is a sign of democratization of the decision-making process (Bherer and Breux 2012). However, this proliferation of public participation can bring over-fragmentation of this approach (ibid.).

The definition of participation is therefore important to be clearly defined, especially in the environmental management context. This chapter presents various meanings and concepts to develop and integrate ideas and definitions more appropriate to water management. Although participation seems intuitively simple, it is not a straightforward concept; its definition is flexible, complex, and value-laden, with multiple meanings to different people, and many words associated with it - collaboration, deliberation, involvement, engagement, social-learning, and co-management (Rosener 1981; Carr 2015).

There are close to one hundred definitions for public participation, according to Rowe and Frewer (2005). In their article on the politics of public participation, Croft and Beresford (1992) claimed in the first sentence that "Participation is one of those contentious words (...) which can seem to mean everything and nothing. There is little agreement about its definition" (p. 20). Participation can also be defined as a process where its participants (individuals, groups, or organisations)

choose to take an active role in the decision-making process that affects them (Rowe, Marsh, and Frewer 2004; Wandersman 1981; Reed 2008).

Participation is applied in different fields, ranging from health care and urban planning to environmental management and technology development, encompassing research fields such as political science, sociology, social psychology, engineering, management, and architecture (Von Korff et al., 2014). For further review, an adaptation of Rennet et al. (1995) definition will be applied; public participation is an arena for exchanging and facilitating communication between public, private and civic stakeholders and actors regarding a specific problem or goal. Similarly, participant refers to actively or passively involved in the participatory process, independent of position, power or role (Carr, Blöschl, and Loucks 2012). In this context, this definition fits with the design of participatory processes in River Basin Committees, a space where different actors and stakeholders can discuss and articulate together on addressing river basin-related decisions.

2.1.3 Typology of Public Participation

During its history and development, the term 'participatory' has become loaded with ideological, social, political, and methodological meaning, engendering different interpretations (Lawrence 2006). Consequently, diverse typologies have been developed through the years to understand these different interpretations and contexts. Reed (2008) summarized these typologies in four groups based on their differentiation criteria (Table 1). These typologies can be used as a priori to choose a suitable participatory method or be used post-hoc to categorise the occurred type of participation (Reed 2008).

Table 1: Basis for Typologies of participation
Source: author's elaboration, derived from Reed (2008)

Basis for typology	Example
Different degrees of participation on a continuum	Arnstein (1969); Davidson (1998)
Directions of communication flow	Rowe and Frewer (2000)
Theoretical basis (normative and pragmatic)	Beierle (2002)
Objectives of participation	Tippett, Handley, and Ravetz (2007)

Sherry Arnstein (1969), in her seminal article 'Ladders of Participation' (Figure 1), points to the importance of distinguishing between different formats of citizen participation according to the publics' empowerment degree (Webler 1999). In a continuum of increasing citizenship involvement, each rung of Arnstein's ladder of participation corresponds to the extent of citizen power in determining the decision-making process. The lower rungs of the ladder - *'manipulation'* and *'therapy'* – represent the degrees of non-participation, where the ones who detain power try to educate or cure participants and impose their intentions, including them, without allowing actual involvement in the discussions. The middle rungs – *'informing'*,

'consultation' and *'placation'* – represent the degrees tokenism, which means that participants get informed and have the chance to comment and be heard about an intervention, giving to the power-holders an input about the topic, but with no guarantee that their suggestions and concerns will have a true effect in the decision. Finally, the upper three rungs - 'partnership', 'delegated power', and 'citizen control' – represent the degrees of citizen power; the participants have the power to negotiate, share responsibilities, and actively influence the decision-making process (Arnstein 1969).

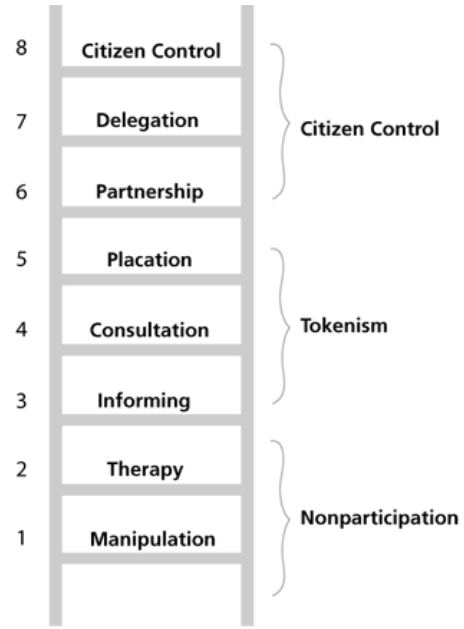

Figure 1: Eight Rungs on a Ladder of Citizen Participation: from passive dissemination of information ('manipulation') to active engagement ('citizen control')
Source: Arnstein (1969)

Based on Arnstein's allegory, Wiedemann and Femers (1993) developed a revised ladder of public participation, linking the degree of involvement with the level of access to information and civic right's in the decision making process. Pretty's (1995) typology classifies participation according to the participants' degree of involvement in activities and control over outcomes, ranging from manipulative to self-mobilised. Michener (1998) classified participation as observing if it is whether people-centred or planner-centred. Carver (2001) adapted Arnstein's work on a ladder of e-participation, with each rung depicting public services availability. The European Water Framework Directive (EU-WFD) considered three principal forms of participation with an increasing level of involvement: information supply, consultation and active involvement. Fung (2006) extended Arnstein's Ladder, conceptualising participation in three dimensions: who participates, how they communicate, and how much authority and power they have.

Although the hierarchical structure of a ladder in these metaphors implies that the preference of higher over lower rungs, different levels of engagement are likely to be more appropriate depending on the context and the project objectives (Richards, Blackstock, and Carter 2004; Tippett, Handley, and Ravetz 2007). Scott Davidson (1998) proposed a "wheel of participation" as

another metaphor that emphasises legitimacy on different extents of engagement and minimises associated ambiguities with the consultation.

Rowe & Frewer's (2000) typology focuses on nature rather than the degree of involvement; they used the directions of communication flow between parties to identify public engagement types. Some typologies concentrate on the theoretical basis, distinguishing participation as normative, focused on processes and suggesting the democratic right that people have to participate in the decision-making process; and pragmatic, focused on participation as a mean to an end, with the potential to deliver high-quality decisions (Reed 2008).

For this study, it is important to adopt the literature on typologies of participation to help examine and evaluate it in the case study area. Therefore, the results are presented in Chapter 5.2 and discussed in Chapter 6.

2.1.4 The Participation Process

Participatory processes are broadly defined for this research as methods and activities that engage and achieve active participation by the public and/or stakeholders, often encountered in river basin management in its decision-making process (Carr 2015). Approaches to participation have been progressing in the last decades: from awareness-raising in the 60s to a contemporary post-hoc consensus over the best practice of participation (Reed 2008). Participation is presumed to ameliorate natural resources management through different mechanisms, which can be categorised into three groups: (1) by providing space for deliberation, (2) by mobilising and developing social capital for better quality on decisions and implementation, and (3) by raising legitimacy of decisions for their better implementation (Carr 2015).

Wesselink et al. (2011) summarized the idea of public participation design in three rationales – normative, substantive, and instrumental – that could be identified by answering three questions: *who, what and how is included?* (Table 2). The term "public participation" encompasses a range of methods designed to include, involve, and inform the public, allowing those affected by a decision to influence it (Smith 1993).

Table 2: Participation rationales and participation design choices
Source: author's elaboration, derived from Wesselink et al. (2011)

	Normative	Substantive	Instrumental
Who is included?	those who have a stake (stakeholders)	- those who have additional knowledge	- those who have blocking power or are needed for implementation
What is included?	- participant's views and concerns	- policymakers' concerns; all knowledge and views	- policymakers' concerns; selected knowledge and views
How is it	- in all stages and issues	- only when it adds substantive value	- only when it ensures smooth implementation

included?

Various methods and guidelines come under the public participation categorisation, varying from elicit information input to elicit judgemental and decisional input from which actual policies can be derived (Rowe and Frewer 2000). In Table 3, Rowe & Frewer (2000) summarily described the key features of eight of these approaches.

Table 3: Some formalized Public Participation Methods
Source: author's elaboration, derived from Rowe & Frewer (2000)

Method	Characteristic
Referenda	- The vote is a choice of one of two options; - All participants have equal influence; - Binding outcome
Public Hearings/Inquiries	- Agencies presentations regarding plans in an open forum - The public may voice an opinion, but with no direct impact on recommendations
Public opinion survey	- Often enacted through a written questionnaire or telephone survey; - Involve a variety of questions - For information collection
Negotiated rulemaking	- A working committee of stakeholders representatives and sponsors - Consensus is required on a specific question
Consensus Conference	- Panel with independent facilitator questions expert witnesses - Open meetings to the wider public - Conclusions made via report or press conference
Citizens' Jury	- Panel with independent facilitator questions expert witnesses - Generally, no open meetings to the wider public - Conclusions made via report or press conference
Citizen advisory committee	- A sponsor convenes a group to examine some significant issue - Interaction of public with industry representatives
Focus Group	- Free discussion on the general topic with recording - Little input from the facilitator - Used to assess opinions or attitudes

The success and failure of the particular method will stem from how it is applied, with the structural features of the general mechanism limiting or enhancing the effectiveness of the participation (e.g., the presence or absence of a mediator in a group process).

2.1.5 Benefits and Limitations of Participation

Participation in water resources governance has gained increased attention over the last decade. Key water policy and sustainable development documents emphasise stakeholders' role and public engagement in water management (e.g. European Water Framework Directive and The Dublin Statement on Water and Sustainable Development) (European Comission 2003; Tippett, Handley, and Ravetz 2007; Carr et al. 2012). Worldwide, the inclusion and enhancement of non-state actors participation in environmental decision-making has been seen as a key strategy to a lack of effectiveness on environmental policy (Newig and Fritsch 2009). Several ideas and theories emerge from the literature on how participatory processes can help environmental stewardship on social-ecological systems (Stringer et al. 2006).

Scholars have identified a diverse range of participation benefits, from increasing legitimacy of decisions to the development of participatory and representative democracy (Fiorino 1990; Renn, Webler, and Wiedemann 1995; Beierle and Cayford 2002). Many of these benefits are linked to the inclusion of participants in the decision-making process. To a certain extent, they have driven the widespread incorporation in national and international policy levels (Reed 2008). The general perception about participation ensures that relevant interests are heard within a more open and integrated government, leading to more innovative and well-informed decisions (Dougill et al. 2006). The usual arguments for participation include its contribution to the legitimacy and the public acceptance of governance processes and outcomes, the inclusion of local knowledge in decisions and plans, the resolution of conflicts, and marginalised groups' empowerment (Wesselink et al. 2011).

Normative claims focus on benefits for democracy, citizenship, and equity (Reed 2008). Participation includes relevant stakeholders marginalised in the decision-making process, promoting active citizenship (Martin and Sherington 1997). For Richards et al. (2004), when participatory processes are transparent and consider conflicting claims, it can build public trust in decisions and civil society. Environmental decisions are more likely to be perceived as holistic, fair, and accountable through a participatory approach (ibid.). It is also argued that participation can empower stakeholders through knowledge co-generation and capacity building (Okali, Sumberg, and Farrington 1994; Reed 2008; Wallerstein 1999). It may promote social learning, legitimacy, and the development and transformation of new and existing relationships, as individuals have the chance to learn about each other’s views, experiences and contexts (Pahl-Wostl and Hare 2004; Stringer et al. 2006).

Pragmatic claims focus on the benefits related to the quality and durability of participative environmental decisions (Reed 2008). First, it is argued that participation enables better adaptations of instruments and measures to social-cultural and environmental decisions (ibid.), therefore enhancing adoptions among target groups (Martin and Sherington 1997; Reed 2007). Second, it is argued that participatory processes can lead to higher quality decision-making, as they can be based on complete context-based information, anticipating and enhancing unexpected negative outcomes (Fischer 2000; Beierle 2002; Koontz and Thomas 2006; Newig 2007). Third, by establishing trust and legitimacy between stakeholders, the participatory process

may lead to a sense of ownership and, depending on the nature of the initiative, to a significant reduction of implementation costs (Richards, Blackstock and Carter 2004; Reed 2008).

Participatory governance can promote social outcomes, such as trust, legitimacy and social capital. According to Goodwin (2003), the concept of capital is broad and has different meanings. For better understanding, it can be differentiated into five kinds of capital: financial, natural, produced, human and social. Financial capital facilitates economic production; natural capital is made up of natural resources and ecosystem services; produced capital is the physical asset created by humans' productive activity; human capital refers to the productive capacity of an individual acquired through education and training; and social capital consists of a stock of trust, mutual understanding, shared values and social held knowledge (ibid.).

Scholars have demonstrated successful collaborative efforts in developing social capital (Leach and Sabatier 2005; Lubell 2005). Putnam (1993) refers to social capital as "the features of social organization, such as trust, norms, and networks that can improve the efficiency of society by facilitating coordinated actions." (p. 167). Thus, it can be argued that in a given social context, higher social capital leads to lower transactions costs needed in the provision of public goods (Pahl-Wostl et al. 2007). Social capital efficiency in programs based on participatory governance and collective action has made social capital a keystone for sustainable development policies (Ballet et al. 2007).

Despite its diverse techniques and benefits, public participation has various constraints as well. For example, the process can be time-consuming and expensive, reinforce the traditional power structures, intensify existing conflicts, and be perceived by its participants as ineffective, which can cause frustration and a decrease in engagement and involvement of some stakeholder groups (Renn, Webler, and Wiedemann 1995; Reed 2008; Newig and Fritsch 2009a; Wesselink et al. 2011).

Participation is not a panacea for the challenges of common good governance; it can lead to increased conflicts between stakeholders and disillusionment with the government (Grant and Curtis 2004). Kothari (2001) stated that the empowerment of marginalised groups might bring unexpected and negative interactions among the existing power structure; the most visible, vocal or wealthiest individuals are allowed to participate, without attempts to identify less vocal people. In addition, the existence of non-negotiable actors with veto power can limit the extension of the participatory process capability to empower participants to influence the decision, and the insufficient expertise of some stakeholders to meaningfully engage in highly technical debates can lead to decreasing levels of engagement and risk the credibility of participation (Broad et al. 2007; Reed 2008; Fischer and Young 2007). Besides, the lack of trust in authorities and the belief that their input will not be taken seriously can undermine the process.

Participatory processes are time-consuming and entail costs at all levels: to the participants and organisers. Time and money are needed to ensure inclusiveness, empowerment, transparency and equity; to bring all stakeholders into the decision-making arena. Therefore, the lack of these resources can culminate in the underrepresentation of more vulnerable stakeholders due to the lack of resources (money or time) (Carr 2015; Reed 2008; Richards, Blackstock, and Carter 2004;

Irvin and Stansbury 2004; Oakley 1991). Despite these and other constraints, participation is increasingly promoted and enforced and an environmental management strategy (Innes and Booher 2004).

2.2 EVALUATION OF PUBLIC PARTICIPATION IN WATER MANAGEMENT

In order to develop effective participation strategies and programs, the evaluation of participation processes is important to identify the process's strengths and weaknesses and assess participation status in a project (Chess and Purcell 1999; Beierle 1998). Evaluation is also part of an evolving learning cycle with the potential to identify areas of improvement (Richards, Blackstock, and Carter 2004). Finally, continued evaluation is crucial to identify and understand the potentialities of what participation can achieve (Carr et al. 2012). As with any other process, public participation's success is led by a set of criteria.

Patton (1997) argues that evaluation processes call for clear criteria, selected according to the evaluation's type and objectives. However, participatory processes' multi-objective and complex nature engenders challenges and problems in establishing and operationalising criteria for developing and validating evaluation frameworks (Blackstock et al. 2007). Carr et al. (2012) organized and analysed how researchers have assessed participation programmes and projects in a detailed literature review. According to its findings, participation in water management can be evaluated regarding the process and/or outcomes (ibid.). A dynamic framework was developed from this review to capture and link together five stakeholder participation features (Figure 2).

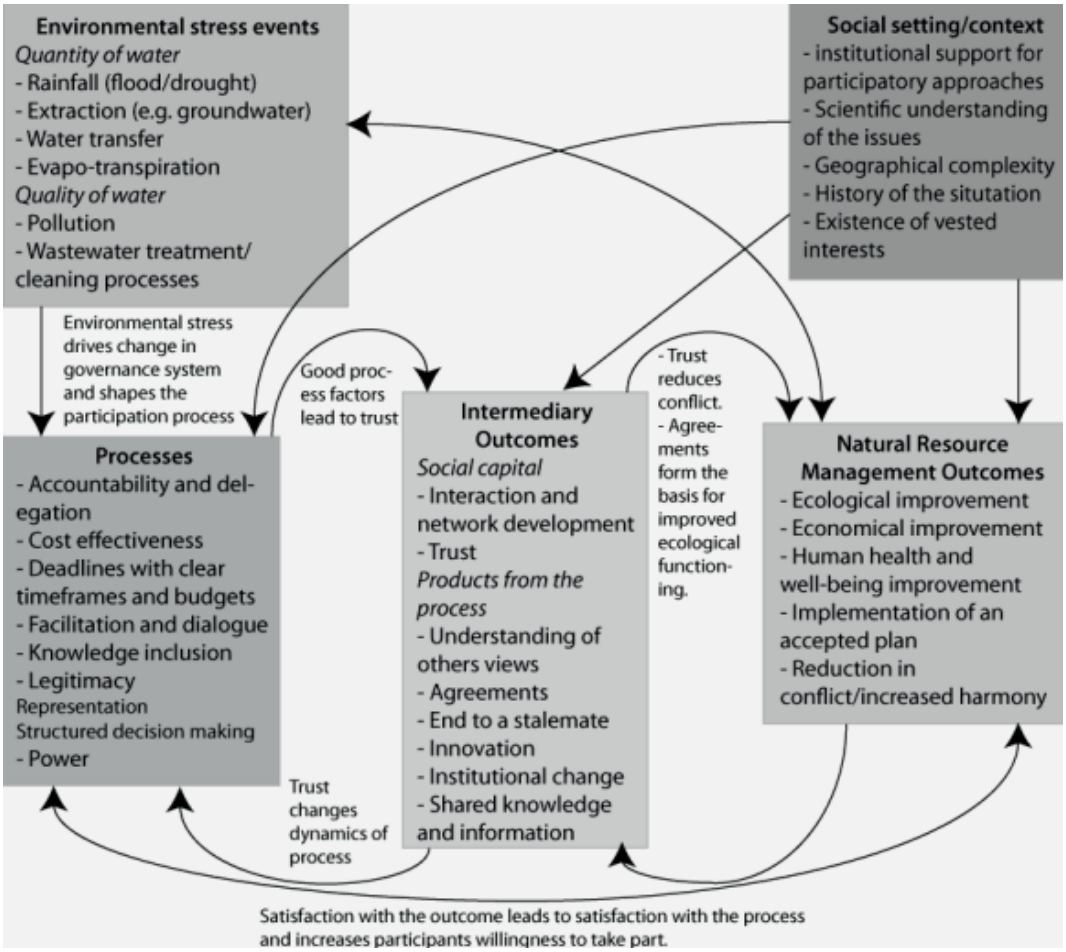

Figure 2: Framework for evaluating drivers, processes and outcomes of stakeholder participation
Source: Carr et al. (2014)

The framework follows a model where an environmental stress event and social settings lead to the stakeholder participation process's specific characteristics, resulting in intermediary outcomes (non-tangible) and resource management outcomes (Carr et al. 2014). Furthermore, evidence suggests that some good participation process features are positively correlated to the achievement of intermediary outcomes (ibid.; Newig and Fritsch 2009).

Another important feature of this framework is the addition of Context Evaluation to the model. Many researchers have already drawn the importance of the context in determining the process and its outcome, recognizing that different political, social, and cultural contexts require different process designs (Beierle 1998; Rowe and Frewer 2004; Newig and Fritsch 2009b). Context attributes can be described as outside the participant's control, such as technical capacity, geographical complexity and historical background (Beierle and Konisky 2000). Some context factors seem to be more significant than process factors in achieving resource management outcomes; in a case study analysis, it was found that some context variables (e.g. degree of issue complexity) were more significantly related to environmental outcomes than process factors (Newig and Fritsch 2009b; Carr et al. 2012). Beierle and Cayford (2002) applied an evaluation framework based on the context, process, and outcomes of achieving social goals. Their analysis of 239 cases of participation in common good decision making found that some process factors,

rather than context, determined to which extent participation achieved some social goals[1] (Carr et al. 2012).

2.2.1 A Conceptual Framework for an evaluation of Public Participation in River Basin Committee

For this study, participation is analysed by evaluating the process and intermediary outcomes of the participatory processes (i.e. plenary meetings), focusing on a set of criteria. Context is a critical factor integrated into the evaluation framework for this thesis (Figure 3).

This Evaluation framework attempts to asses public participation at the Velhas River Basin organization by linking the participation process to its intermediary outcomes. This framework was applied empirically throughout this research as a conceptual framework, and its results can be found in Chapter 2.2.1.

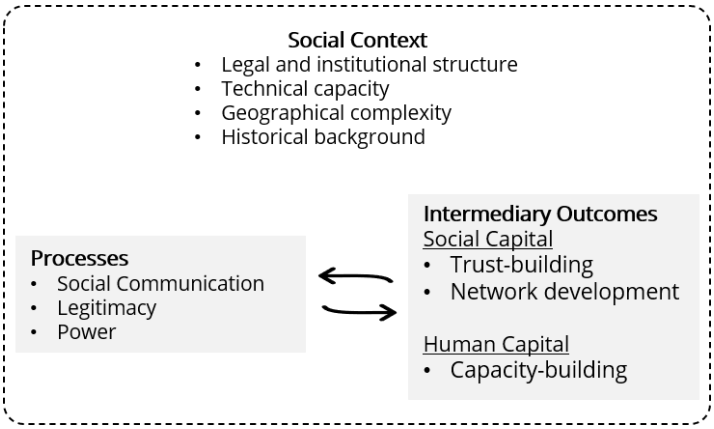

Figure 3: Framework for analysing participation in this thesis.
Source: Author's elaboration, adapted from Carr et al. (2014)

2.2.1.1 Process-Evaluation

Process evaluation focus on the quality and design of the process (Beierle and Konisky 2000). Renn and Webler (1995) developed one of the first process evaluation frameworks based on Habermas's ideal speech concepts; reaching a consensus is part of a utopic ideal speech situation, in which everybody is free to discuss and question each other's assumptions and power imbalance does not exist (see also Webler 2002). Renn and Webler's framework identified two primary criteria for good participation: fairness and competence (ibid.). Further, the criteria were extended to include more specific aspects of these criteria; transparency, accountability, access to resources, cost-effectiveness, communication flow, etc. The water sector is typically state-

1 "Social goals are those goals which transcend the immediate interest of the parties involved in a decision. The benefits of achieving them spill over from the participants themselves to the regulatory system as a whole." (Beierle 1999 p. 81). Social goals include: (1) Educating and informing the public; (2) Incorporating public values into decision-making: (3) Improving the substative quality of the decision: (4) Increasing trust in institutions: and (5) Reducing conflitcts (ibid.).

managed, so some of these process characteristics are especially relevant to the water sector, such as legitimacy, power and social communication (Carr et al. 2012).

Legitimacy

In European policy, public participation in environmental decision-making is expected to increase legitimacy (Newig and Fritsch 2009b). According to Webler et al. (2001), a process is legitimate if it is open, uses consensual decision-making, is evidence-focused rather than political motivation, and is not arbitrarily interrupted with a premature sunset date. Legitimacy is also based on how well the process manages conflicts, avoiding the processes to collapse into heightened personal and political disagreements and interests (ibid.). Representativeness is also an important characteristic of legitimate processes; the public participants should involve a broadly representative sample of the affected public (Rowe and Frewer 2000).

Power

The promotion of equal power among participants and stakeholders is an important feature of a good participation process. The process should be fair and based on evidence rather than rhetoric and political power, thereby "levelling the playing field"[2] (Webler, Tuler, and Krueger 2001). Depending on the power dynamics, it is critical to deal with power asymmetry and promote power-sharing in a participatory process to avoid the marginalisation of less powerful participants, the illegitimacy of the process, and delay of implementation due to litigation (Reed 2008). Institutional arrangements can support and promote power-sharing, pointing to participation as a democratic right rather than just a normative goal (Richards et al. 2004).

Social Communication

Water resources management often involves various distinct actors and stakeholders. Facilitation and dialogue are important in integrating these multiple perspectives and providing information to improve decision-making (Carr et al. 2012). Social communication can also be used to identify and include participants values and views in the discussion arena, which could be used and incorporated to determine the ideal outcome of the decision process (ibid.). In a good participation process, facilitation should be impartial, dynamic and strive to find a common interest; and dialogue should be a space of exchange where people feel comfortable to share their ideas, needs, values and concerns (Beierle 1998; Rowe and Frewer 2000; Webler et al. 2001; Pahl-Wostl et al. 2007; ibid.).

2.2.1.2 Intermediary Outcome Criteria

Intermediary outcomes describe some outcomes that may not have been the ultimate goal of a participation process, and they can be seen as important side-benefits of the process (Carr et al., 2012). These outcomes can be identified in the goal-free evaluation, and they do not relate directly to a change in resource management when evaluated, but they may be essential to achieve resources management improvement (Beierle 1998; ibid.; Koontz and Thomas 2006).

[2] According to Webler et al. (2001, p. 444), "leveling the playing field would mean having an open process that is strongly driven by evidence as opposed to rhetoric"

They are also related to developing important capitals within the process, especially social and human capital.

The relative accuracy of social capital in addressing complex issues results in it being considered a made-to-measure terminology for analysing common goods management and governance (Ballet et al., 2007). Furthermore, Pretty and Ward (2001) stated that although natural resources could be improved quickly with no attention to human and social capital, they are necessary for sustainable and equitable natural resources management solutions. Thus, investment in social and human capital is a must for international agencies, NGOs, banks and governments (ibid.). Accordingly, the intermediary outcome criteria can also be differentiated into two groups: social capital, with trust-building and network development criteria, and human capital, with capacity development criteria. As this set of criteria aims to analyse the intermediary outcomes (or social goals) of the participatory process at the Velhas River Basin Committee, the remaining capitals are not included in this analysis since they would better evaluate the Natural Resources management outcomes.

Social Capital

- Trust-Building

For Berkes (2009), trust appears to be a determinant of success in many collaborative management cases as a prelude to building working connections. It facilitates cooperation, reduces cost and time on monitoring between people and institutions, and engenders reciprocal trust. Trust also takes time to build and is fragile, having a great impact on the emergence of cooperative arrangements. However, in a group, individuals will increasingly invest their time in the group itself when trust is built (Pretty and Ward 2001; Lubell 2007). Trust is also associated with enabling an open and free space for dialogue which allows creative solutions and agreements; and can lead to greater acceptance of decisions and more efficient implementation (Pretty and Ward 2001; Newig and Fritsch 2009b).

- Network Development

Ecosystems are constantly changing, and humans constantly flux within this system; thus, static information base and set managers prescriptions are not entirely reliable (Ostrom 2007). Some case studies show that managing social-ecological systems often need social networks that span multiple organization levels to integrate dispersed or fragmented information from different sources. Interactions in this network generate environmental knowledge and provide memory for ecosystem management (Hahn et al. 2006). Several authors described how participation improved interactions and networks between participants in water management projects, bringing connectivity that can raise the capacity for knowledge sharing, engagement and collaboration. Two forms can express network development: bridging, whereby new connections between individuals and networks are created, and bonding, whereby existing relationships are strengthened (Berkes 2009; Carr et al. 2012).

Human Capital

- Capacity Building

According to Beierle and Cayford (2002), within public participation in environmental management, capacity is "the public's ability to understand environmental problems, get involved in decision making and act collectively to implement the change" (p. 13). The definition of success in participatory projects needs to include social capital benefits and the participants' benefits, such as building capacity for the future or increasing knowledge of complex environmental issues (Tuler and Webler 1999; Grant and Curtis 2004). The involvement of stakeholders in creating the vision and strategy for natural resources management ensures that management plans and actions are better informed and accepted, and enhance stakeholders' capacity to solve future issues (Grant and Curtis 2004). Capacity building develops relationships and skills important for participants to engage in the current and future processes and is one of the pre-conditions for enabling transformative personal and institutional change (Blackstock et al., 2007).

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3 METHODOLOGICAL FRAMEWORK

3.1 RESEARCH DESIGN

3.1.1 Single Case Study Approach

This research focuses on public participation in river basin management, with an in-depth case study on the Velhas River Basin Committee in Brazil. The nature of this topic is appropriate for a case study approach, which methods fulfil due to its applicability when dealing with contemporary issues and behavioural events that are out of the researcher's control. The case study design is also explorative and inductive, favourable for qualitative research (Yin 2009). Qualitative methods have been widely applied in environmental management research since they facilitate the capture of meanings, interpretation and analysis more easily (Jabbour and Balsillie 2003)

In his work, Yin (2009) suggests that case study research is proper for a broad investigation of a research topic, covering contextual or complex conditions rather than just isolated variables and relying on various sources of evidence. Besides, social theoretical concepts guide the case study research (ibid.). In this case, the leading concept is public participation in river basin management and water governance, which incorporates propositions on legitimacy, power, social communication, human and social capital. Therefore, a case study method is a suitable research framework; public participation in watershed management is a contemporary phenomenon within the river basin's real-life context. Thereby, there is the exploration of situations (e.g. participatory activities) with no single clear set of outcomes.

Furthermore, a single case study allows researchers to retain meaningful and holistic characteristics of real-life events with distinctive insights, so its use is recommended (Yin 2009; Silverman 2015). It also allows the discussion of theories in a particular context. So, the empirical results of the research will be compared with previous theories and findings (analytical generalisations) rather than to quantified frequencies (statistical generalisation) (Yin 2009).

The research was designed as a single-layered case study with one unit of analysis: public participation (context) at the Velhas River Basin Committee (unit). The scientific identification of literature on the participatory approach in water governance supported the theoretical and conceptual framework and the research design. The theoretical framework includes the scope for analysis and indicated the variables and indicators for data collection (section 2.2.1). Thus, the basis for public participation in river basin management contextualisation is fundamental for the case study design shown in Figure 4. Furthermore, contextual information was integrated as it is a critical factor that should be integrated into any analysis and evaluation to understand the situation's underlying structures (Carr et al. 2012).

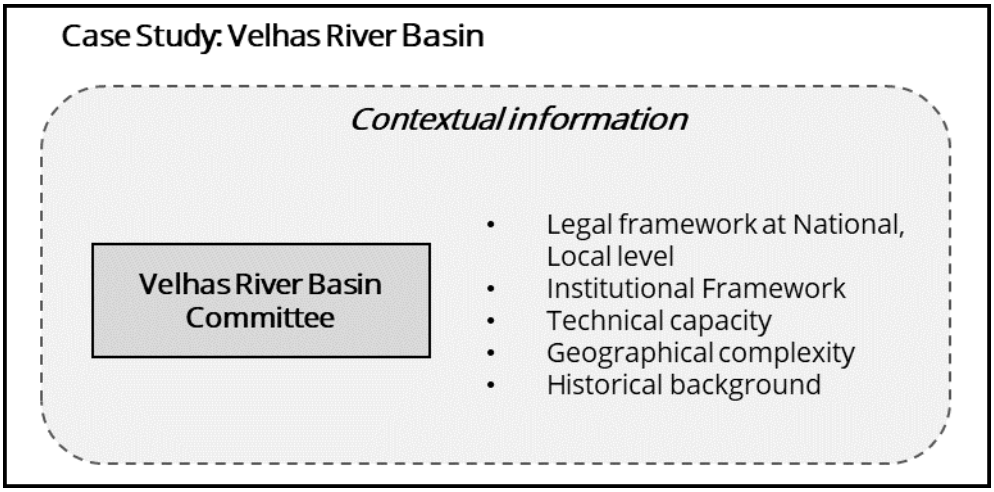

Figure 4: Case Study Design
Source: own elaboration, derived from Yin (2009)

This research study was conducted in two main steps over the research period. In the first step, data were collected via primary - survey questionnaire and Interviews, official documents; and secondary source – Secondary literature review. In the second step, the collected data was examined and assessed, resulting in the inferences on the case study (Figure 5).

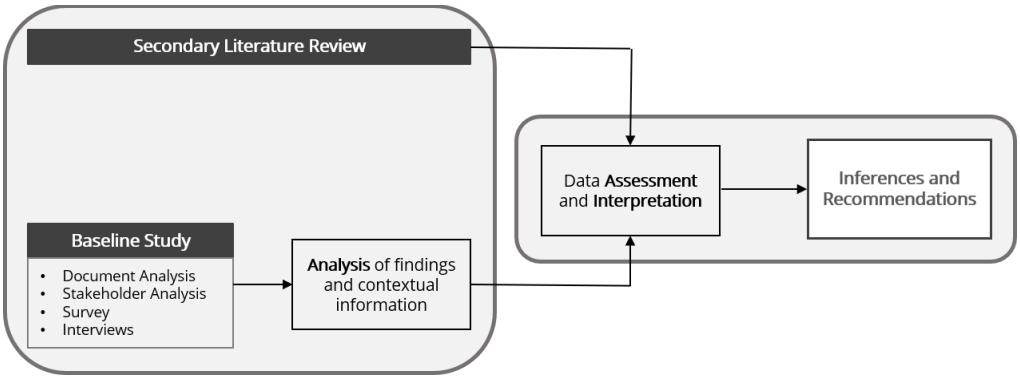

Figure 5: Working steps of the research.

3.2 DATA COLLECTION

3.2.1 Literature Review

In the public participation process research field, a literature review is an important method applied for data collection, with many researchers applying this methodology as their main source of data collection (see Beierle and Cayford 2002; Reed 2008; Carr et al. 2012). It is an economical and easy to access method that requires no collection or processing and provides a vast amount of information (s.g. historical insights) that would not be provided by other research methods (Ritchie and Lewis 2003). In this thesis, a desktop scholarly literature review was conducted throughout all three research stages: before, during and after research conduction.

Different data sources were used, and a theoretical framework was derived from a systematic selection of scholarly literature, especially using online databases such as Scopus and Google Scholar with keywords related to “water governance”, “river basin management”, “river basin committee” and “public participation”. This documentation amounted to around 80 documents, and this data was a major contributor to sourcing evidence for the case study data collection (Yin 2009). The literature review was mostly derived from secondary sources, including academic publications and institutional reports. In addition, primary literature was also accessed, such as project reports, government statistics, official governmental documents and institutional documents.

Secondary scientific literature review facilitated the introduction to the specific topic and supported the development and preparation of the research design and methods. It also supported the interpretation and contextualisation of the results and their discussion. Relevant printed and online material related to the topic of public participation, river basin management and water governance was selected and accessed for literature review. This text material also provided theoretical and contextual information for stakeholder identification and categorisation, institutional structures, policy framework and other settings.

3.2.2 Survey Questionnaire

A survey questionnaire was employed as a quantitative approach. For this research context, a survey questionnaire is a methodology that seeks categorical rather than numerical responses, on which it relies qualitative evidence and contextual data (Yin 2009). The variables for the applied survey were derived from the theoretical framework presented in Chapter 2 and baseline surveys. In this thesis, the survey focused on two main concepts and related indicators, as shown in Table 4.

Table 4: Variables set of the survey questionnaire.

	Variables	Indicators	Context Variables
Independent	• Characteristics of the process	- Legitimacy - Power - Social Communication	· Age · Gender · Ethnicity · Education · Occupation · Institutional Interests · Stakeholder cluster · Frequency of participation
Dependent	• Intermediary Outcomes from the process	- Trust-Building - Network development - Capacity Development	

The survey variables were based on a literature review and selected according to previous research on participation at the CBH-Velhas, which can be found in Chapter 2.2. The criteria

provided an evaluation framework that simplified and homogenized the data collection. This research will supplement the quantitative data with narratives to explain the perspectives revealed by the survey (Carr et al., 2012). The thematic of the questions grouped the survey's questionnaire. The complete questionnaire can be found in Appendix A.

Demographic Profile: The questionnaire started with personal and professional questions, providing contextual information to help define the respondents' demographic profile.

Process-based criteria: The second part of the questionnaires was related to the characteristics of the participatory process in the CBH-Velhas, such as power, legitimacy and social communication.

Intermediary outcomes criteria: The third part of the questionnaire was related to the intermediary outcomes of the participatory process in the CBH-Velhas, and it was checked through questions on trust-building, network development and capacity building.

The survey was applied via the online platform Google Forms in Portuguese. A 5-level Likert scale was used to limit binary answers and provide a clearer perception of the analysed indicators. The online questionnaire was open from February 2021 until March 2021 (two months). The survey's respondents were contacted first via a YouTube comment section in an On-line Plenary meeting in February (24.02.2021) and later directly via e-mail.

The survey's target group was the elected CBH-Velhas members and their alternates; 28 official members and 28 alternates. Although the original target was the general public, the COVID-19 restrictions have made it necessary to adapt the target group due to the lack of communication channels with the non-member's participants of the CBH-Velhas meetings. As a result, nine responded to the survey questionnaire from 56 people, representing 16% of the target population. Furthermore, although gender and representative clusters were originally attempted to be targetted in a balanced way, it was opportunistic depending on who was willing and agreed to participate in this research. Therefore, the selection is not quantitatively representative but is adequate for the qualitative aspect of this research.

3.2.3 Interviewing Techniques

A total of three interviews were conducted with respondents of the survey by the researcher. Stakeholders and key informants of different clusters (state government, municipal government, water users and civil society) were the targets for the participatory process analysis. A priori, the interview was designed as data collection for further triangulation and validation of the survey and literature review data. The interviews were semi-structured; questions were added depending on the respondent's answer. The open pool questions can be found in Appendix B. The interviews were used to broaden the knowledge of the management and current situation on the CBH-Velhas participation processes. The interviewees were first contacted via e-mail to confirm an appointment and then conducted in Portuguese via videoconference in Zoom. The average time of each interview was of 60 minutes.

Two of the three interviews were performed via Zoom and recorded with the interviewee's authorization. The content was transcripted via Microsoft Office software in the original language

(Brazilian Portuguese). Due to the conflict of schedules and timezone, the third interviewee sent her interview in written form in a PDF. Unfortunately, no member of the Municipal Government cluster demonstrated interest in participating in the discussion.

3.3 DATA ANALYSIS

The main process of analysis in this thesis is an analytical generalisation. The primary database for this work is text material, with quantitative and, mainly, qualitative data. This documentation includes existing documents, such as reports, proclamations and scholarly papers. They were consulted for pertinent and contextual information. Document analysis was performed; these data were selected, organised, appraised, synthesised and presented in narrative and graphic form (Bowen 2009). The document analysis combined the national and local level analysis, the case study analysis, and interviews transcripts.

The empirical data was evaluated in two ways. First, the survey analysis was concentrated on descriptive statistics using Microsoft Excel. Although this analysis is not general for the entire universe in river basin management, this assessment can indicate a tendency among the sampled participants of the participatory process at the Velhas River Basin Committee.

The first level of analysis is Brazil, with contextual information on national policy and governance and secondary literature review from historical records and scientific literature to gain a holistic view of water legislation and governance. First, the national political analysis included identifying federal policies, legislation, and other political instruments. Then, they were analysed by searching for exact keywords related to "water governance", "water law", "river basin/water/watershed management", "river basin committee", and "bulk water charging" in Portuguese and English. The complete analysis can be consulted under chapter 5.1.

The second level of analysis is the local level of analysis, the Velhas River Basin Committee. Historical and official records and scientific literature were gathered to build contextual information at the local level. An in-depth analysis followed a set of criteria related to the participatory process and its intermediary outcomes. The data was gathered from literature-based information and survey and interviews with stakeholders and key informants, directly and indirectly, involved in the participatory processes at the CBH-Velhas. The criteria used in this analysis is explained in section 2.2.

Figure 6: Levels of the research analysis

In recent years, an increasing number of researchers have chosen a mixed-method approach, including the qualitative and quantitative approach to the study design. This mixture of processes supports this thesis's triangulation process, as shown in Figure 7 (Ritchie and Lewis 2003). Triangulating data can be provided "a confluence of evidence that breeds credibility into the research" (Eisner 1991, p. 110). In addition, triangulating different methods can provide findings from across data sets, thus reducing potential biases impacts that can exist in a single study (Bowen 2009). Reliability and validity are concepts that help to establish the truthfulness, credibility and believability of findings (Neuman 2013).

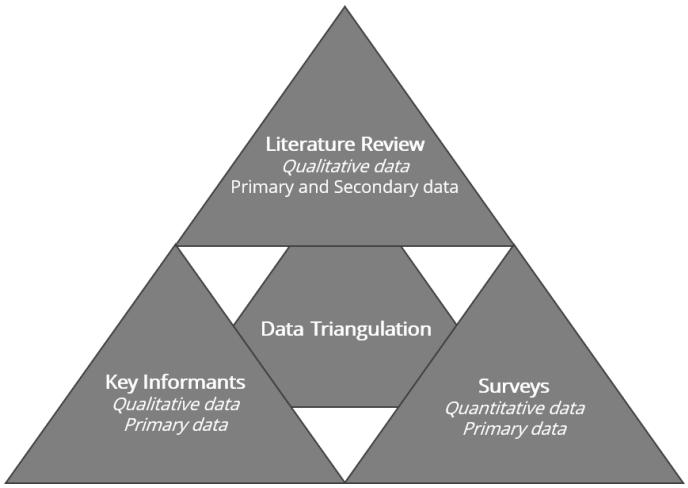

Figure 7: Data triangulation of this thesis

3.4 RESEARCH ETHIC

The research ethics complied with the Brazilian legislation guidelines since the research and primary data source are situated in Brazil. Furthermore, this study followed the TU Dresden regulations. The involved people were informed about the topic and process of the research at every contact moment to promote transparent and valid data collection.

The application of the survey questionnaire was carried out without the identification of the respondents, anonymously and voluntarily. The questions were impersonal, and the respondents' data was aggregated and stored in a database, without the possibility of individual identification, following Article 1, items I - V of the National Health Council Resolution number 510/2016 (Brazil 2016). Thus, meeting national and international ethical fundaments. The concept of anonymity was also applied for the interviews; the interviewees were kept anonymous. A reference was only made to the sector the respondents are affiliated with.

4 CASE STUDY: THE VELHAS RIVER BASIN COMMITTEE

4.1 THE VELHAS RIVER BASIN

The Velhas River Basin is located at the central region of Minas Gerais state, located between longitudes 43°25' and 44°50' East and between latitude 17°15' and 20°25' South (Figure 8). The Velhas River Basin is part of the São Francisco River Basin in Brazil and covers a drainage area of 27,850 km². The basin is bounded to the southwest by the Paraopeba river basin, to the west Sao Francisco River, to the north by the Jequitaí and Pacuí River Basin, to the northeast by the High Jequitinhonha river basin, and by the Doce River Basin to south and southeast (CBHRV, 2015). The name Velhas[3] river was probably given in by governor Antônio de Albuquerque Coelho de Carvalho in 1711. The Velhas river takes its primary source from the Andorinhas waterfall, in Outro Preto, at approximately 1,500 m, and flows north-westward 806,84 km into the São Francisco river Barra do Guacuí at an altitude of 478 m (CBHRV 2015).

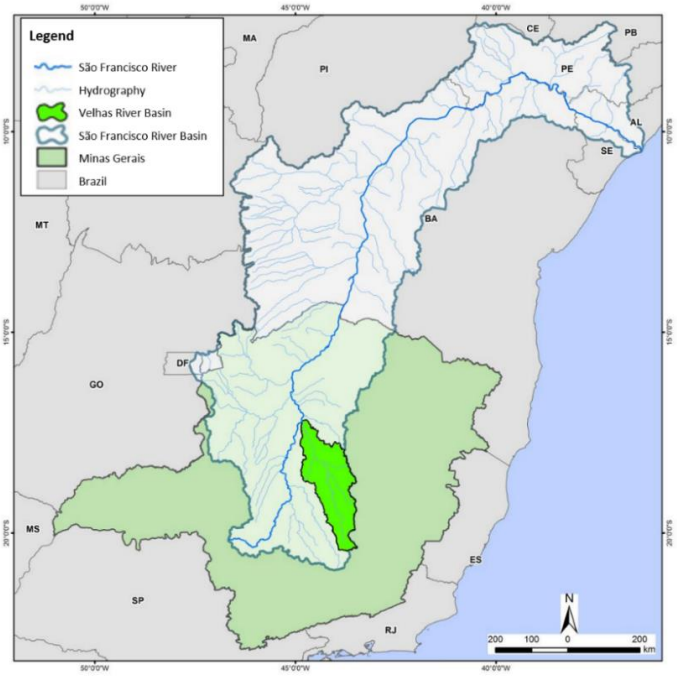

Figure 8: The Velhas River Basin, map of the study area in the context of the São Francisco River Basin and Minas Gerais
Source: Adapted from CBHRV (2004)

The administrative structure of the Velhas River Basin can be described as rather complex. The basin spans over 51 municipalities, including the state capital Belo Horizonte, Brazil's third-largest city. However, some municipalities' borders mismatch the river basin's borders, resulting in a problem of fit. In a regional context, these municipalities account for 24.7% (28.1% of the urban population) of the Minas Gerais population, with 4.4 million inhabitants, contributing 62% of the provincial PIB (IBGE 2010; CBHRV 2015).

[3] The river had the original indigenous name of UAIMII, changed to GUAICHUI, which means "River of the old descendant Tribes". In Portuguese, Velhas can be translated as the adjective "old", hence Rio das Velhas can be translated as "River of the old" (CBHRV, 2004).

The settlement history in Minas Gerais is strongly related to mineral extractions in the region. The Bandeirantes[4] found gold and precious stones in the region, initiating the basin area's occupation process at the end of the 17th century. The region's topographic, geological, and pedological characteristics led to agricultural activity implantation with tremendous success (CBHRV 2004). The region's enrichment and high occupation caused an intense and disordered industrialization process and urbanization, with consequent consolidation of the Greater Belo Horizonte (RMBH - Região Metropolitana de Belo Horizonte) (CBHRV 2004; Polignamo et al. 2004). The thereat escalated the degradation of the natural resources at the river basin. Until 2002, there were no sewage treatment plants within the RMBH, compromising the Velhas river downstream, where it runs through a large, impoverished area of extensive ranching and subsistence farming, before flowing into the São Francisco river, one of Brazil's most important rivers (Abers 2007; Abers & Keck 2009).

The basin is divided into four planning macro-regions (Table 5): Upper, Upper-Middle, Middle-Lower, and Lower Velhas river. This division considered the divergences of each region concerning environmental impacts and socio-political and cultural matters. These macro-regions are composed of 23 planning and management regions, called Territorial Strategic Unities (UTE – Unidades Estratégias Territoriais) (Figure 9), defined by Normative Deliberation in 2012 (CBHRV, 2012).

[4] Bandeirantes (Portuguese: flag-carriers) were slavers, explorers, and fortune hunters in early Colonial Brazil .

Table 5: The Velhas River Basin five macro-regions
Source: author's elaboration, derived from CBHRV (2015)

Upper Velhas River	It comprises the entire area called the "Iron Quadrangle"[5], with Ouro Preto as the southern limit; Belo Horizonte, Contagem, and Sabará are the northern limit. It consists of ten municipalities, constituting 9.8% of the Rio das Velhas Basin (2,739 km²). The Upper Velhas River has the largest population, with an expressive economic activity, mainly concentrated in the RMBH. This region has an integrated drinking water supply system with one of its main sources: Rio das Velhas, Belo Horizonte, Raposos, Nova Lima, Sabará, and Santa Luzia. The main polluting agents are the untreated industrial and domestic sewers and the effluents generated by clandestine mining activities in this area.
Upper-Middle Velhas River	The region presents a lower population concentration, with the predominance of farming and livestock activities. The Upper-Middle Velhas River has 15.4% (4,276.01 km²) of the basin of the Rio das Velhas area and comprises 20 municipalities.
Middle-Lower Velhas River	The region represents the largest portion within the Rio das Velhas Basin, with 12,204.16 km² (43.8%) and 23 municipalities.
Lower Velhas River	The Lower Velhas River is the second largest basin region (31%, 8.630 km²). Like the Upper-Middle region, this part is also characterized by its low population density and predominance of farming and livestock activities.

[5] The Iron Quadrangle (Portuguese: Quadrilatéro Ferrífero) os considered one of the richest mineral-bearing regions in the world. The region is known for its extensive deposits of gold, diamonds, and iron ore, being the source of approximately 40% of all gold produced in Brazil between the years 1500 and 2000 (Menezes et al. 2006)

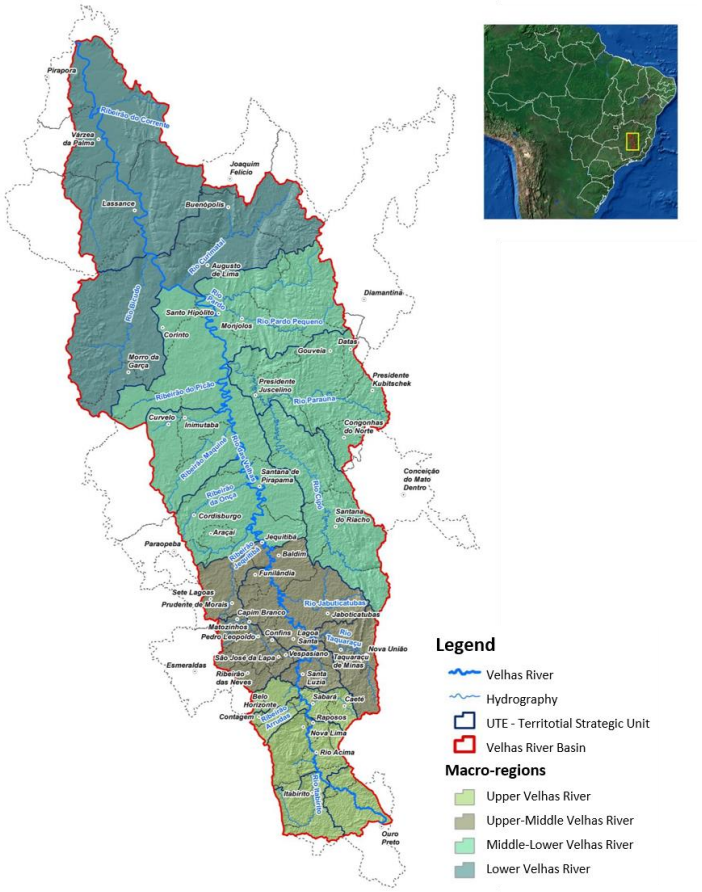

Figure 9: Velhas River Basin UTEs and macro-regions
Source: Adapted from CBHRV (2004)

4.2 THE VELHAS RIVER BASIN COMMITTEE

In the early 90s, a major World Bank funded project in RMBH financed two sewage treatment plants and sanitation infrastructure for Belo Horizonte. A condition of this loan was to formulate a water resource plan for the Velhas Basin and the establishment of a water agency to implement it (Abers & Keck 2009). However, according to state law, this new agency would only be created if approved by a River Basin Committee (Minas Gerais 1994). Thus, at the final stage of the project, the state government was rushed to find a basin committee to comply with the World Bank contract.

The Velhas River Basin Committee (CBH – Velhas - Comitê da Bacia Hidrográfica do Rio das Velhas) was created by State Decree 39.692 in 1998, governed by the Water Law and State Law n. 13.199/99 (Minas Gerais 1998; 1999; Brasil 1997). The CBH-Velhas' purpose is to promote investment programs' technical and financial viability and consolidate urban and regional structuring policy, aiming at the basin's sustainable development (Minas Gerais 1998).

According to Internal Regiment CBH-Velhas – Normative Deliberation August 05 2, 2019, the Committee institutional structure consists of the Plenary, the Directorate, the Extended Directorate, and the Technical Chambers. The Committee comprises 28 tenured members

equally distributed among three members: government, water users, and civil society. There are seven representatives of the State government, seven representatives of the municipalities appointed by the mayors, seven representatives of civil society organizations related to water resources, and seven representatives of water users, considering the participation of at least three of the following sectors: urban water supply, industry, mining, hydropower, irrigation and agriculture, waterborne transportation, and fishing, tourism, and other non-consumptive uses. In addition, each tenured member has an alternate to replace them in the event of impediment or absence, totalling 56 members. Every two years, open assemblies are held to elect these members (CBHRV 2019). Table 6 describes the current Plenary composition.

Table 6: CBH-Velhas members composition
Source: author's elaboration, derived from CBHRV 2020)

Titular	Alternate
State Government	
State Secretariat of Health	Water Supply and Sewage Services Agency - ARSAE-MG
Technical Assistance and Rural Extension Company – EMATER MG	State Secretariat of Agriculture, Livestock, and Supply - SEAPA
State Forest Institute - IEF	State Environment Foundation - FEAM
Minas Gerais Agricultural Research Company - EPAMIG	Minas Gerais Agricultural Research Company - EPAMIG
Minas Gerais Military Police - PMMG	Secretariat for the Environment and Sustainable Development
Development Agency of the RMBH - ARMBH	Institute of Historical and Artistic Heritage -IEPHA
State Institute of Water Management - IGAM	Mineiro Institute of agriculture - IMA
Municipal Government	
Várzea da Palma City Hall	Lassance City Hall
Minas Gerais Basic Sanitation Consortium - CORESAB	Morro da Garça City Hall
Curvelo City Hall	Pedro Leopoldo City Hall
Jequitibá City Hall	Funilândia City Hall
Ribeirão das Neves City Hall	Baldim City Hall
Belo Horizonte City Hall	Rio Acima City Hall
Ouro Preto City Hall	Contagem City Hall
Users	
CEMIG Generation and Transmission PLC	AngloGold Ashanti – Mining PLC
Federation of Industries of the State of Minas Gerais – FIEMG	Brazilian Mining Institute - IBRAM
Mineral Industry Union of the State of Minas Gerais - SINDIEXTRA	Vale PLC
Federation of Agriculture of the State of Minas Gerais - FAEMG	Federation of Agriculture of the State of Minas Gerais - FAEMG
Curvelo Farmer Union	Curvelo Farmer Union
Autonomous Water and Sanitation Services – SAAE Itabirito	Autonomous Water and Sanitation Services - SAAE Sete Lagoas
Water and Sanitation of Minas Gerais - COPASA	Autonomous Water and Sanitation Services - SAAE Caeté
Civil Society	
Brazilian Association of Sanitary and Environmental Engineering	Environmental Conservation Institute
Association of Residents and Producers of Family Farming	Federal Institute of Northern Minas - IFNMG
Arts and Crafts Development Association - ADAO	Community Association of Country House in Maravilha
Artistic, Cultural and Environmental Movement of Caeté	CONVIVERDE Movement
National Forum of Civil Society in Watershed Management	Association of Candy Man and Farmers of São Bartolomeu
Association for Environmental Recovery and Conservation	Association for the Environmental Protection of Mutuca Valley
Guaicuy Guaicuy - SOS Velhas River	Community Council United by Ribeiro de Abreu

The Plenary is the highest and deliberative instance, responsible for analyzing and issuing final decisions on any committee matter and comprises the 28 committee's titular members. The Directorate is composed of the President, Vice President, and Secretary. The Extended

Directorate is formed by the Directorate, plus five counsellors so that parity is maintained between the four segments of the Committee (CBHRV 2019).

The Technical Chambers (CT – Câmara Técnica) are thematic and sectoral group discussions related to regional water management and functions as an administrative and legal instrument for activities organization, including political and economic resources. There are four CTs: Permit and Charging Technical Chamber, Institutional and Legal Technical Chamber, Planning Technical Chamber, and Project and Control Technical Chamber. Each CT has two representatives of each member category. The CBH-Velhas is supported by a river basin agency called Peixe Vivo (AGBPV - Agência de bacia Peixe Vivo) recognized by Normative Deliberation n. 56, of June 08, 2007 (Minas Gerais 2007). The AGBPV is a legal entity under private law, formed by civil society (one third) and water users (two thirds). The agency enables the committee's administrative and technical structure and the bulk water charging (Sepúlveda et al. 2011; CBHRV 2019). Figure 10 presents the operational design of CBH-Velhas.

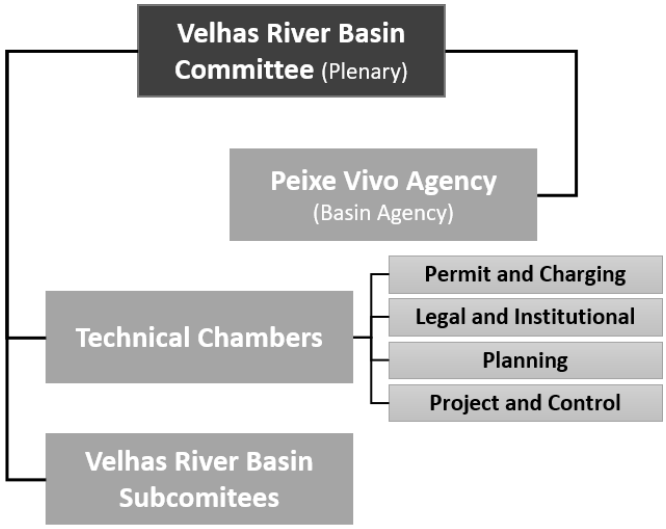

Figure 10: Operational framework of CBH-Velhas
Source: author's elaboration, derived from Sepúlveda et al. (2011)

The Subcommittees are consultative and propositional groups acting at the sub-basin level of the Velhas River basin. It follows the same model of the CBH-Velhas in its member constitution. There are currently 14 river basin subcommittees of the Velhas river tributaries, characterizing a decentralized and participative management process in the basin (CBHRV 2015). The subcommittees were created to encourage the direct participation of local social actors in decision-making processes. It brought an advance in the representativeness and articulation of sub-basins entities, promoting several actions (e.g., interventions in projects, partnership building, legal actions, fundraising, among others). Exercising its propositional and consultative purposes consolidates planning and territorial management decentralization and enables the exchange and discussion of topics from diverse sub-basins at the Plenary (Sepúlveda, Lemos and Sposito 2011; Sepúlveda 2006).

4.3 THE MANUELZÃO PROJECT

To better understand the CBH-Velhas history, it is crucial to consider the social movements active in the region. The most noteworthy is the Manuelzão Project, an extension project of the Faculty of Medicine of UFMG (Federal University of Minas Gerais). The project was initiated in 1997 as an outcome of a program[6] that sent students to work throughout Minas Gerais. Medical faculty professors added an environmental health component to the program and encouraged the interns to work with community organizations to connect water and health problems through river clean-ups and education efforts. The awakening to the importance of knowing the causes of the diseases that affected the population culminated with the emergence of the Manuelzão[7] Project focused on the Velhas River Basin due to the need to seek a way to overcome the municipals perception of their environmental issues (Abers & Keck 2009; Lisboa 2012; Projeto Manuelzão 2009).

In the first years, the project worked in a set of "Manuelzão Committees" at the municipal and community level, gathering key locals such as teachers, business and community leaders, civic organizations, and politicians. Each committee had a specific objective, depending on the most urgent problem in the region. These committees became a virtual network of mini stakeholder councils and, until 2007, were counting more than 80 committees in the Velhas River basin (Abers & Keck, 2009). However, the Manuelzão project quickly became a more extensive civil society program, with a scope of health and citizenship promotion and river protection in the river basin, with multidisciplinary projects ranging from eco-tourism to environmental education. In addition, the project supplied researchers to investigate water problems, legal assistance to support denouncements, and events organization (Abers 2007; Abers & Keck 2013).

In 2001, Manuelzão had 14 sub-projects with funding from the federal government and the state water and sanitation company (COPASA-MG). In addition, the project had many larger partnerships in the river basin, mostly with state agencies of the environmental and sanitation sector. With a vast umbrella of activates backed by these agencies, this partnership was beneficial for everyone: the state agencies had access to local organizations and improved their image with the community, local leaders took part in the Manuelzão committees and gained legitimacy by integrating the project, and the Manuelzão project strengthened its influence sphere, attaching its name to various activities (Abers 2007; Lisboa 2012).

Since 2000, the Manuelzão Project has been legally organized as Instituto Guaicuy - SOS Rio das Velhas/ Manuelzão Project, already recognized as a Civil Society Organization of Public Interest by the Ministry of Justice in 2002. Abers (2007) argues that much of the project's success comes from disseminating a new frame for environmental activism with an alternative water management approach that prioritized local solutions. Thereby, it built a sense of shared identity

6 The „Collective Health Internship" (Portuguese: Internato Rural) aims to implement medical care and clinical assistance in rural areas and small towns, guiding interns to emphasize on preventive medicine, anchored in the expansion of the primary care coverage network (Lisboa 2012).

7 The project is named after Manuel Nardi, an old countryman and great connoisseur of the Minas Gerais backlands who inspired Guimarães Rosa to create one of his most famous characters, Manuelzão in the book "Manuelzão and Miguilim" (Lisboa 2012).

among many diversified actors throughout the watershed and changed the local people's perception of their collective action possibilities. Besides network building, the project also translated technical issues into ordinary language, universalizing the information to all the river basin actors. It is essential to emphasize that the Manuelzão Project complies with the Water Law. According to Polignamo (2006), the Manuelzão Project proposes the watershed as a new territory of action and systemic thinking on environmental management and health promotion.

Although both institutions shared the same region of action, the CBH-Velhas and the Manuelzão project didn't interact for some years. But in 2003, the project mobilized to get organizations and municipalities affiliated with the Manuelzão committees to enter the CBH-Velhas. This change was inspired by the decision-making power and the potential influence the CBH-Velhas has on regional water management (Abers 2007). In return, the project was an essential social actor for the committee, increasing its incorporation into the public policy environment in Minas Gerais (Theodoro and Warner 2018). In 2003, Manuelzão became dominant at the CBH-Velhas and elected its director as the committee president, Apolonio Heringer (Abers 2007; Abers & Keck 2009; Lisboa 2012). In 2004, the new president brought Manuelzão's campaign "Meta 2010"[8] to the CBH-Velhas. The Meta 2010 was endorsed by the state governor and included in the Velhas River Basin Plan in 2004, including specific actions for its achievement (CBHRV 2004).

The 2015 Velhas River Basin Plan (PDRH – Plano Diretor da Bacia Hidrográfica do Rio das Velhas) incorporated the gains obtained by Meta 2010. It signalled significant advances in environmental sanitation, social mobilization within the committee structure, and the river revitalization brought back some fish species to the Middle and Upper Velhas river. Therefore, the PDRH 2015 proposed the continuity of activities, emphasizing water bodies' intervention by discussing key agendas (e.g., economic activities, water security, environmental preservation, and land use processes (CBHRV 2015).

[8] "The Goal 2010 - To navigate, to swim and to fish at the Velhas River" (Portuguese: Meta 2010 – Navegar, Pescar e Nadar no rio das Velhas) had as main goal the revitalization of the Velhas River by the end of the decade, and involved a set of partnerships with state agencies, state legislature and private users (Abers & Keck 2009).

5 RESULTS

5.1 WATER GOVERNANCE IN BRAZIL

5.1.1 Historic Context

Historically, water management in Brazil has had both centralized and fragmented aspects. It has been fragmented according to each sector (energy, irrigated agriculture, sanitation), carrying out its planning and measures, and it has been centralized as a result of state and federal governments excluding the participation of municipalities, users and civil society in the policymaking process (Abers and Jorge 2005). Nevertheless, as Drummond and Barros-Platiau (2006) argue, Brazil was a pro-development society for most of the time, with a deep and long-lasting consensus favouring economic growth at any cost, an attitude supported by a similar global consensus. This developmentalism was a national project for almost 60 years, aiming to bring economic power at the expense of political liberty, natural resource conservation, and social justice (Drummond and Barros-Platiau 2006).

Between the end of the 19th and mid-20th centuries, the applied bureaucratic water management model was characterized by rationality, a hierarchy of actions, and the gradual concentration of authority by public entities (Lanna 1999). Since the colonial era, a great deal of land was granted to a small number of people. Consequently, the Portuguese king and, later, central governments struggled to manage and control the use of these lands' associated resources, such as soil and water. Thus, the history of Brazil's environmental law demonstrated that there was always a strong influence from private landowners (Drummond and Barros-Platiau 2006). The rights over rivers were associated with the right to land. However, the Portuguese Crown tried to assure their control over perennial and navigable rivers, and water derivation was bound to donation or granting for royal use. In 1804, a permit enabled the free deliberation of water for agricultural and industrial use. This permit was the only regulatory instrument over water use until the publication of a Water Law in 1934 (Pompeu 1972).

The "Water and Mine Code" (Código de Águas e Minas), the popular name of Decree 24.643/34 (Brasil 1934), was Brazil's first official water law as a republic and a landmark water regulation in the country. This code dissociated land property from its associated water and mineral property, putting those resources under rational control and planning by official federal agencies. Thus, it went against the previous precedent of joint land and water proprietorship. Water became a national patrimony that could only be exploited by governmental concessions to licensed companies (Drummond and Barros-Platiau 2006). The code also classified legal categories, discriminated against multiple water uses, and assured society's broad interests over water by prioritizing water supply and bringing a new water management vision. So, it initiated water recognition as a public and common good and eased conflicts between landowners and communities (Jacobi 2004). Although this concession system took water out of a “free-for-all exploitation”, it did not intend to preserve.

In 1946, the Federal Constitution determined that lakes and any water body in the national domain that runs over more than one State were under the federal union's domain, and water bodies located entirely in one State were under the state domain. Municipal domain was not specified by law (Brasil 1946). Yet, this decentralization was not exercised, and the federal government maintained a centralized control over water issues in strategic sectors for industrial development, such as the hydropower generation sector (Campos and Fracalanza 2010). In 1948, the São Francisco Valley Commission (Comissão do Vale do São Francisco) was created to assist the social and economic development at the São Francisco river region, and it is a precursor of the river basin approach in Brazil (OECD 2015).

In the mid-20th century, an economic-financial model was adopted, and one of the main driving forces were investment programs in water resources which overlooked some water-related environmental problems (Lanna 1999). In the 50s, the national developmental project launched by president Juscelino Kubitschek made Brazil a preeminent hydropower potency, shaping the Brazilian energy matrix. However, with the country's economic growth, an expansion of energy demand, industrial activity, and urbanization put more pressure on the available water resources, compromising water quality and impacting waterborne diseases on vulnerable groups (Tucci, Hespanhol and Netto 2001).

The awakening of the military dictatorship increased power centralization in 1964. The new military government created two federal agencies in 1965: the National Department of Water and Energy (DNAE – Departamento Nacional de Águas e Energia) and the Ministry of Mining and Energy (MME - Ministério das Minas e Energia); strengthening the preponderance of the energy sector on water management (Barth 1999; Rebouças, Braga Jr., and Tundisi 2002). Until the 70s, water use issues were handled from large private users' demands or problems related to floods and drought. The central government made decisions, and the watershed was not the predominant planning unit (ANA, 2011).

Since the 1970s, entities and organizations worldwide have been seeking to address water resources conservation and protection. The 1972 United Nations Conference on the Environment, also known as the Stockholm conference, was the first international summit to make the environment a central issue for discussion. Among the topics of discussion was the importance of creating and establishing less predatory management strategies for renewable natural resources, including water resources (Barth 1999). Under the aegis of 26 principles, the Stockholm Declaration was the first international document to place environmental issues at the forefront of global concerns, starting a dialogue between the Global North and South on the links between economic growth, pollution, and human welfare by applying management and planning as an instrument. The declaration’s framework for environmental action focuses on the cyclic interaction between environmental assessment, management, and supporting measures, as described in Figure 11 (UN General Assembly 1972).

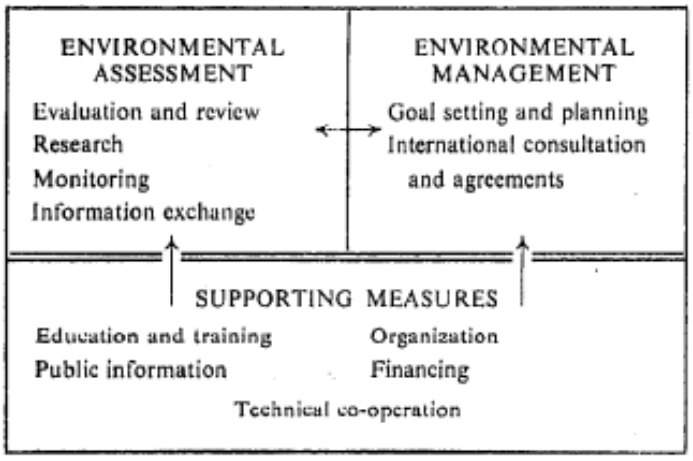

Figure 11: Framework of the Action Plan derived during the Stockholm conference in 1972
Source: UN General Assembly (1972)

During this period in Brazil, water pollution was rising due to urbanization, generating a conflict in different governance scales. The state government considered this a public health issue and started to legislate over pollutants emission control, especially industrial pollutants. According to Barth (1999), the states used water pollution as a manoeuvre to break the federal exclusivity over water legislation. To adhere to the 1972 Stockholm Declaration's recommendations, the federal government created the Special Secretariat for the Environment (SEMA – Secretaria Especial do Meio Ambiente) in 1973 via Decree 73.030. SEMA was the first national explicit and entirely governmental organization for environmental protection and policy management. One of its prime activities was the institution of environmental quality standards enforced by future legislation designed by agency technicians (Drummond and Barros-Platiau 2006).

A surge of more robust environmental rules and laws came afterwards. The global environmental awareness and the growing environmental concern and mobilization in the country bolstered the demands of environmentally conscious Brazilian activists, managers, politicians, and scientists on new issues to be addressed in the country's policy arena. The legal, institutional, and scientific framework was enhanced, and civil society's demands became weighty and difficult to be ignored or shaped by the state. Brazilian technicians and specialists debated the need to change the water management scenario by creating an integrated and decentralized management system (Abers & Jorge, 2005; Drummond & Barros-Platiau 2006).

Due to the complexities of water user-related problems, São Paulo was the first state to create a river basin committee in 1976. As a result, the state government and the MME signed an agreement targeting better water quality conditions of the Tietê and the Cubatão rivers. This committee was a pioneer in the country and intended to accomplish an intergovernmental and interinstitutional integration for water resources management in Brazil (Barth 1999). According to Porto and Porto (2008), this experience's success resulted in the Special Committee for Integrated River Basin Studies (CEEIBH - Comitê Especial de Estudos Integrados de Bacias Hidrográficas) and the subsequent creation of executive committees in several watersheds. However, these committees had only advisory duties, with no mandatory implementation of their suggestions. Even so, they constituted an essential mark for the future development of river basin management (Porto and Porto 2008).

In 1980, the III National Development Plan (PND – Plano Nacional de Desenvolvimento) was approved, delegating the National Water Resources Policy elaboration to the federal government (Matos 2002). Some initiated actions resulted in proposals for the new water policy and were later incorporated by the Federal Constitution in 1988 (Campos and Fracalanza 2010). National and international debates coincided on the definition of fundamental principles for this new model: decentralized management on the watershed level, integration of sectoral policies concerning water management, the involvement of water users and civil society in the decision-making process, and the switch of concept over water: from water as an infinite gift of nature to water as a good with economic value (Abers & Jorge 2005).

The UN set up the World Commission on Environment and Development (WCED) to raise the main environmental problems in 1983 and suggest strategies for preserving the environment, resulting in the Brundtland Report[9]. This document brought guiding principles for sustainable development, as it is known today. Also, in 1983 the International Seminar on Resource Management Water was held in Brasília, representing the beginning of this topic's debates. Following these events, the MME recommended the creation and institution of the National Water Resource Management System (SINGREH - Sistema Nacional de Gerenciamento de Recursos Hídricos), the transition of CEEIBH to a new system, the pursuit of subsidies to institute the National Water Resources Policy (PNRH - Política Nacional de Recursos Hídricos), and the institution of state-level systems for water management (ANA 2011).

In 1985, the democratic transition enabled significant steps towards a more participatory course of action in Brazil. In its final years, the military regime was discredited, arousing the citizenry to call for more direct participation and profoundly influence public policies from then on. The emphasis on “bottom-up” design and citizen engagement contrasted with some principles of representative democracy (OECD 2015). With the resumption of democratic rules in Brazil, some institutional innovations were implemented in public policy management, primarily due to social movements demanding higher civic participation in the policymaking process (ANA, 2011). The technocratic development model during the military regime gave place to a strong anti-centralized and anti-authoritarian public attitude, shared by two contradictory currents of opinion: the radical liberal thinking, who defended a free-market strategy without the inefficiency of the State, and the enthusiasts of participatory democracy as the only way for real citizen emancipation (Abers & Keck, 2013).

The 1988 Brazil Federal Constitution defined regulations for environmental quality and protection. It characterized water as a public good and defines some rules for water use permits. Article 20 stated that water spanning more than one state or country is under the union domain; water covering only one state remains within state control (Brasil 1988). So, the states can have their own water regulations and manage their own institutions. Although the constitution decentralized the power, delegating several competencies to the states and municipalities, subparagraph XIX of Article 12 obliges the federal government to create a national water management system. Thus, a new decentralized system cannot be defined only by federal law

[9] Published in 1987, the report entitled «Our common future» came to be known came to be known as the «Brundtland Report» after the Commission's chairwoman, Gro Harlem Brundtland.

(Abers and Jorge, 2005). Nevertheless, the 1988 Federal Constitution can be taken as a prelude to a new era of approach to environmental regulations. The text discloses a change of tone from past rules, bringing the custody of environmental resources from private individuals to the union (Drummond and Barros-Platiau 2006).

In the last decades, the formulation and implementation of public policies have included new paradigms to these processes: decentralized and participative management has become an international trend (Arretche 1996). This change has been justified by contributing to political relations' democratization and increasing public actions' efficiency and effectiveness. Municipal participatory budgeting and council creation are examples of these new institutional forms that arose in the last decades to encourage direct participation in diverse public issues (Utzig and Guimaraens 1996). During the 80s, Brazilian technicians, specialists, and social movements intensely discussed the urge to change the fragmented and centralized water management scenario. National and international debates coincided in defining the basic principles of a new model: management would be decentralized to the river basin level; it would integrate all policies sectors involved in water management; it would include water users and society, and would recognize water as an asset with an economic value, not as an inexhaustible gift from nature (Abers and Jorge 2005). In the 90s, new challenges concerning water management include defining the institutional aspects for management and control of water, environmental preservation, the use and control of rural soil, and the pollution impact within a sustainable system.

In 1991, São Paulo passed the first water reform law, Law 7.663, and it introduced water management concepts that accord significant power to stakeholders at the river basin level (Abers and Jorge 2005; Abers 2007). In addition, the water law also allowed the creation of advisory and deliberative bodies: the Water Resources Council (CRH – Conselho de Recursos Hídricos) to debate the topics relevant to the state and the river basin committees to manage the basin units in São Paulo (ANA, 2011). In this new institutional structure, the state government retains control on issuing over water permits, the water resource provides the management rules, and the river basin committees, consisting of municipal, state, and civil society representatives, are responsible for planning, conflict resolution, and the bulk water use charging system at the river basin (Abers 2007).

Between 1991 and 1997, 14 new states formulated legislation on water resources, mostly following the São Paulo model (Abers and Jorge, 2005). Figure 12 displays the state laws and their revision from 1991 to 2010. These state legislation reforms followed different models, but the majority aimed to promote integrated water management by decentralizing the management unit to the river basin-level and by creating new institutions to bring together those who had a stake in water use and protection: the river basin committee (Abers and Keck 2009). At this time, the Dublin Conference, held in 1992, pointed out serious water security problems and established principles[10] for sustainable water management (ANA 2011).

[10] 1) Water is a finite and vulnerable resource; 2) participatory approach; 3) Role of Woman; and 4) Social and economic value of water

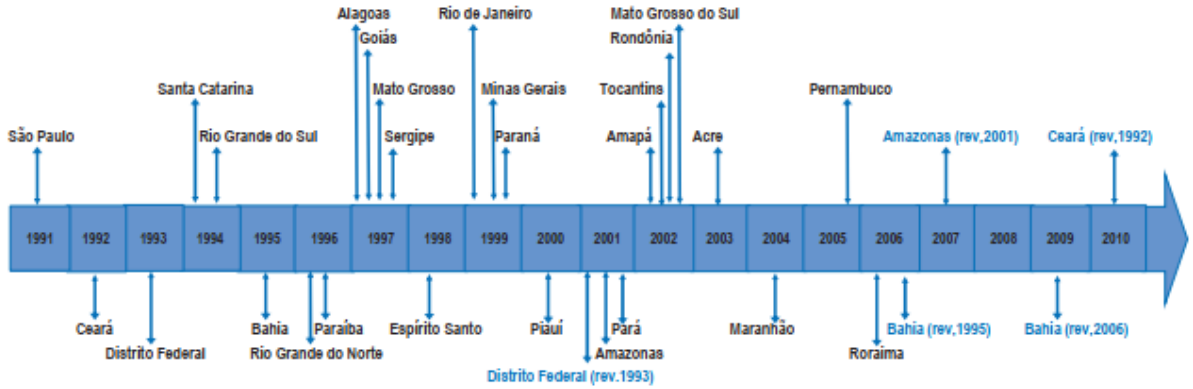

Figure 12: Timeline of water resource laws at the state level in Brazil
Source: OECD (2015).

Following a worldwide trend and with a new legislation framework constructed under the influence of a plurality of political forces and subjects under the Democratic State of Law, the Brazilian government enacted a series of principles and guidelines that would promote citizen participation in the design, implementation, and social control of public policies. Furthermore, concerned with implementing improvements in its water management mechanisms, mitigating water resources degradation and promoting rational water use, the federal government has been implementing a new water management framework for the last decades, the "Water Law".

5.1.2 The Water Law

In this new context, the National Water Resources Policy (PNRH – Política Nacional de Recursos Hídricos) was defined by Federal Law 9.433 in 1997 (the Water Law) and supported article 21, section XIX of the Federal Constitution. It reflects social movements and specialists' efforts, which were determinants in creating institutional arrangements, and enabled greater civil society participation in water management (ANA 2011; Brasil 1988, 1997). The PNRH is a cornerstone of water governance legislation in Brazil. It set instruments to manage federally owned water resources and created the National Water Resource Management System (SINGREH), replacing an outdated, inefficient, sectoral-based water management system with a new regulatory framework (Lemos and Oliveira 2004).

The PNRH is structured from three main elements: decentralized management by river basin, integrated management, and participative management (Jacobi 2010). The law enabled water management based on the principles of decentralization and participation. It introduced a systemic model of participative integration, adopting the river basin and sub-basin as the planning unit, water as an economic asset, and the basin committees as a decision arena (Farias 2005). This new legal framework represented a change in Brazilian water governance: the central government, traditional water manager, institutionalizes a decentralized system, and the decision-making power on water management and bulk water charging will be shared between state agencies and basin committees (Silva 2013). The principles underpinning the Water law reveal a significant

influence of Integrated Water Resources Management (IWRM) concepts. In several articles, the law addresses terms referring to the need to practice IWRM, as highlighted in article 1[11] (Senra and Nascimento, 2017). Abers & Keck (2006) argue that the inclusion of IWRM is due to the engagement of a network of technical-scientific experts in the law's design.

The National Water Resource Management System (SINGREH) is an institutional arrangement to implement the tools and guidelines of the PNRH, which assembles multi-level entities. The Water Law regulates the system and came with new principles embedded in five management instruments to support the PNRH implementation: river basin plans, water body classification, water permits, bulk water charge, and information system. SINGREH considers Brazil's federative character and the prospect of society involvement in the decision-making process. This model creation was based on the French model[12] for water management, establishing that the community must participate via forums and debates in the negotiations and decisions related to water management (Brasil 1997; Braga et al. 2009; Campos and Fracalanza 2010). Figure 13 presents SINGREH's institutional structure with the component entities and their performance level, and Table 7 describes each SINGREH member's main responsibilities.

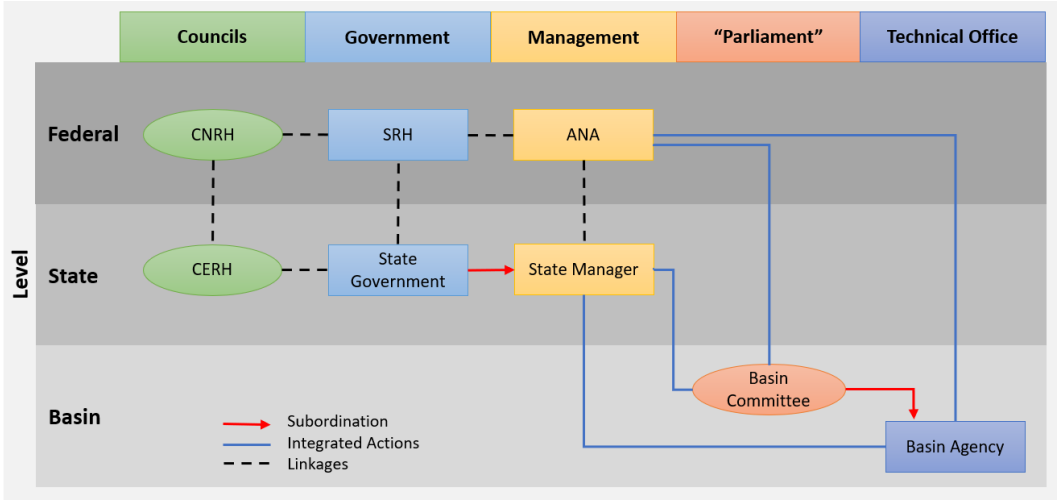

Figure 13: SINGREH Institutional Matrix. The rectangular shape represents the entities bodies responsible for tool implementation and management, and the round shape represents the highest level of decision-making
Source: author's elaboration, derived from ANA (2011)

[11] In the Federal Law 9.433, Article 1 presents the six guiding principles of new policy: I) water is commodity of public domain; II) water is a limited natural resource, endowed with economic value; III) in situations of water scarcity, the priority use of water resources is human and animal consumption; IV) the management of water resources should always provide for the multiple use of water; V) the river basin is the territorial unit for the National Water Resources Policy implementation and for the National Water Resources System of Management operation; VI) the water resources management must be decentralized and have the participation of the public sector, users and communities (Brasil 1997).

[12] Established in 1964, it is a decentralized and participatory model, with the committee as a forum for negotiation and decision making, and the basin agency as the executive secretariat and technical support of the committee(Campos and Fracalanza 2010).

Table 7: SINGREH members and their main responsibilities
Source: Author's elaboration, derived from Braga et al. (2009)

Entities	Description
CNRH – National Water Resources Council	The highest level in the SINGREH hierarchy is an intergovernmental collegiate responsible for the final resolution on water-related conflict and subsidizing the PNRH formulation and implementation.
SRH - Water Resources Secretary	Integrated into the Environmental Ministry, it is responsible for PNRH elaboration, serving as the executive secretariat of CNRH.
ANA – National Water Agency	The entity is responsible for water use regulation in federal rivers and SINGREH implementation coordination.
CERH - State Water Resources Council	The highest level at the state hierarchy is responsible for the final resolution on the water-related conflict at the State and for subsidizing the State Water resource Policy formulation and implementation.
State Government	It is the central organizer and coordinator of the State water resources system with similar ANA responsibilities at the state level.
River Basin Committee	Collegiate constituted by water users, government, and society is responsible for approving and executing the River Basin Plan, establishing bulk water pricing and charges mechanisms in the river basin.
River Basin Water Agency	The executive branch of the River Basin Committee, providing technical and administrative support to the committee.

To implement this new and complex system, Law 9.984, from July 17, 2000, created the National Water Agency (ANA – Agência Nacional de Águas). It has an ambiguous nature; it is simultaneously a regulatory and an executive agency. It is ANA's competence to create technical conditions to implement the Water Law, promote decentralized and participatory management, in coordination with other SINGREH members, to implement SINGREH's five management instruments (Table 8), and to seek adequate solutions to the three most major water problems in Brazil: severe droughts, floods, and water pollution. ANA is also responsible for controlling and managing rivers under national federal jurisdiction and defining cooperation and articulation strategies between different water management jurisdictions (ANA 2013; Braga et al. 2009; OECD 2015).

Table 8: SINGREH management tools
Source: Author's elaboration, derived from Braga et al. (2009)

Instrument	Description
River Basin Plans	Master plans to provide the guidelines for water management and PNRH implementation at the basin level. In addition, they must define the priorities for water permits and an investment program for sustainable development at the basin. These plans have a long-term horizon and are accompanied by periodic reviews and updates.
Water Bodies Classification	It determines water quality levels, in time and each part of the river network, concordance with its uses, goals, and programs defined by the River Basin Plan.
Water Permits	It aims to ensure quantitative and qualitative control over water use through quantitative and qualitative data available from the information system.
Bulk water charges	It is an economic tool that considers the water permits granted. The charges are intended to enhance water use efficiency, reduce water pollution, and provide financial resources to investment programs.
Information System	The system goals are producing, systemizing, and providing data and information on water quality and quantity conditions and water use at the basin level.

The CBHs are the "Water Parliaments" and aim at the participative and decentralized water resources management by implementing management instruments, conflict negotiation, and multiple water use promotion at the basin level. They integrate multi-level governance, promote environmental conservation and mitigation, ensure sustainable and rational water resources use, and consolidate as decision-making spaces, especially in regions with water security problems (Braga et al. 2009; ANA 2013). Thus, the river basin committee is the basis of the PNRH and SINGREH: decentralized by river basin and the participation of diversified stakeholders – from the government (Federal, State, and Municipal, accordingly to the basin reach), water users, and civil society organizations linked to the water resource participating in the decision-making process with the support of a basin agency (ANA 2013; Brasil 1997).

These committees have the mission to assign environmental, economic, and social values to water by: promoting the debates over water-related issues; articulating the intervening entities actions; arbitrating on the related water conflicts; approving the River Basin Plan and monitoring its implementation, suggesting the necessary steps to comply with its goals; establishing the mechanisms for bulk water use charges, and suggesting bulk water pricing.

This new decentralized and participative water management framework - The „Water Law"-, and this new decision-making spaces -The River Basin Committees - are powerful instruments for social change. However, these forums should not be influenced by more influential actors. Therefore, the design of the participatory processes in the committee is an important factor to overcome this issue and guarantee a democratic deliberative space in these organizations.

5.2 PUBLIC PARTICIPATION IN THE VELHAS RIVER BASIN

5.2.1 Survey Questionnaire

5.2.1.1 Demographic Profile

This section of the questionnaire required the respondents to give information on their demographic profiles. Of this total, 89.9% are residents of the Metropolitan Region of Belo Horizonte, and one resident of Curitiba, Paraná. This distribution points to a predominance of residents of the greater BH cities. In addition, 58,9% of the respondents identified themselves as female, while 44,4% identified themselves as male. Most of the respondents are between 30-39 years old, while 11,1% are between 18-29, 50-69 and over 70. In the ethnic identity of the respondents, 66,7% identified themselves as “pardos”, and 33,33% identified as “white/caucasian”. On the literacy degree, all the respondents have at least a Bachelor degree (55,6%), a master degree (33,3%) or a PhD degree (11,1%). The area of expertise of the respondents was diversified, with 55,6% working in applied science (engineering), 33,3% working in natural science (e.g. biology, physics), and 11,1% working in social science (Figure 14).

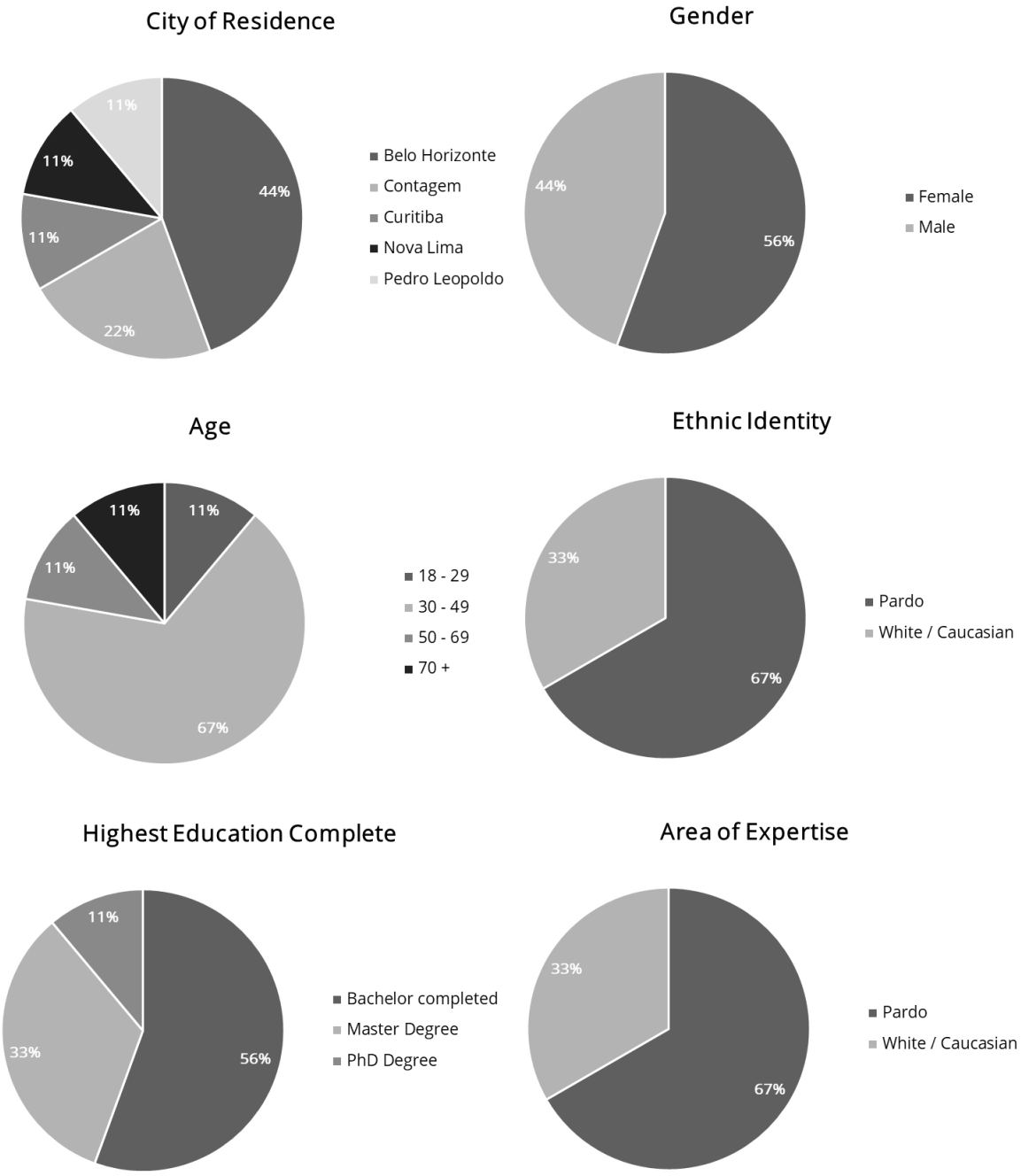

Figure 14: Percentage of respondents by demographic characteristics (City of residence, Gender, Age, Ethnic Identity, Highest Education and Area of Expertise).

When questioned about their relationship with the CBH-Velhas, 7 out of 9 informed that they are official committee members. So, in a total of 20 official elected members of the CBH-Velhas, only seven responded to the questionnaire survey, representing 78% of the total sample. The “Water user” cluster has the highest number of respondents of the questionnaire (44,4%), followed by Civil Society (33,3%) and Municipal Government (22.2%). The participation frequency of the respondents varies, with 44,4% of them informing that they “always” participate in the CBH-Velhas meetings, 22,2% informing that they “frequently” and “rarely” participate in the CHB-Velhas meetings, and 11,1% answering that they “Sometimes” take part of the meetings. The

motivations to join the CBH-Velhas meetings were restricted to two reasons: “Concern with water resources“ (77,8%) and “Professional Work obligation” (22,2%) (Figure 15).

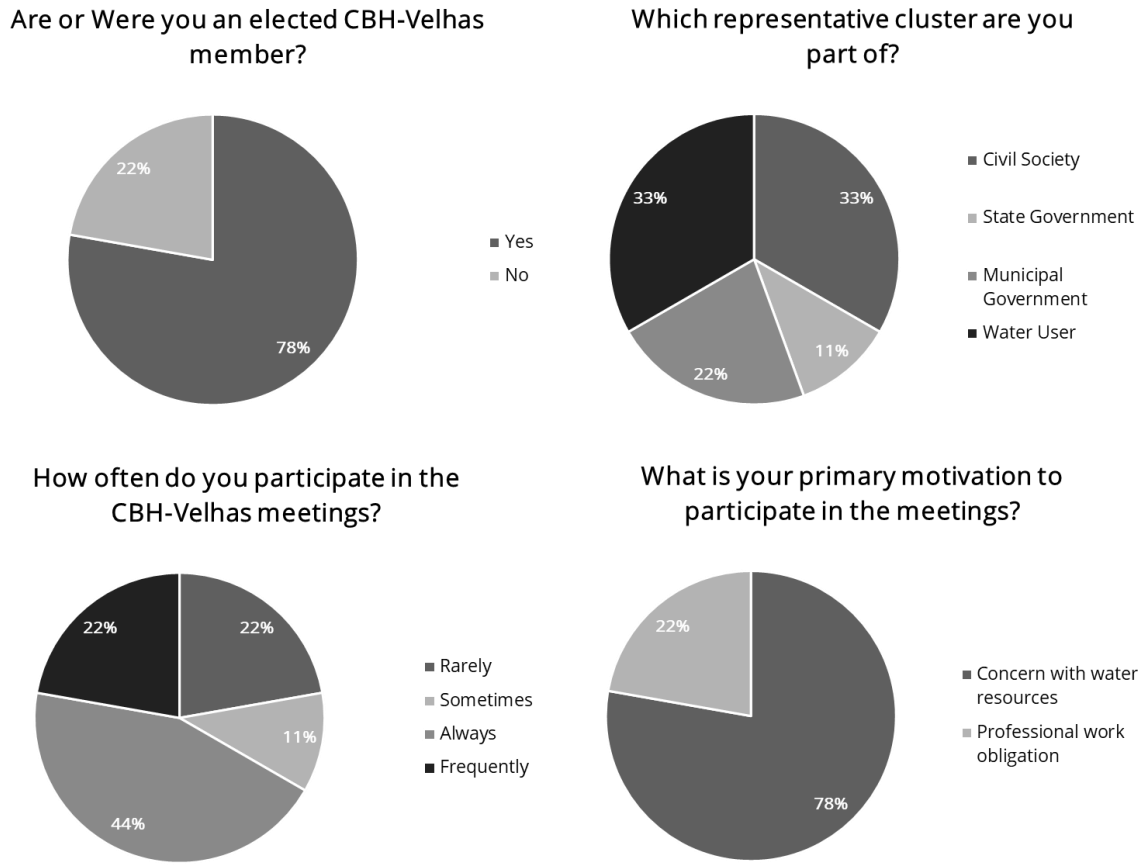

Figure 15: Percentage of respondents by their relationship with the CBH-Velhas.
Source: Author’s elaboration

5.2.1.2 Perception of the Participants

The proposed thematic is an adaptation based on the work of Carr et al. (2012). With the responses to the applied questionnaire, it was sought to evaluate the participatory processes of the CBH-Velhas under the perspective of some indicators of the process (power, legitimacy, and social communication) and intermediary outcomes from the process (trust-building, network development and capacity building). These indicators were used as a mathematical metric to evaluate the performance and analyse the participative process by statistical analysis that considered the percentage of the frequency of the responses.

Process Evaluation

Legitimacy

In this criterion, the questions sought to determine the legitimacy feature of the participatory processes. This perception of the legitimacy of the process is based on their understanding of how it includes and allows those influenced by management decisions to contribute fairly to the committee's actions. Thus, regarding the participatory processes' legitimacy, the results are shown in the following figures.

In Figure 16, the overall result of the Legitimacy questions is displayed. In a total of 45 responses to the questions related to legitimacy, thirty (67%) responses agreed, and six (13%) responses strongly agree that the participatory process is legitimate, four (9%) responses disagree with the legitimacy of the process and, five (11%) five responses were neutral about the questions related to the legitimacy of the process.

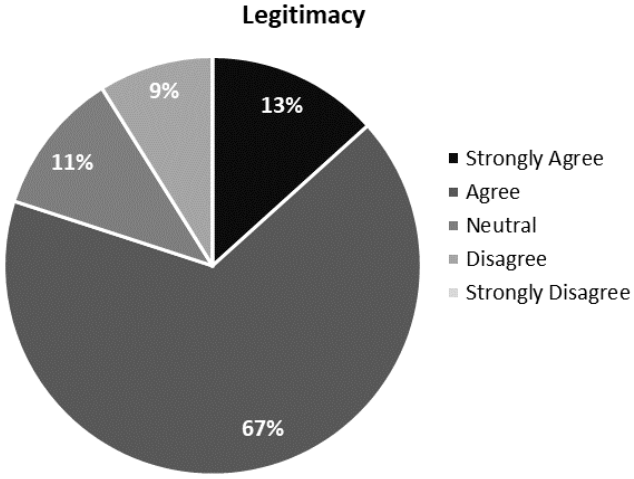

Figure 16: Perception of the legitimacy of the participatory process

Figure 17 presents Legitimacy-themed questions in the survey questionnaire. For example, on the representativeness of a broad part of the stakeholders in the committee question, 56% understands that the committee exercise representativeness of the river basin's stakeholders, while 11% disagree and 33% are neutral to this with this proposition. When asked about the adequate access to information to all participants, 33% strongly agree, and 44% agree that the committee enables accessibility to information, while 22% disagree that all the participants have access to information and meetings. When asked about the transparency, openness, and accountability of the process, 89% agrees with this statement, and 11% strongly agree. A similar level of agreement was also found in the statement affirming that the process incorporated consensual decision-making when 78% agreed with the proposition, 11% strongly agreed, and 11% chose to be neutral on this feature of the process. However, in the question about the political bias within the decision-making process, 67% agreed, and 11% strongly agreed that there was no political bias in the participatory process, while 11% disagreed with this statement and 11% responded „Neutral" to this question.

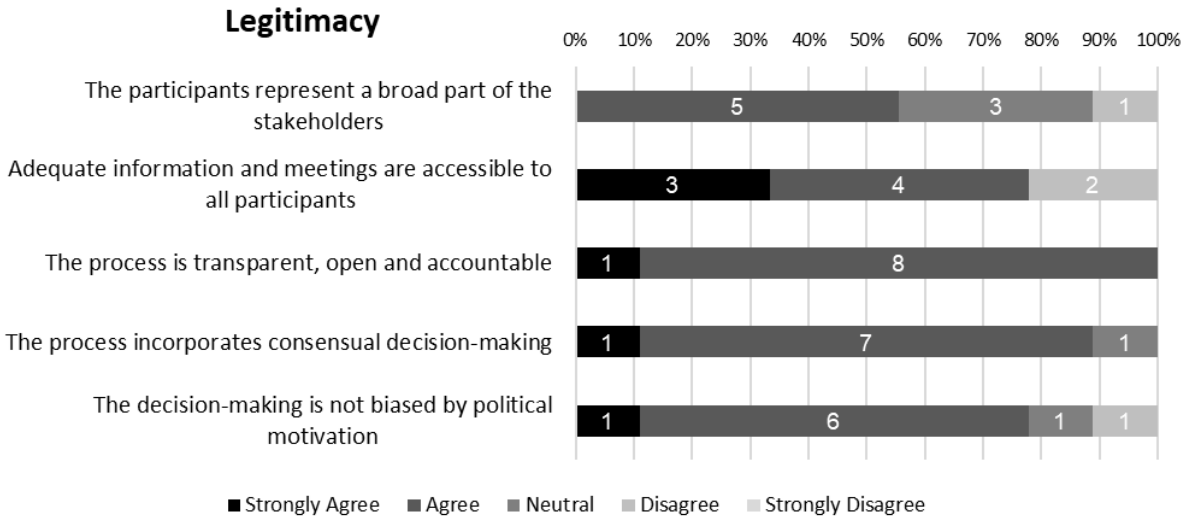

Figure 17: Legitimacy features of the participatory process

Power

The respondents were asked to indicate whether they agree or disagree with the statements related to the power dynamics of the participatory process. In the responses to all questions, 69% agreed or strongly agreed with the proposed statement, while 16% of the responses were neutral, and 15% disagreed with the statements (Figure 18).

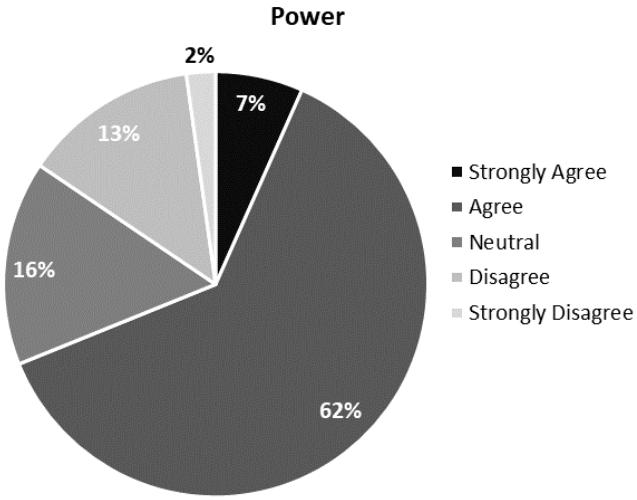

Figure 18: Perception of the power dynamic within the participatory process

The specific frequencies for each statement are shown in Figure 19. In response to the first statement, most of those surveyed (67%) agreed participants of the participatory processes of the CBH-Velhas have substantial influence over the decision-making, while 22% disagree with this statement. The same concordance rate (67%) was found when it was stated that institutional arrangements promote power-sharing between participants, with 11% disagreement with this affirmation. Finally, of the responses to the statement about the representative cluster balanced power to influence the participatory process and its outcomes, 44% agreed, and 22% strongly agreed with this statement, while 22% were neutral and 11% disagreed.

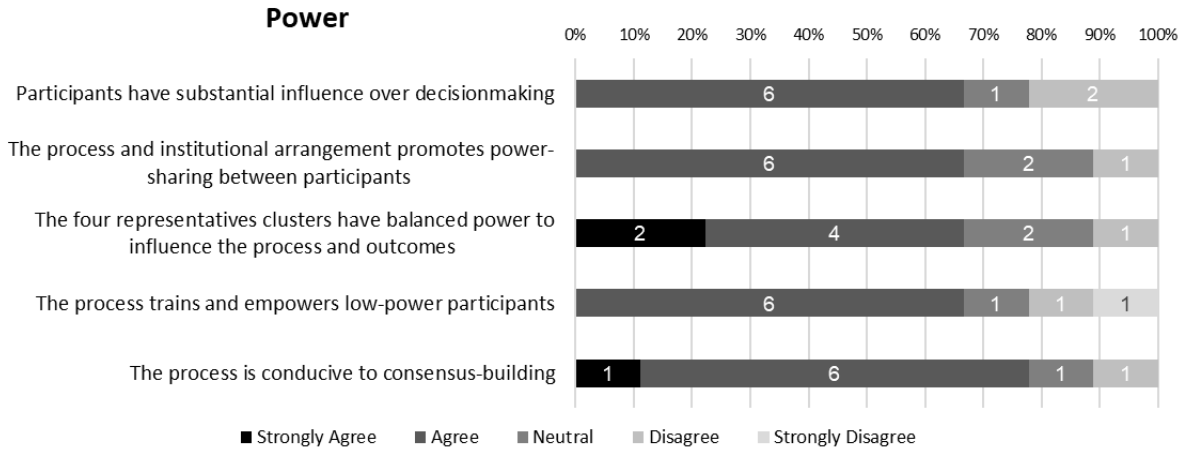

Figure 19: Power dynamic features within the participatory process

The respondents shared their perception of the training and empowerment of low-power participants, with 67% agreeing to this statement and 22% disagreeing and strongly disagreeing with it. The statement about the process leading to consensus-building had the higher rate of agreement of this criterion, with 11% "Strongly Agree" and 67% "Agree" against 11% "Disagree" and 11% "Neutral".

Social Communication

The graph in Figure 20 shows a strong agreement rate for the statements themed on social communication in the CBH-Velhas. Most of the responses to this criterion majority agreed at different levels to the statements on facilitation and dialogue (78% "agree", 11% "Strongly Agree"), while two (4%) responses expressed disagreement, and three (7%) were neutral. Social communication had the highest rate of agreement to the statements.

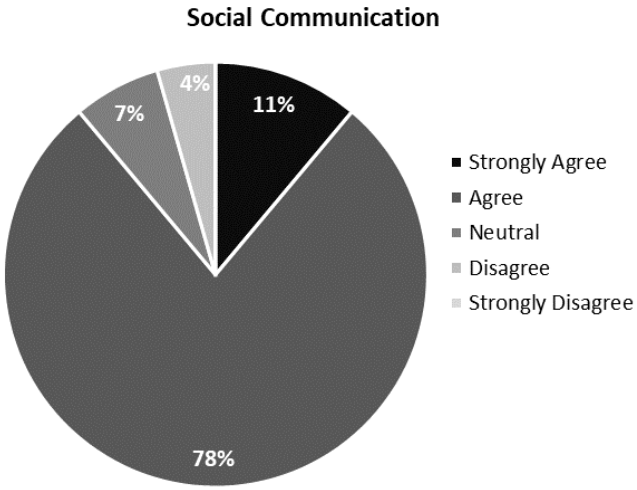

Figure 20: Perception on facilitation and dialogue within the participatory process

In Figure 21, the frequencies for the survey questionnaires statements can be found on the chart. According to 89% of the respondents, facilitation in the CBH-Velhas creates a space of exchange

between participants, with only 11% disagreement with this statement. Furthermore, when stated that the CBH-Velhas meetings attempt to focus on shared values rather than vested interests, 56% „Agree“ and 22% „Strongly Agree“ with this affirmation, with 22% „Neutral“ and no disagreement.

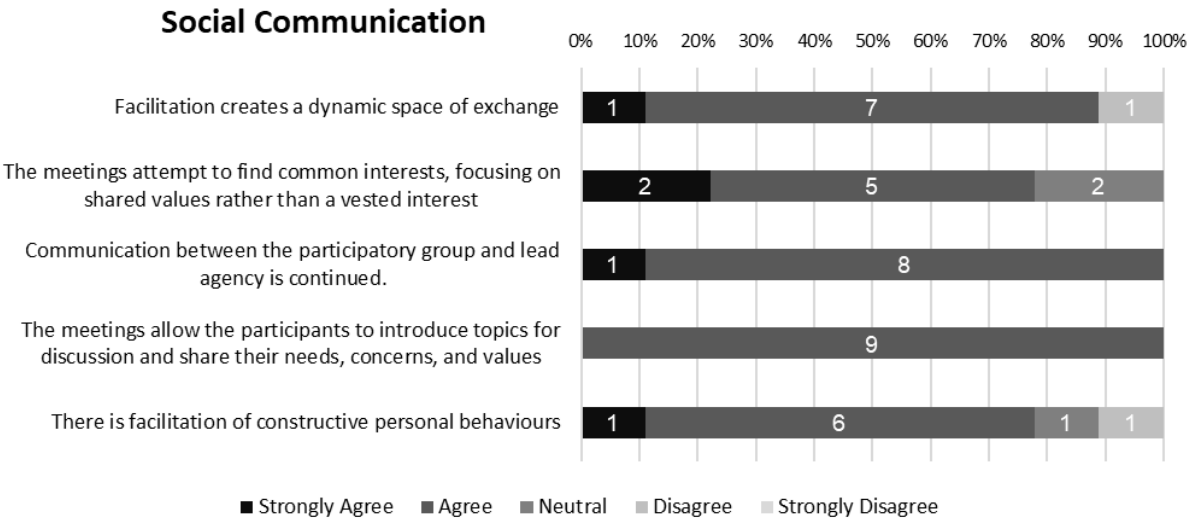

Figure 21: Social communication features within the participatory process

The same clear agreement was found with the following two statements, when 11% „Strongly Agree“ and 89% „Agree“ with the existence of continuous communication between the participants and lead agencies, and 100% „Agree“ that the meetings allow the participants to introduce topics and share their concerns, values and needs in the discussion. The facilitation of constructive personal behaviour is perceived by 78% of the respondents (11% „Strongly Agree, 67% „Agree“), and disagreed by 11%, with 11% responding „Neutral“.

Intermediary Outcomes

Trust-Building

To capture the respondent’s perception of trust-building as an intermediary outcome of the participatory approach in the CBH-Velhas, four statements were presented to be assessed on a Likert scale. Figure 22 presents a summary of statistics for the overall results of this section of the survey questionnaire. In total, 75% of responses were in concordance with the statements themed on trust-building in the questionnaire (6% “Strongly Agree” and 69% “Agree” responses). In addition, none of the responses strongly disagreed with the statements, 8% disagreed, and 17% of the responses were “Neutral” for the statements.

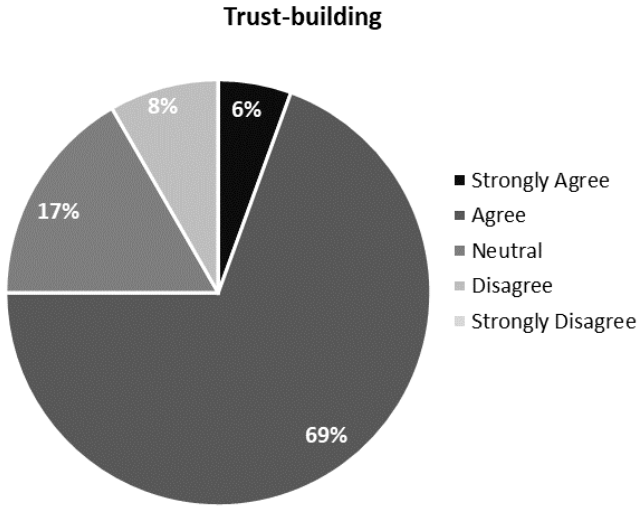

Figure 22: Perception trust-building as an intermediary outcome of the participatory process

When examining these responses per statement, the results are shown in Figure 23. The majority of the respondents for this variable felt that trust-building comes as an outcome of the participatory process of the CBH-Velhas. For example, when it was stated that public trust in government agencies was fostered, 67% agreed (11% „Strongly Agree“ and 56% „Agree“), and 33% were „Neutral“. A similar distribution of trust was found when it was stated that there is a clear understanding of how the participant's input could be used to manage the river basin; again, 67% agreed (11% „Strongly Agree“ and 56% „Agree“). However, 11% were neutral, and 22% disagreed with this statement.

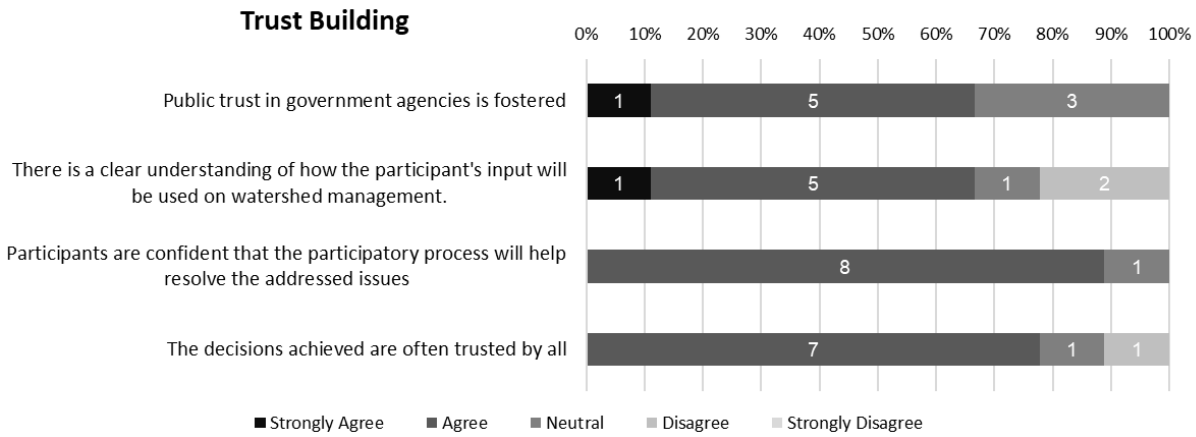

Figure 23: Trust-building as an intermediary outcome of the participatory process.

The confidence of the participants that the participatory process will help solve the addressed issues was high; 89% „Agreed“ and 11% were „Neutral“ to this statement. In the last statement, 78% agreed that all decisions are often trusted by all, while 11% were „Neutral“, and 11% disagreed.

Network Development

In this variable, the questions sought to determine if the participatory process develops interactions among the participants. Figure 24 presents the overall results for all the responses,

with one “Strongly Agree” (3%) and 26 “Agree (72%). Although no “Strongly Disagree” was given as a response, eight (22%)responses were neutral, and one response was “Disagree” (3%). Thus, the responses to “Network development” questions were the ones with the lowest number of disagreements to the statements.

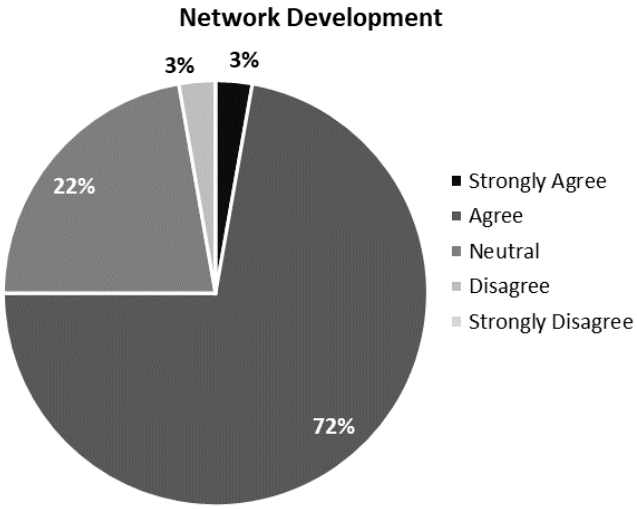

Figure 24: Perception of the development of the network as an intermediary outcome of the participatory process

On the more detailed results per statement, Figure 25 presents the chart with the distribution of responses to each statement of this section of the questionnaire survey. For example, on the first statement, „the process leads to constructive interaction between participants, leading to continued dialogue“, 56% agreed with this affirmation, while 33% had a neutral perception of it, and 11% disagreed.

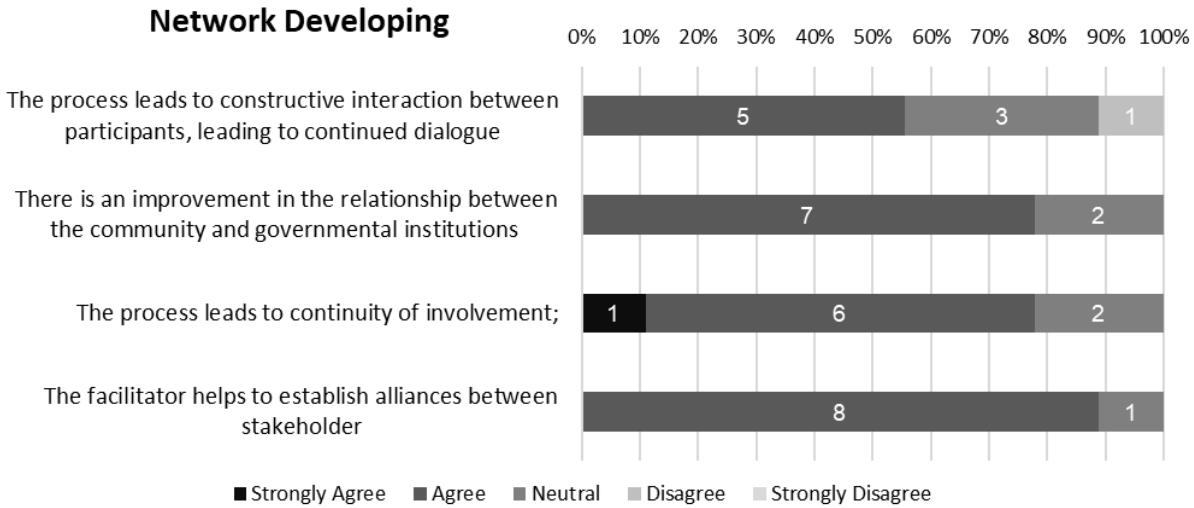

Figure 25: Network development as an intermediary outcome of the participatory process

On the other hand, a high concordance was found when it was stated an improvement in the relationship between the community and governmental institutions (78% „Agree“, 22% „Neutral“), and that the facilitator helps to establish alliances between stakeholders (89% „Agree“, 11%

„Neutral“). Furthermore, the participatory process influence on the continuity of involvement of the participants was perceived by 78% of the respondents, with 11% „Strongly Agree“, 67% „Agree“, and 22% „Neutral“.

Capacity Building

The respondents were asked to indicate whether they agree or disagree with the statements related to capacity building as an intermediary outcome of the participatory processes at the CBH-Velhas. In the responses to all questions, 86% agreed (twenty-five responses) or strongly agreed (six responses) with the proposed statement, 8% of the responses were neutral (three responses), and 6% disagreed with the statements (two responses) (Figure 26).

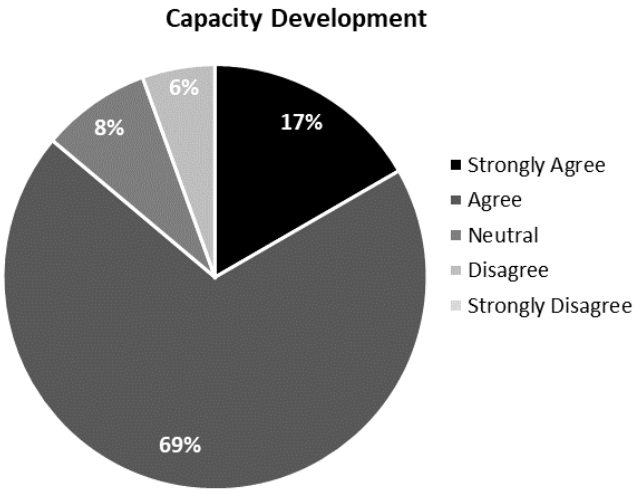

Figure 26: Perception of the capacity development as an intermediary outcome of the participatory process

The themes identified for this criterion in the responses are summarised in Figure 27. According to 7 respondents, the public is educated about the implications of their values and actions regarding water use (11% „Strongly Agree“, 67% „Agree“), while one respondent disagrees with this statement. Furthermore, all the respondents agreed that the participatory processes in the CBH-Velhas lead to higher awareness and reflection on the challenges and opportunities on the river basin management (22% „Strongly Agree“, 78% „Agree“).

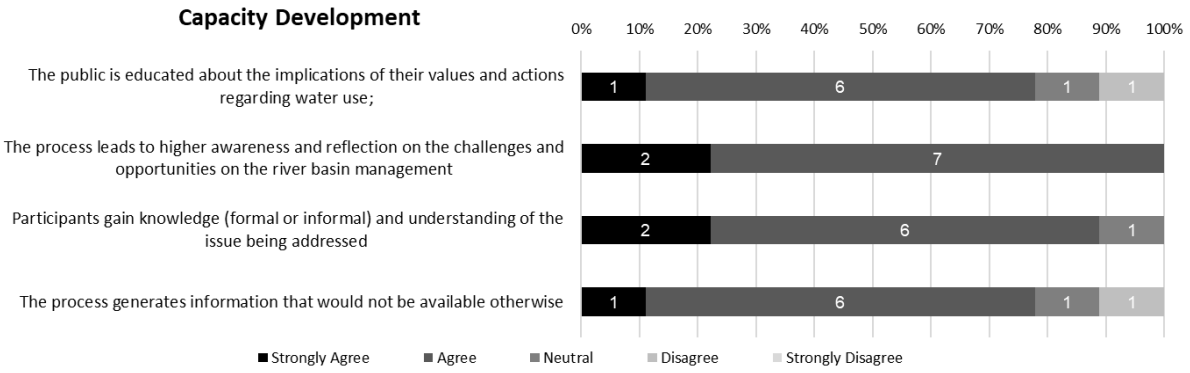

Figure 27: Capacity development as an intermediary outcome of the participatory process

When stated on the gain of knowledge and understanding by the participants, 67% „Agree" and 22% „Strongly Agree" with this affirmation, with only one „Neutral" response (11%). The major part of the respondents perceived the participatory process as a generator of information that otherwise would not be available; the distribution of responses to this statement was: 67% „Agree"11% „Strongly Agree", 11% „Neutral" and 11% „Disagree"

5.2.2 Interviews

The interviews were directed to those who informed at the end of the survey questionnaire their availability and interest in participating in an interview. From the survey questionnaire respondents, six showed interest in being interviewed. From these six potential interviewees, three replied positively to the invitations. A descriptive table about the interviewees is presented below (Table 9). The identity of the interviewees will not be disclosed, and the confidentiality of their data will be respected; hence they will be identified according to an ID code.

Table 9: Interviewee's profile

ID	Interview Date	Sex	CBH-Velhas member	Representative Cluster
ID_01	04/05/2021	Male	Yes	Water User
ID_02	10/05/2021	Male	Yes	State Government
ID_03	22/05/2021	Female	No	Civil Society

As the main goal was to understand the perceptions, motivations, and experiences with the participatory processes in the CBH-Velhas, the results enabled the identification of the perceived quality of the participatory process and intermediary outcomes by the interviewees. Nevertheless, most results are exemplified with quotations translated to English.

Process Evaluation

Legitimacy

This section deals with the reflections of the interviewees on legitimacy in the CBH-Velhas participatory processes. The interviewees acknowledged that although the process is open with

consensual decision-making, representativeness is a current issue within the committee member board. Interviewee ID:01 and ID:02, official committee members, mentioned that some people were always elected as official committee representatives some years ago. Since the foundation of the CBH-Velhas, the presidency position was occupied by members of the same group of actors, mainly linked to the Manuelzao Project. In 2020, under the motto of „Renovation and Experience“, the former Municipal government representative Poliana Valgas was the first female elected president of the committee. The interviewees cited Poliana's election as a positive sign of change, increasing representativeness in the committee, bringing new leadership, and renovating and updating the CBH-Velhas member board. Interviewee ID_03 described the plenary meetings as „usually attended by the same people, who sometimes change roles amongst the stakeholders holding chairs within the committee, but they're still the same group who has known each other for a long time. Eventually, a new face or group is engaging, but not continuously and assuming a more permanent role“.

The municipal cluster was often cited as the one in which representatives face some difficulties. The municipal cluster often elects representatives who are members of the municipal administrations at the river basin, where elections happen every four years. Municipal elections don't share the same timeframe as the CBH-Velhas elections. Furthermore, whenever a new mayor is elected, there is the possibility that a change of the municipal administration leads to a change of municipal representant in the CBH-Velhas, harming the mandate continuity and engagement of the municipal cluster to the CBH-Velhas processes.

Representativeness is also affected by the public accessibility to the meetings. The plenary meetings are usually in Belo Horizonte during the commercial, affecting more vulnerable groups who might claim to the CBH-Velhas and could not attend due to the logistics of the meetings. During the pandemic, since April 2020, the meetings transitioned to the online platform „Youtube“, where they are live-streamed and upload for the broad public. Although it grants potential greater access to the meetings and their discussion content, connectivity is still a challenge to rural and peripheral groups of the Velhas River basin.

Power

As already discussed in chapter 2.2.1.1, power implies power-sharing and dealing with power asymmetries in the process to avoid marginalisation and exclusion of less powerful groups. All interviewees highlighted the municipal cluster as the less powerful of all four clusters. Although all clusters hold the same share of power theoretically, this equal share is informally not seen, as mentioned by ID:03. However, ID_02 mentioned the subcommittee as a way to empower and incentivise greater participation of this group. In addition, the subcommittees would ease accessibility to the CBH-Velhas through their local meetings.

The interviewees also cited the knowledge gap as a source of power imbalance within the committee. ID_03 described how more passionate and personal inputs based on traditional local knowledge guided less powerful groups. More economically powerful stakeholders based their positions on technical and financial-driven data (especially water users and state government), overestimating the academic inputs against the traditional knowledge. Another criticism of the

committee's power-dynamic is the available human resources some clusters have to dedicate to the CBH-Velhas Activities, especially the water users and the state government. Some organizations enable professionals to dedicate time to the official agenda, whereas less powerful groups deal with the challenges to engage and participate in the meetings. ID_01 informed that there is no ethical or gender quota in the committee as there is in bigger ones, such as in the Sao Francisco River Committee, and that the establishment of quotas for indigenous, quilombolas and other misrepresented groups could be an instrument for inclusiveness and to foster a sense of belonging of this groups to the CBH-Velhas.

ID_03 mentioned hydro-environmental projects to raise awareness among the river basin population, the past work in partnership with the Manuelzao Project and the offline and online content creation to share and spread information at the river basin territory. ID_01 also mentioned the importance of sharing information and developing capacities to empower and include these vulnerable groups, fomenting and strengthening new leaderships in the CBH-Velhas.

Social Communication

Official elected members of the CBH-Velhas lead facilitation with strong support from the Peixe Vivo agency. ID_03 mentioned that, as facilitation is a volunteer role taken by a regular committee member, facilitation may lack expertise and preparedness when dealing with multiple and diverse actors and stakeholders to avoid bias. ID_01 cited a Mobilization GT (Technical Groups) in the Peixe Vivo agency, responsible for the survey of potential topics and agendas to be introduced and discussed in the CBH-Velhas. This Mobilization team gives support to the articulation and facilitation of important topics in the meetings.

The general communication to the public is set formal and informally. A communication agency is included in the CBH-Velhas budget and is responsible for the communication strategies and plans of the committee. This private agency is also responsible for formulating and designing workshops, seminars, magazines, the official website, and other media. The use of digital and social media is also part of the communication strategy of the CBH-Velhas, aiming to reach a broader target on their communications channels. The subcommittees are included in the committee’s communication strategy, with a direct and open dialogue between the CBH-Velhas and them. But, according to ID_03, the communication strategy of the CBH-Velhas still needs to reach a public beyond the usual meeting's attendants. Subject ID_03 highlighted in her interview that these strategies require better coordination and collaboration with the operating water agencies, that social media could be greater used for information sharing with a broader public of the basin.

Intermediary Outcome

Trust-Building

This section deals with an improvement of trust between the multiple actors and stakeholders of the Velhas River basin. As none of these criteria is unrelated to the other listed ones, some interviewees' perceptions can overlap through different criteria. ID_02 and ID_03 specified that

they never experienced any informal external approach to influence a topic or decision under discussion. ID_03 described when water use is under pressure for companies with a high impact in the river basin, the decision made is not always in the best interest of the river basin, which explicates the vested interest process. The other interviewees did not recognize external interests overlapping the river basin's interest in the decision-making, citing the importance of the water permission assignments (outorga) as an instrument to regulate the water use in the basin. This unbiased agenda and agreements strengthen the trust and the relationship between diverse actors.

Network Development

This section is linked to the development of networks and relationships within the participation in meetings of the CBH-Velhas. The interviewees identified a strong network development between the participants during the participatory processes of the CBH-Velhas. They believed that meetings in the committee bring together all participants, allowing them to build and bridge diverse river basin segments. Furthermore, the interviewees feel that they all share the same interest and area of work or expertise: water. However, ID_03 identified this networking as exclusive to the usual participants: "[communication between members is continuous] as most participants also engage in other water-related events, jobs, and activities, besides taking part in the CBH-Velhas. They are part of this water bubble or water world, familiar to a few individuals." Therefore, there is a network development but mostly within the same closed group. ID_03 also stated that, although participation in the CBH-Velhas is based on representativeness and open dialogue, network development could be better developed with other Velhas River basin's stakeholders.

ID_01 highlighted the importance of the Technical Chambers on bridging different actors and stakeholders on segmented topics of their interest. The interviewee cited the example of the CONVAZÃO Technical Chamber, where different clusters work as partners to decide and achieve optimal solutions on water security in the Upper Velhas river basin. However, the relationship between different clusters has different patterns of development. It was cited volatility between the state government and civil society representatives. Due to the high potential conflicts between these clusters, the low engagement of the state government cluster and the traditional high civil society engagement at the CBH-Velhas, the network development between these stakeholders seemed slower. Turning to the municipal cluster, which has a higher engagement in the subcommittees than the CBH-Velhas, it was cited as another source of concern on the network development. Considering the diverse water use and conflicts in different sub-basins, the relationship between this cluster and the others is affected. Therefore, the relationship between water users and municipal representatives also seemed to present a lower development rate.

Capacity Development

This section deals with the capacity development of the CBH-Velhas participants and stakeholders as an outcome of the participatory process. For the official elected members of the committee, training and workshops are organized and provided by state public agencies. The

Technical Chambers also informs and develops the members' capacity on specific issues present in the CBH-Velhas agenda. For example, one interviewee cited that the IGAM, with the ANA's support, offers capacitation and training to the committee members and, when more technical discussions are needed, specialists on the area are invited to help the Plenary members to a better quality of articulation and deliberation of more specific and technical topics.

A common view amongst interviewees was that although there are many hydro-environmental and environmental education projects in the river basin, improvements are needed. ID_03 commented, "I haven't heard yet about a capacity building program for official members, aiming for them to be at the "same" page while making decisions that impact the river basin management". Some interviewees corroborated with this view, highlighting the need to improve the training and qualification of the non-members. ID_01 cited that the lack of capacitation of the public brings morosity and misunderstandings during the discussions in the meeting.

5.3 EVALUATION OF PUBLIC PARTICIPATION IN THE CBH-VELHAS

Although the survey questionnaires responses indicate a successful participatory process at the CBH-Velhas, with a high agreement rate to statements for the selected criteria, the interviews exposed a different scenario for the state of public participation at the Velhas River Basin Committee. Some comments from this research participants indicated that public participation was not fully effective when tested against the criteria set applied in this study.

In Table 10, a summary of the results of the evaluation of public participation in the CBH-Velhas is presented by each criterion. All the criteria presented one or more deficiencies in its perception by the research participants. Therefore, the participatory processes at the Velhas River Basin Committee are partially successful, which means that although the process is not completely successful, some conditions are still met at the CBH-Velhas processes.

Table 10: Summary of the valuation of public participation in the CBH-Velhas

	Criterion	Argument
Process Evaluation	Legitimacy	Although all stakeholders are invited to participate, some constraints impede some groups to participate (e.g. internet connection, time, location of the meetings). The same group of actors has served the official representative's terms for some years, causing a low power alternate at the committee.
	Power	A power imbalance was noticed due to many factors, such as the knowledge gap and the lack of resources of some stakeholder's groups, and the misrepresentativeness of more vulnerable groups.
	Social Communication	The communication at the CBH-Velhas still fails to reach a broader public beyond the regular meeting's attendees.
Intermediary Outcomes Evaluation	Trust Building	The water permits (outorga) acts as an important instrument to grant and regulate water use and, consequently, the decisions related to this topic at the CBH-Velhas. However, the decision-making process is still perceived as potentially under the influence of vested interests of financially more powerful stakeholders by some research participants, potentially decreasing trust among stakeholders at the CBH-Velhas.
	Network Development	Some sectors of the CBH-Velhas, such as the Technical Chambers, have a strong role in bridging actors and stakeholders on segmented topics of interest. The network is also developed among the elected representatives of the CBH-Velhas due to their shared interests and field of work. However, this development is not homogeneous among different clusters. A low network development was pointed as a result of conflicts between and low engagement of some stakeholders.
	Capacity Building	The CBH-Velhas supplies its elected members with workshops and training for their capacitation for better decision making. Although there are many hydro-environmental and environmental education projects in the Velhas River Basin, there is still the need to develop capacitation and training programs for non-members was detected.

6 DISCUSSION

6.1 INTRODUCTION

This chapter discusses the findings presented in Chapter 5, considers the challenges and limitations of this research, and reflects on the research. As a reminder, the goals of this research are (1) to identify and analyse the underlying legal and institutional structures and key stakeholders that are relevant to the Velhas River Basin Committee, and (2) to determine and describe the current practice of public participation in river basin management in the Velhas river basin.

As this thesis profits from a case study design, this research is an analytical generalization of theoretical propositions rather than populations and universes. Therefore, its purpose is to compare empirical evidence with previous theories and findings (Yin 2009). Since “Public Participation” is quite common in environmental management research, some research findings can be exemplified to other river basin committees. However, no case study equals another, and, again, only a limited analytical generalisation can be withdrawn from this thesis. Although the selected criteria may impact the analysis of public participation in river basin management, local and regional features (geographical complexity, historical and legal background) are decisive factors of public participation at the CBH-Velhas.

As in criteria-based evaluation, a major challenge in this research was the data collection and availability and the inclusion of correct indicators. The selection of evaluation indicators is very context-dependent, and data availability can vary greatly (Gain, Giupponi, and Wada 2016). Even though this research never aimed for statistical analysis, the primary goal was to get a bigger sampling for the survey questionnaire and the interviews. The survey questionnaire was open for two months and provided a total of 9 responses. The low number of responses was not surprising, as, normally, research carried out through online questionnaires has a lower rate of responses, as already confirmed by Gonçalves (2008) in his research. Therefore, it explains the low results obtained in this data collection. However, caution must be applied with a small sample size, as the findings might not be transferable to a larger sampling.

Additionally, the current COVID-19 pandemic has profoundly impacted people’s health and routine. In Brazil, the pandemic had a strong impact on society, with conflicting information from different sources, a lack of national coordination on the crisis, and the pandemic's politicisation. During the social isolation imposed for mitigating the COVID-19, schools, universities and workspaces were migrated to the virtual space (F. Lopes 2021). This abrupt change also affected the CBH-Velhas, in which physical meetings and seminars migrated to videoconferences and online communication. Therefore, the surveying of questionnaires and the prospecting of interviewees was undermined by this virtual migration. Difficulties and hindrances were faced on reaching out and communicating with the members' committee and, because during the meetings only the members could actively join the conference, it was only possible to interact with the meetings via YouTube comments. This research would benefit from physical meetings, where the questionnaire surveys and network could be more easily performed. Another

hindrance to the data collection was the different time zones between Germany (GMT+2) and Brazil (GMT-3). All interviewees work from 8 am until 6 pm in Brazil, resulting in scheduling conflicts and postponements. One (ID_03) had to respond in written form to avoid further delay on this thesis from the three interviewees.

The interview guide was designed accordingly to the selected criteria for this research, aiming to collect relevant subjective norms, ideas, and perceptions at the individual level. Semi-structured interviews were important on the conduction of the interviews, loosening for deeper results and outputs. In addition, the sending of the questions in a PDF file via e-mail before the interview helped the interviewees to get more familiar with the guide questions they would respond to.

The issue of data quality should also be addressed. As aforementioned, the migration to a virtual environment limited the possibility of interaction and accessibility between the researcher of this thesis and non-members participants of the committee's meetings. Therefore, the target group for the survey questionnaires was the official elected members and alternates of the committee. So, it is important to bear in mind the possible bias in the responses. Of the nine respondents, only two were non-official members of the BH-Velhas.

Furthermore, the scales used in the survey questionnaire were a 5-point Likert scale (i.e. Strongly disagree, Disagree, Neutral, Agree, Strongly Agree). The standardisation of this scale and the qualitative transformation in quantitative data can bring problems for assigning numerical values to subjective qualitative data (Hwang and Yoon 1981). This discrepancy could be observed in the different results obtained from the survey questionnaire and the interviews. Although most of the criteria presented a positive perception from the respondents in the survey, the interviews showed a different, deeper perception of these indicators. So, the findings of the interviews could represent a counterpoint to the survey results.

6.2 INTEGRATING PROCESS AND INTERMEDIARY OUTCOME EVALUATION

There is a general assumption that high-quality processes lead to a willingness to participate and, thus, desirable participatory outcomes and facilitation and consensus-building between conflicting stakeholders require good processes (Webler et al. 2001; Rowe and Frewer 2004; Pahl-Wostl et al. 2008; Newig and Fritsch 2009b; Carr et al. 2012). A cross-sectional analysis of the collected qualitative data suggests the influence of some features of the process on the intermediary outcomes of the participatory processes at the CBH-Velhas.

Public participation is an "iterative and potentially open-ended process" (p.16, Richards et al. 2004) and, therefore, the process and its outcomes can potentially influence each other. Thus, it is important to evaluate the process and its outcomes better to understand the participatory process effectiveness better. In addition, some criteria of the pre-set applied in this research suggest some interactions with each other.

This research results show that legitimacy and power interact with each other. The lack of representation of some civil society segments results in a power imbalance at the committee.

The same relationship was found between power and capacity development. Informing and educating the public can potentially empower more vulnerable stakeholders, promoting power and sharing within the committee. The same could be applied for capacity development and network development. By building capacity on a broader public, their empowerment and increasing involvement at the CBH-Velhas meetings could potentially increase the network development among different stakeholders. The next sections of this chapter examine and discuss the link between some of the pre-set criteria applied in this study.

6.2.1 Representativeness and Inclusiveness

Representativeness in the committee brought some inputs to the survey and the interview. In this study, it was found a power imbalance between the representative clusters of the committee. It was argued that, although the committee respects the four-cluster representativeness instituted by the Water Law, it is observed that some society's segments have no representation in the committee. The lack of representation for some groups of actors in river basin committees, especially those belonging to more vulnerable groups (e.g. quilombolas, indigenous, afro-descendants people), was already noted (Carvalho 2015). Souza Junior (2003) reported in this research that one of the causes for this paucity could be the lack of criteria to guarantee spatial vacancies distributions and the non-inclusion of minorities on the committee. According to Trachtenberg and Focht (2005), if the participants reflect the range of interest, value and other relevant demographic features of the represented non-governmental actors and stakeholders, representativeness is improved. However, when only some groups among these stakeholders are drawn to the participatory process, members of under-represented groups might feel left out in the policy-making process and reject its results (ibid.).

Another important finding on the representativeness and inclusiveness of the CBH-Velhas was the municipal cluster difficulty in engaging its representatives in the committee. The Velhas River Basin has a large catchment area with multiple diverse cultural, social, political, economic and environmental impacts and extensions. The CBH-Velhas has a subcommittee strategy to articulate and decentralize the committee's activities to the sub-basin level to address its geographical and socio-political complexity. In these spaces, the CBH-Velhas engages in the decision-making process at the municipal level, with some positive results on sanitation in some small cities (Reis 2011). However, the subcommittees are only consultive and have no deliberative power in the CBH-Velhas. Agrawal and Ribot (1999) argue that to include accountability, a democratic, decentralized model goes beyond the transference of power from central to local authority bodies, and the success of decentralization depends on some variables such as social capital and civic education. Another issue faced by the municipal cluster is the problem of fit related to the municipal government mandates. The mandate of the CBH-Velhas does not follow the mandates of the municipal government, which brings changes of members of the municipalities in the official member board of the committee.

Although non-representativeness harms the legitimacy of the process and the power-balance and trust-building at the CBH-Velhas, the inclusion of too many stakeholders can also create a problem. In the HarmoniCOP project at the Flemish river basin, the high number of participants

at the meetings was problematic due to the lack of an appropriate meeting format for a large group. The same project at the Elbe river basin found out that when the stakeholder groups are organized and these organizations represent their members adequately, it is possible to include many stakeholders in the decision-making process (Mostert et al. 2007). However, identifying and bringing together a 'mini-public' that mirror the broader spectrum of opinions and positions is challenging, especially in a river basin, where multiple issues are addressed (Holmes 2011; Carr 2015).

Different viewpoints should be sufficiently represented in the decision-making process. Representativeness and inclusiveness of participants in any participation process are decisive, so it needs careful planning and consideration, or an inadequate representation can affect the process's quality (Diduck and Mitchell 2003).

6.2.2 Information and Knowledge Exchange

Although most interviewees (two of three) agreed with the quality of social communication at the CBH-Velhas, it is seen as a problem for the third interviewee. For better accountability and transparency in its processes, the communication strategies at the committee flow through an operating water agency (Agência Peixe Vivo) and a hired communication agency. However, the communication becomes less fluid and organic, failing to reach a part of the stakeholders. This issue became more visible during the COVID-19 pandemic when the transition to the virtual environment harmed the accessibility of groups who have poor to no connection to the internet.

In their research, Hirsch et al. (2010) found out that a diverse group of stakeholders at the meetings and discussions promoted multi-level communication and successfully transferred local interests to higher levels. For Rowe and Frewer (2000), higher levels of public participation may seek some input from the public representatives, characterized by dialogue and two-way information exchange. Thus, public misunderstandings and objections could be overcome by the view of experts, increasing public acceptance of policies and decisions as a result of a well-aligned process. Informing the public comes not only on communicating the information but also on assuring that the message is absorbed and understood by the receivers.

In her work at the Watermark Project, Abers and other researchers (2005; 2007; 2009) disclosed the close relationship between the Manuelzao Project and local communities to empower and include the general public in the CBH-Velhas, informing and educating the public on some problems at the Velhas River Basin. The Manuelzao Project managed to "translate technical issues into ordinary language", building an identity and disclosing the relationship of local communities with the Velhas River basin (Abers 2007). It is somewhat surprising that the survey questionnaires respondents presented a 78% rate of agreement with the sentences describing some features of capacity development at the CBH-Velhas, but all of the interviewees showed dissatisfaction when asked on this topic. Another interesting finding was how capacity building is still an important topic to be addressed at the CBH-Velhas. Özerol and Newig (2008) reported that communication and capacity building are the most recurrent issues implementing WFD in Europe.

Knowledge is an important element for effective decision-making, so facilitating learning and system thinking among the participants is essential to the participation process. Yet, it is important not to promote overly technical debates that exclude and bar out other participants in this process (Beierle and Cayford 2002; Abers 2010). For Graham (2004), participation is more than a transmission of information but a learning and social construction process. Because river basin management is information-intensive, it is important to bring traditional and technical knowledge holders to the participatory process, mobilizing and integrating information into management strategies (Hahn et al. 2006; Carr 2015).

Although a large group of the well-informed public might fulfil an ideal of public participation, this vision is unrealistic. There is a difference between what the wider affected public should know and what the active participant public should know (Beierle 1998). The CBH-Velhas attempts to practice this varied knowledge and information sharing through its Technical Chambers and Working groups (GT). Some interviewees cited the importance of the articulated work of the Technical Chambers and the Working groups to provide relevant knowledge to the committee members when a more technical agenda needs to be addressed during the meetings. However, it is also crucial that the wider public knows enough about relevant issues in the basin to have a realistic understanding of the topics being discussed and the decisions being made at the CBH-Velhas.

Misinformation and lack of knowledge on environmental issues affect how the public control its impact on water resources and is identified as a hindrance to participation. Communication with the public and capacity development are connected to participants' understanding and ability to participate. (Beierle 1998; Özerol and Newig 2008). The development of common understandings and knowledge among a group of participants is an important step to set the rules and principles of participation (Harrison et al. 2001). Özerol and Newig (2008) reported that capacity building and communication problems could not be solved quickly since training and learning are necessary, demanding time from the public and authorities. However, education should be continuously available to the citizens, especially at the local level, and it takes some time and commitment, so people have sufficient knowledge to participate in these processes(Pretty 1995) meaningfully.

On the other hand, local knowledge should be integrated into the participatory process. For example, one interviewee cited the one-way knowledge flow in the CBH-Velhas: from "knowledge producers" to the general public. Some researchers propose a shift in this dynamic towards a more collaborative approach, with the technical body and the general public communicate and influence each other throughout the process, and both bits of knowledge, traditional and technical, are equally valued (Phillipson and Liddon 2007; Reed 2008).

6.2.3 Social and Human Capital

In a diverse environment such as the CBH-Velhas, trust and network building can play a strong role in fostering legitimacy and transforming conflicts between stakeholders (Stringer et al. 2006; Reed 2008). This current study found that one of the committee's participatory process criticisms was the "same faces" that integrate the Plenary as officially elected members. Some interviewees

cited the importance of renovating the committee and developing new leadership at the committee.

The committee was described as a “water bubble” where most participants also engage in other water-related events, jobs, and activities. The network and relationship building seems to be hampered by this configuration. According to some researchers (Carr 2015; Schlüter and Pahl-Wostl 2007), clientelist networks can block environmental strategies. In their empirical work on social capital and value creation, Tsai and Ghoshal (1998) described how social interactions in a network developed trustworthiness. For Putnam (2000), “what really matters from the point of view of social capital and civic engagement is not merely nominal membership, but active and involved membership” (pg. 59).

Public participation also promotes social learning, where the wider public can learn from each other by developing new relationships and building trust among a group (Pahl-Wostl and Hare 2004; Stringer et al. 2006). Otherwise, power inequalities emerge, precluding the broad public engagement on the CBH-Velhas activities. Prell et al. (2007) reported how working with small groups built opportunities for the participants to socialize, thus enhancing trust and the relationship between participants.

For Tippett and Handley (2007), trust and relationship development increase the likelihood that the participants will perceive the participatory processes as fair and transparent. In her study on self-organization and self-governance, Ostrom (1990) points out that social capital can be viewed as a tool to solve common pool resources problems, such as opportunistic behaviour and individualistic behaviour. Because social capital supposedly enables actors to a more meaningful participation in the decision-making process, defend their interests, and contribute to joint problem-solving, Jager et al. (2019) termed social capital as “Stakeholder Capacity Building”. Yet, Cleaver (1999) argues that the ideas of social capital and civil society are strongly institutionalist and vague in development projects, with the reduction of participation as a managerial ‘toolbox’ for better environmental management.

Natural resources management can be information intensive in socio-ecological systems due to the fragmented knowledge from a multi-scale source. Therefore, it is important to build strong institutions to foment social and human capital across the parties of the system (Berkes 2009). According to Berkes (2009), social capital is important because it is a prerequisite for collective action and social learning. Furthermore, by bonding existing relationships and bridging new connections, the enhancement of social capital can facilitate further collaboration between different actors and lead to better acceptance of decisions, resulting in compliance and efficient implementation of the reached decision (Newig and Fritsch 2009b; Carr et al. 2012).

7 CONCLUSION

Public participation is an increasing research topic among environmental resources management, especially discussing participation as an essential mechanism for sustainable water management. As a result, many studies have been published on public participation in natural resources and water resources management. However, there is not so much information on participatory processes on river basin management in state-level basins in Brazil. So, this study sought to complement this information gap on participatory processes at a selected study area, the Velhas River Basin, in Minas Gerais. This thesis relied on a case study research design to identify and analyse participation processes at the Velhas River Basin Committee.

The first objective was fulfilled by a literature review of the historical, geographical, institutional and legal context in which the CBH-Velhas is inserted. This literature review of the basin was also part of the evaluation framework, where contextual information is necessary to analyse institutional context-based factors of the committee. The comprehensive overview is presented in Chapters 4 and 5.1, but a shorter overview indicates that the CBH-Velhas strongly links to the Civil Society cluster. The CBH-Velhas and the Manuelzao project history can be told together, as both organizations were founded almost simultaneously. Although they initially developed their activities parallelly, the Manuelzao Project played an important role at the CBH-Velhas over the years, especially regarding multi-level governance creating the subcommittees and civic engagement CBH-Velhas activities. Hence, the CBH-Velhas occupies a prominent position at the regional and national levels regarding water policy and stewardship.

The second objective was fulfilled by the results presented in Chapter 5.2 and discussed in Chapter 6. For so, multiple steps were required, as described in Chapter 3. First, the prior development of the theoretical framework allowed the identification and selection of a set of criteria and indicators for the analysis and evaluation of the participatory processes. Then, criteria data were collected through a survey questionnaire application and semi-structured interviews to finally be analysed. Based on the analysis and discussion of the empirical research presented in this report, this study has shown significant barriers to effective and successful public participation. Although data for these criteria were collected separately, the process features and its intermediary outcomes have a strong interaction between them, and, therefore, an integrated analysis of the pre-set criteria was applied and discussed in this study.

The results exposed a flawed public participation process, manifested by a lack of representativeness, some failures in information and knowledge sharing, and underdevelopment of social capital. Power and social communication interact with the capacity building of the process. Informing and educating the public has a strong role in empowering and motivating the public to involve and recognize their contribution to the problems and solutions of the Velhas River Basin challenges and meaningfully participate. Legitimacy and social interaction with trust-building and network development, both indicators of social capital. The extent of inclusiveness and representativity of less vulnerable groups can influence network development and trust-building among members and non-members. Although the general result exposed a good level of trust and network development within the committee, it was cited almost exclusively in a

„water bubble“ of actors and stakeholders who work and contribute to the water segments for some years. Thus, newcomers and further participants who are not part of this „water bubble“ could face difficulties and hindrances in developing new relationships and networks during the participatory processes. Therefore, hindrances on access and representation in the process could threaten the building of social capital. These loopholes on the committee's participatory processes should be addressed so a broader public, especially the less powerful segments, would impact and influence the decision-making process. However, the suggestions of measurements and instruments to overcome these problems are not in the scope of this thesis. So, it is recommended for future researchers to focus on improvements and solutions for a more active public participation in the CBH-Velhas.

As this thesis benefits from a case study, a holistic, flexible, and context-specific analysis was made. Still, collecting and analysing different sources of evidence demand a significant amount of time and resources, which were not available for this research. Therefore, even though the case-study method enables a complex, in-depth analysis of the topic, it is also challenging to implement a comprehensive analysis within the frame of a master thesis. Therefore, this thesis could not fully analyse and discuss the embraced topic and presents only an overview of participatory processes at the CBH-Velhas. This work has the potential to be further developed and would benefit from an *in situ* participant observation, questionnaire applications and interviews.

Finally, considering that this research has a general objective of contributing to the challenges and potentialities regarding public participation in river basin management, it can be concluded that the Velhas River Basin Committee has managed to engage the public in its processes, despite some hindrances that its participants still perceive. The Brazilian Water law grant some executive power to the committee (i.e. River Basin Plans, Water framing, Water Permits and Bulk water charges). On the search of consensus between its representative's clusters, the meetings and conferences in the committee provide a space to promote debates, exchange of knowledge, and exercise citizenship. Such a scenario would not be reached only via public consultation but with more active participation.

Public participation is too complex to find an easy solution to what works and why (Beierle and Konisky 1999). However, critical and promising perspectives emerged from the collected data for this thesis, especially from the interviews. A common point in the interviews concerning public participation at the CBH-Velhas recognized the weak points of the committee processes by the elected members and the willingness to improve it, especially regarding Legitimacy, power and capacity development. The CBH-Velhas has a symbiotic history with regional Grassroot and civic involvement. Therefore, strengthening the institutional committee related to its actors and stakeholders, especially civil society, is pivotal for the CBH-Velhas and its basins subcommittees, where lessons learned could be transferred and adapted to different realities. As already exhaustively stated in this thesis and other research papers, public participation is one of the crucial factors toward more sustainable water resources stewardship.

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APPENDIX A SURVEY QUESTIONNAIRE

DEMOGRAPHY

1. City of residence:_____

2. Gender:
- Male
- Female
- Other: _____
- Prefer not to say

3. Age:
- Under 18 years old
- 18-29 years old
- 30-49 years old
- 50-69 years old
- 70 years or older
- Prefer not to say

4. Ethnic / Color identity:
- White / Caucasian
- Indigenous
- Pardo
- Asian-Brazilian
- Prefer not to say

5. Highest Education completed:
- Never studied, incomplete Primary
- Primary School
- Secondary School incomplete
- Secondary School completed
- University incompleted
- University completed
- Prefer not to say

6. Area of expertise:
- Formal Science (e.g. Statistics, Mathematics)
- Natural Science (e.g. Life and physical science)
- Social Science
- Engineering (Applied Science)
- Other: ____

7. Are or Were you an elected CBH-Velhas member?
- Yes
- No

8. Which representative cluster are you part of?
- Federal Government
- State Government
- Municipal Government
- User
- Civil Society

9. How often do you participate in the CBH-Velhas meetings?

- Never
- Sometimes
- Frequently
- Always

10. What is your primary motivation to participate in the meetings?

- Concern with water resources
- Concern with economic impacts
- Personal obligation
- Professional work
- Water management instruments deliberation (bulk water use charges)

PROCESS CRITERIA

Criteria related to the participatory process design.

Legitimacy

In this criteria, we would like to determine if the participatory process includes or allows those influenced by management decisions to fairly contribute to the decision-making process.

Survey Question	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
1 The participants represent a broad part of the stakeholders. 2. Adequate information and meetings are accessible to all participants 3. The process is transparent, open and accountable 4. The process incorporates consensual decision-making 5. The decision-making is not biased by political motivation					
Do you recognize any hindrance for legitimacy in the decision-making process?	(Free to comment)				

Power

In this criteria, we would like to determine if the participatory process deals with power asymmetry and supporting power-sharing between participants.

Survey Question	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
1. Participants have substantial influence over decision-making 2. The process and institutional arrangement promotes power-sharing between participants 3. The four representatives clusters have balanced power to influence the process and outcomes 4. The process trains and empowers low-power participants					

5. The process is conducive to consensus-building
Do you recognize any hindrance for balanced power in the decision-making process?

Social communication (Facilitation and Dialogue)

In this criteria, we would like to determine if communication within the process is fair and democratic.

Survey Question	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
1. Facilitation creates a dynamic space of exchange 2. The meetings attempt to find common interests, focusing on shared values rather than a vested interest 3. Communication between the participatory group and lead agency is continued. 4. The meetings allow the participants to introduce topics for discussion and share their needs, concerns, and values 5. There is facilitation of constructive personal behaviours					
Do you recognize any hindrance for facilitation and dialogue in the decision-making process?	(Free to comment)				

INTERMEDIARY OUTCOMES (Social Goals)

Criteria related to essential side benefits of the participatory process, which transcends any immediate interest.

Social Capital (Trust-building and Network Development)

Survey Question	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
Trust-Building In this criteria, we would like to determine if the participatory process fosters trust between different participant horizontally and vertically.					
1. Public trust in government agencies is fostered 2. There is a clear understanding of how the participant's input will be used on watershed management. 3. Participants are confident that the participatory process will help resolve the addressed issues 4. The decisions achieved are often trusted by all					
Do you recognize any hindrance to trust-building in the decision-making process?	(Free to comment)				
Network development In this criteria, we would like to determine if the participatory process develops interactions among participants.					
1. The process leads to constructive interaction between participants, leading to continued dialogue 2. There is an improvement in the relationship between the community and governmental institutions 3. The process leads to continuity of involvement; 4. The facilitator helps to establish alliances between stakeholder					

Capacity Building In this criteria, we would like to determine if knowledge and skills are developed and shared among participants.	
1. The public is educated about the implications of their values and actions regarding water use; 2. The process leads to higher awareness and reflection on the challenges and opportunities on the river basin management 3. Participants gain knowledge (formal or informal) and understanding of the issue being addressed 4. The process generates information that would not be available otherwise	
Do you recognize any hindrance to capacity building in the decision-making process?	(Free to comment)

APPENDIX B INTERVIEW POOL OF QUESTIONS

INTERVIEW GUIDELINES

PERSONAL INFORMATION
Name:
Sex:
Representative Cluster:

The purpose of this interview is to gain input regarding participatory processes in the Velhas River Basin Committee regarding some process and intermediary outcome criteria (Legitimacy, Power, Social Communication; Trust-building, Network development and Capacity Development). The inputs of this interview will support the master research. The identity of the respondents will be kept confidential and will not be disclosed to a third party.

Pool of Questions

Introduction

1. Could you briefly describe your personal and institutional involvement in the CBH-Velhas?
2. How would you describe the participative processes in the committee?
3. How would you describe other participants and representatives of the committee? Do they play a fixed role within the committee, or are there flexibility within the CBH-Velhas structures?

Process-criteria

4. How is the participation of less visible and/or more vulnerable groups in the committee meetings? (e.g. residents of the rural and vulnerable urban areas, women, peripheric residents)
5. Do you recognize any strategy or actions from the CBH-Velhas to incentivize and/or empower these less dominant groups?
6. How would you describe the power distribution within the committee members? Do all the participants hold the same power to impact the decision-making process?
7. Who is taking over the facilitation process during the meetings? How do you describe the quality of facilitation and mediation inside and outside the committee?
8. Are the participants actively communicating and discussing in the meetings?
9. How do you describe the communication strategies of the committee with the internal and external public? Do you think the announcements and information published by the committee are reaching a public beyond the internal public?

Intermediary outcomes:

10. How impartial is the committee's reached agreements and decisions? Do you recognize any decision that was vested in external interest?
11. How would you describe network and relationship building with the other members and participants of the CBH-Velhas' meeting? Is communication between members continuous or strict only during the meetings?
12. How do you judge the development of the inter-institutional relationship? Do you recognize any improvement in the relationship between the community and official governmental organizations?

1. The members and participants of the committee have different academic and professional backgrounds. Does the committee offer capacity-building programs to develop and capacitate its members and public to the general and technical discussion topics?
2. If you are not an official member of the committee, do you feel motivated to have continuous involvement in the committee? Why?

Final Questions

3. Would you like to say something else that was not mentioned in this interview or in the survey questionnaire you previously responded to?