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Water Resources Governance and Sustainable Regional Development: The Case of the Itajaí Committee (SC)

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Abstract
This article aims to analyze the performance of the Itajaí Committee in relation to water resources management, with a view to identifying its impact on the Sustainable Regional Development (SRD) of the Itajaí Valley (SC). The methodology is a qualitative-quantitative approach of a descriptive and exploratory nature, divided into two stages: i) analysis of meeting minutes, attendance lists of ordinary and extraordinary general assemblies, and other official documents; ii) analysis of the perception of the governance of water management by the members of the Itajaí Committee through semi-structured interviews. The results reveal deficiencies in several aspects that exacerbate conflicts over water, including low participation rates of members in the assemblies, especially representatives from the local population of the basin, the lack of implementation of economic instruments for water use, and the shortage of financial and technological resources. Despite various actions that have contributed to the sustainable development of the region, particularly in terms of Disaster Risk Management, the Committee seems to have lost relevance in recent years. This weakening has made the Committee a less attractive and efficient space for the involved actors, which hinders the progress of an integrated and solid agenda for SRD. Therefore, it is necessary to implement strategies for participatory water resources management, including the adoption of water usage charges, the promotion of equity, strengthening representation and inclusiveness in decision-making, and encouraging political autonomy for the implementation of concrete actions.

Keywords: Governance. Water Resources. Itajaí Committee. Sustainable Regional Development

Governança dos Recursos Hídricos e Desenvolvimento Regional Sustentável: O Caso do Comitê Itajaí (SC)

Resumo
Este artigo objetiva analisar a atuação do Comitê do Itajaí em relação a gestão dos recursos hídricos, com vistas a identificar o impacto no Desenvolvimento Regional Sustentável (DRS) do Vale do Itajaí (SC). A metodologia se configura como uma abordagem qualiquantitativa

de caráter descritivo e exploratório, dividida em duas etapas: i) análise de atas, listas de presença da assembleia geral ordinária e extraordinária entre outros documentos oficiais; ii) análise da percepção sobre a governança da governança da água dos membros do Comitê do Itajaí por meio de entrevistas semiestruturadas. Os resultados revelam deficiências em vários aspectos que agravam conflitos em torno da água, incluindo a baixa taxa de participação dos membros nas assembleias, especialmente dos representantes da população da bacia, a não implementação de instrumentos econômicos pelo uso da água, a falta de recursos financeiros e tecnológicos etc. Apesar de diversas ações que contribuíram para o desenvolvimento sustentável da região, principalmente no que diz respeito a Gestão de Risco de Desastre, o Comitê parece ter perdido relevância nos últimos anos. Esse enfraquecimento tem tornado o Comitê um espaço menos atraente e eficiente para os atores envolvidos, o que prejudica o avanço de uma agenda integrada e sólida para o DRS. Diante disso, é necessário implementar estratégias de gestão participativa dos recursos hídricos incluindo a adoção da cobrança pelo uso da água, a promoção da equidade, o fortalecimento da representação e representatividade na tomada de decisões e o estímulo à autonomia política para a implementação de ações concretas.

Palavras–chave: Governança. Recursos Hídricos. Comitê do Itajaí. Desenvolvimento Regional Sustentável.

Gobernanza de los recursos hídricos y desarrollo regional sostenible: El caso del Comité de Itajaí (SC)

Resumen

Este artículo tiene como objetivo analizar el desempeño del Comité de Itajaí en relación con la gestión de los recursos hídricos, con el fin de identificar su impacto en el Desarrollo Regional Sostenible (DRS) del Valle de Itajaí (SC). La metodología es un enfoque cualitativo-cuantitativo de carácter descriptivo y exploratorio, dividido en dos etapas: i) análisis de las actas de las reuniones, listas de asistencia de asambleas generales ordinarias y extraordinarias, y otros documentos oficiales; ii) análisis de la percepción de la gobernanza de la gestión del agua por los miembros del Comité de Itajaí mediante entrevistas semiestructuradas. Los resultados revelan deficiencias en varios aspectos que agravan los conflictos sobre el agua, incluyendo la baja tasa de participación de los miembros en las asambleas, especialmente los representantes de la población local de la cuenca, la falta de implementación de instrumentos económicos para el uso del agua y la escasez de recursos financieros y tecnológicos. A pesar de diversas acciones que han contribuido al desarrollo sostenible de la región, particularmente en términos de Gestión de Riesgos de Desastres, el Comité parece haber perdido relevancia en los últimos años. Este debilitamiento ha hecho que el Comité sea un espacio menos atractivo y eficiente para los actores involucrados, lo que dificulta el avance de una agenda integrada y sólida para el DRS. Por lo tanto, es necesario implementar estrategias de gestión participativa de los recursos hídricos, incluyendo la adopción de cargos por el uso del agua, la promoción de la equidad, el fortalecimiento de la representación e inclusión en la toma de decisiones y el fomento de la autonomía política para la implementación de acciones concretas.

Palabras clave: Gobernanza. Recursos hídricos. Comité de Itajaí. Desarrollo Regional Sostenible.

1 Introduction

There are numerous reasons that make the issue of water a global, complex, and multifaceted problem. The appropriation of water resources by society, driven by standards of comfort and modern life, has led the planet into a serious water crisis. Excessive water use in human activities, industrial pollution, unchecked urbanisation, and the impact of climate change are some of the factors contributing to this crisis. According to Hofste et al. (2019), in most places, there is no global water availability crisis, but rather a crisis resulting from poor management.

In Brazil, which holds 12% of the world's total freshwater, problems related to poor water distribution occur both within and across regions, affecting scarcity, abundance, and pollution-related degradation (Nicollier, Kiperstock & Bernardes, 2023). Historically, the most severe water deficits in Brazil are registered in the semi-arid region of the Northeast, which is often subject to drought. In regions along the Atlantic coast, where 45.5% of the country's population resides, only 2.7% of Brazil's water resources are available. Irrigated agriculture accounts for the largest share of water consumption among all productive activities, approximately 70% (Figueiredo et al., 2024).

In this context, to manage water rationally and sustainably throughout the country, Law no. 9.433/1997 (Brazil, 1997), known as the Water Law, was enacted, establishing the National Water Resources Policy (PNRH) and the National Water Resources Management System (SINGREH). Within this system, River Basin Committees (CBHs) play a strategic role.

In the state of Santa Catarina, the Itajaí River Basin Management Committee (Itajaí Committee) was established by State Decree no. 2.109/1997 (Santa Catarina, 1997). The challenges related to water resource management in the Itajaí River Basin (BHRI) include floods, flash floods, landslides, and droughts; problems related to high rainfall; urbanisation in risk-prone areas (riverbanks and hillsides); and various economic activities (agriculture, irrigation, industry, and ports) that not only compromise water quality and availability in the BHRI but also create conflicts with traditional communities such as Indigenous peoples and artisanal fishers.

Based on the understanding that the water crisis is a governance issue, overcoming the various challenges and conflicts surrounding water resources in the BHRI also depends on the Itajaí Committee's management. However, as part of a multi-scale water governance arrangement within SINGREH, the Itajaí Committee cannot be held solely responsible for the lack of resolution of issues related to integrated water resource management in the BHRI. It is important to stress that basin committees were not conceived to replace state action. Their main role is to define water management priorities, while the implementation of such priorities falls under the responsibility of Water Agencies (Abers & Keck, 2004).

Nevertheless, the Committee plays a fundamental role as a participatory decision-making body, bringing together representatives from different sectors of society to discuss and deliberate on water management issues. In this context, the objective is to analyse the performance of the Itajaí Committee in relation to water resource management, with a view to identifying its impact on the Sustainable Regional Development (SRD) of the Itajaí Valley (SC). The article is divided into five

parts: literature review; case study characterisation; methodology; results and discussion; and conclusion.

2 Sustainable Regional Development and Water Resources Governance

The concept of development became central in political and academic debates following the Second World War, although its roots can be traced back to earlier periods (Theis, 2022). In the 19th century, the pursuit of capital accumulation and expanded reproduction dominated economic thought, widely criticised by Karl Marx and Friedrich Engels (Theis, 2022). This era also witnessed technological innovations such as the combustion engine and mastery of electricity, which spurred the exploitation of natural resources. Between 1871 and 1929, the Neoclassical School prevailed, focusing on wealth accumulation and general equilibrium.

Post-World War II, Rostow's Modernisation Theory and the Keynesian model of economic growth dominated until the 1970s. However, increased production and consumption brought about socio-environmental impacts, such as growing demand for non-essential products and environmental degradation. During the 1960s and 1970s, environmental liabilities were increasingly discussed, leading to the establishment of the United Nations Environment Programme (UNEP) as the global environmental authority (UNEP, 2022).

From the 1970s onwards, the United Nations (UN) initiated global debate on environmental issues, promoting the first global conference on the Human Environment in Stockholm in 1972 (Rocha, Eckert & Nelson, 2023). In this context, Ignacy Sachs introduced the concept of eco-development, proposing endogenous and ecologically responsible development, seeking to harmonise social and economic goals with sustainable resource management (Sachs, 1993). The concept aimed to support a civilisation model based on intergenerational solidarity, with a focus on preserving common goods for future generations.

During the conference, the report 'The Limits to Growth' warned of the risks of depleting common goods if continuous growth models persisted. In 1987, the Brundtland Report consolidated the definition of sustainable development as meeting present needs without compromising those of future generations (Amaro, 2023). Since then, sustainable development has been promoted as a means to reconcile economic growth with environmental conservation, although it remains controversial (Cruz et al., 2022). The 1992 Earth Summit, known as Rio-92, cemented this paradigm with documents such as Agenda 21 and the Earth Charter, establishing global commitments towards a more sustainable and equitable future.

In 2002, the Rio+10 summit in Johannesburg focused on sustainable development, addressing issues such as poverty, natural resources, globalisation, and human rights, with emphasis on renewable energy. Ten years later, Rio+20 introduced governance in the context of sustainable development, proposing measures to ensure access to clean energy—particularly for the poor—and advocating the use of biodiesel and ethanol. This event also marked the creation of the 17 Sustainable Development Goals (SDGs), established by the UN to address social, economic, and environmental challenges and guide global sustainability efforts up to 2030. Of particular note is SDG 6, which aims to ensure sustainable water governance, access to clean water, and basic sanitation for all by 2030.

Sustainable regional development (SRD) is a multidimensional process involving the mobilisation of social, economic, cultural, and environmental assets of a region to improve quality of life. It requires regional autonomy, the capacity to reinvest economic surpluses, social inclusion, environmental awareness, and a collective identity in relation to the territory (De Lima, 2021). In Brazil, SRD must be viewed as a result of social relations, not merely economic activity. The country's passive integration into the global economy results in territorial fragmentation and exacerbates regional inequalities, with some areas supporting capital accumulation while others remain underdeveloped (Butzke, 2020).

Brazil's late industrialisation, initiated during the Vargas government in the 1930s, deepened socio-economic disparities, highlighting the need for regional policies. From 1950 to 1970, the territory was viewed as homogeneous, with state interventions limited to macro-regional scales. The 1980s witnessed a crisis and redefinition of planning, while the 1990s brought new interpretations of development that recognised regional heterogeneity. Since the 2000s, regional planning has incorporated multiple scales. The 2003 National Policy for Regional Development (PNDR) highlights the importance of watershed management, focusing on water sustainability and conflict resolution over water use (Silva, Feitosa & Soares, 2022).

Water generates interest among various groups as a universally used resource. Charging for its use serves not only to promote rational consumption by attributing economic value, but also to generate resources for water management in the BHRI. In addition to being a legal instrument under the PNRH, water charges can sustain a decentralised and participatory decision-making system (Abers & Keck, 2004). This approach aims to stimulate debate on the purpose and application of such charges, rather than enforcing them merely as a legal requirement.

The Global Water Partnership (2002, p. 1) defines water governance as the range of 'political, social, economic, and administrative systems in place to develop and manage water resources and deliver water services at different levels of society.' It encompasses the political, social, economic, and legal frameworks established by a society to manage water-related issues (Empinotti et al., 2021). International water governance rests on three pillars: (a) the role of international actors; (b) international environmental and freshwater law; and (c) financing mechanisms. Its primary aim is to foster cooperation among states and promote an integrated governance model for water resources.

In Brazil, water governance gained strength in the late 1990s with the enactment of the National Water Resources Policy (PNRH) and the creation of SINGREH through Law no. 9.433/1997 (Brazil, 1997). The law establishes, in Article 1, that water is a public good, a finite natural resource with economic value; in situations of scarcity, priority use is for human consumption and livestock watering; water resource management must allow for multiple uses; the river basin is the territorial unit for implementing the PNRH and SINGREH; and management must be decentralised, involving public authorities, users, and communities (ANA, 2020).

SINGREH's institutionalisation was an innovation in water management (Brazil, 1997). Its objectives (Art. 32) include coordinating integrated water management; administratively resolving conflicts over water use; implementing the PNRH;

planning, regulating, and controlling the use, preservation, and recovery of water resources; and promoting water charges. The national system is composed of: (i) National Water Resources Council; (ii) National Water Agency (ANA); (iii) State and Federal District Water Resources Councils; (iv) River Basin Committees; (v) federal, state, district, and municipal agencies with water-related responsibilities; and (vi) Water Agencies.

River Basin Committees are decentralised collegiate bodies with normative, deliberative, and consultative functions, composed of representatives from three equally weighted sectors: the state, municipalities, and civil society organisations based in the basin (Loitzenbauer, 2024). According to the National Water Resources Policy (Brazil, 1997), CBHs are responsible for approving the basin's proposal for integration into the State Water Resources Plan (PERHSC) and its updates; approving proposals for annual and multiannual financial allocations to water management services and works; approving plans for the use, conservation, protection, and recovery of water resources; facilitating cooperation and resolving conflicts among water users; and promoting studies, public engagement, and debate on priority programmes and works of collective interest.

Evaluating the organisational structures managing the system is an essential component of good governance, as such assessments demonstrate commitment to the adopted model. Water governance evaluations are vital for identifying the state of management, strengths and weaknesses, and for guiding improvements, tool development, indicator creation, transparency metrics, and organisational adjustments.

A key outcome of such evaluations is enhanced awareness of governance status and improved access to information. Various governance evaluation models exist, such as the one developed by Dionel (2021), which assesses committee effectiveness across multiple dimensions. These typically include effectiveness, legal status, accountability and transparency, participation, representation and inclusiveness, equity, and technical capacity. Governance evaluation is an essential process for strengthening water resource management systems.

3 The Itajaí River Basin

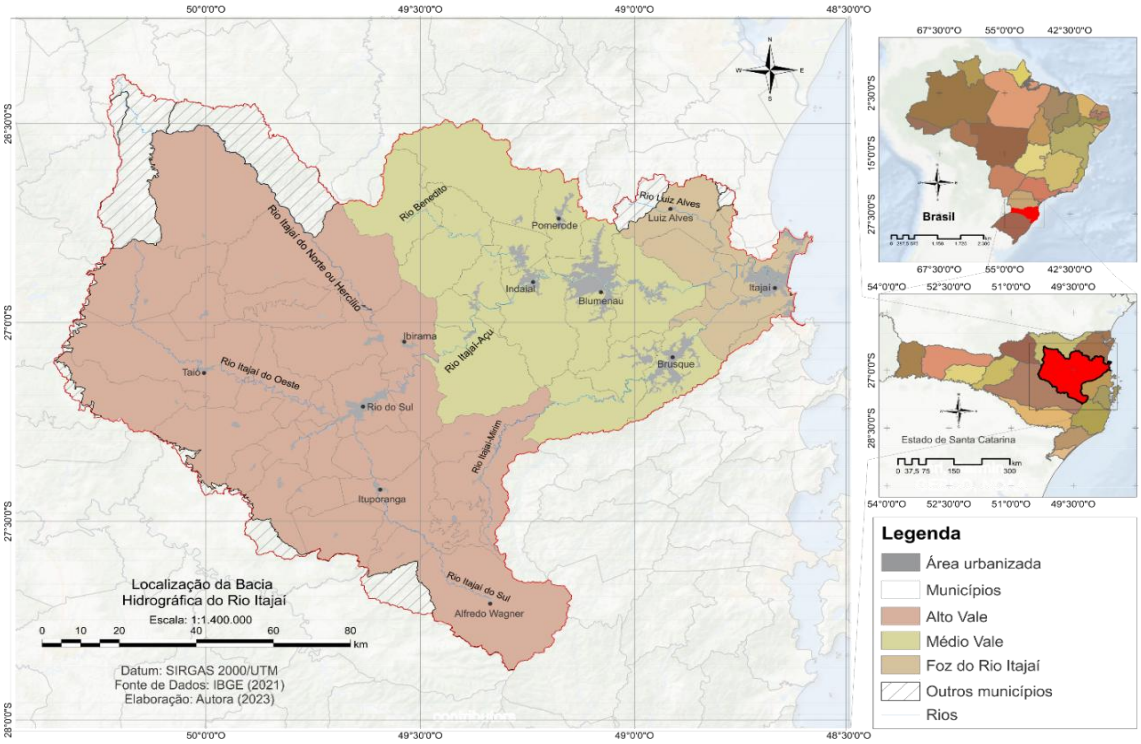
The Itajaí River Basin (BHRI) comprises 61 municipalities, with the Itajaí Committee focusing its activities in 49 of them. According to Vieira et al. (2022), these municipalities are grouped into microregions defined by associations of municipalities: (i) Foz do Rio Itajaí (comprising the Association of Municipalities of the Mouth of the Itajaí River – AMFRI); (ii) Médio Vale (Association of Municipalities of the European Valley – AMVE); and (iii) Alto Vale do Itajaí (covering municipalities in the Association of Municipalities of the Upper Itajaí Valley – AMAVI). The region has a population of over 1.5 million and an area of approximately 15,000 km², making it the largest territorial extension in the state of Santa Catarina (IBGE, 2022).

Water played a decisive role in the region's occupation, as cities were established along the rivers, situated on the banks of the water bodies comprising the BHRI. During colonisation, this location offered benefits such as river transport, water supply, and waste disposal. However, it also led to negative outcomes,

including recurring floods and pollution from sewage and various waste (Mello et al., 2024).

From the 1960s onwards, the BHRI experienced a new dynamic with increased regional integration in Santa Catarina, resulting in social and economic innovations that spurred urbanisation and industrialisation. By the 1990s, commerce, tourism, education, healthcare, and other services expanded significantly. The economic transition led to diversification, focusing on service specialisation to meet the needs of a growing urban population. As of 2023, the primary water-consuming economic activities in the BHRI include public supply, livestock, industry, aquaculture, irrigation, mining, and energy generation (Itajaí Committee, 2021). Among these, irrigation, industrial activity, and livestock farming are the most water-intensive.

Figure 1 – Location of the Itajaí River Basin



Source: Prepared by the authors based on vector data from IBGE (2021).

In the Alto Vale, the greatest concern is drought, which poses a critical threat to water supply and to agricultural and irrigation activities vital to the region. In the Médio Vale, floods are historically significant, and municipalities have developed resilience to cope with them. However, the current concern lies in the growing number of people living in landslide- and flash flood-prone areas, especially in cities like Blumenau, Gaspar, and Brusque. In the Foz do Rio Itajaí, floods and flash floods are major issues affecting SRD in the microregion (Polette, 2022). Key infrastructure, such as ports, has historically been impacted by such events, hindering economic activity. The excessive soil sealing in several municipalities contributes to more frequent flooding. Moreover, sea level rise—projected by the Intergovernmental Panel on Climate Change (IPCC, 2021) to reach 80 cm by 2100—could affect much of the Foz region.

In the Alto Vale microregion, the economy includes agriculture, irrigation, logging, livestock, and diverse industrial sectors. However, major problems stem from pollution caused by intensive pesticide use, which contaminates the Itajaí do Oeste, do Norte, and do Sul rivers—important tributaries of the Itajaí-Açu River (Aquisição et al., 2023). Another key issue is the high volume of water diverted for irrigation, which jeopardises public supply during droughts, when demand rises sharply.

In the Médio Vale, water pollution primarily results from inadequate disposal of liquid and solid waste due to insufficient sewage collection and treatment systems. Only three out of 14 municipalities treat collected sewage, amounting to just 4% of the total volume collected in the microregion. These are Blumenau (33.55%), Gaspar (1.37%), and Indaial (22.45%) (SNIS, 2021). Additionally, industrial pollution—particularly from textile industries—has historically compromised the water quality of the Itajaí-Açu River. The discharge of untreated industrial effluents containing dyes, chemicals, and solid waste harms the aquatic ecosystem, endangering local fauna and flora and water supply (SNIS, 2021).

In the Foz do Rio Itajaí, the economy revolves around port activities, especially in the ports of Itajaí and Navegantes. Together with the BR-101 highway, these ports are key logistics infrastructure. Despite their economic significance, port operations have substantial environmental impacts: (a) water pollution from discharges such as oil spills affects aquatic life and marine habitats like mangroves; (b) fishing activities are harmed, affecting the livelihoods of traditional fishers; and (c) demographic changes caused by the influx of workers increase social tensions and spatial inequality, especially in Itajaí (Ruschmann et al., 2015).

These environmental and socio-economic challenges also directly affect vulnerable groups, notably traditional communities such as the Xokleng Indigenous people and artisanal fishers. The Xokleng, located in Alto Vale, lack access to clean and potable water due to pollution from dams, mining, and farming. Their struggle centres on securing access to and preserving water, vital for their culture and survival (FUNAI, 2018).

In the Foz do Rio Itajaí, conflicts have arisen between traditional and industrial fishers. According to the Ministry of Fisheries and Aquaculture (2015), there are 1,143 artisanal fishers in the region. Most report disputes, especially over fishing territories and quotas. Other tensions involve their subordination to state and municipal fisheries authorities. Traditional fishing areas have diminished, and artisanal fishing has drastically declined in recent decades (Da Silva, 2021).

4 The Itajaí Committee

To manage water resources rationally and sustainably across the country, the Itajaí River Basin Management Committee was established by State Decree no. 2.109/1997 (Santa Catarina, 1997), in accordance with the National Water Resources Policy (PNRH) and the State Water Resources Policy under Law no. 9.748 (Santa Catarina, 1994). Under Decree no. 669/2020, the Committee was renamed the Itajaí River Basin and Adjacent Basins Management Committee, also referred to as the Itajaí Committee (Santa Catarina, 2020).

The Itajaí Committee functions as a parliamentary body to discuss and deliberate on issues related to the waters of the Itajaí River Basin (BHRI). Its primary goal is to promote flood and drought prevention and ensure the provision of water in adequate quantity and quality for all uses (Itajaí Committee, 2012). According to Article 5 of its Internal Regulations, the Itajaí Committee is a collegiate body comprising 50 member organisations, including 10 public administration bodies at the state and federal levels, 20 water users, and 20 civil society organisations representing the basin population. Each organisation is represented by a primary and an alternate delegate (Itajaí Committee, 2012).

State and federal public administration bodies are responsible for implementing public policies and enforcing laws within their jurisdictions. Water users include individuals, companies, or organisations that utilise water from the basin for various purposes such as public supply, irrigation, energy generation, industry, fishing, recreation, among others. The basin's population comprises residents of its territory, both urban and rural, including traditional communities such as Indigenous peoples and artisanal fishers.

The Itajaí Committee has an Internal Regulation approved by the State Water Resources Council and ratified by the Governor through Decree no. 3.426. This regulation states that the Committee's scope includes the Itajaí River Basin and its tributaries. The Committee comprises around 100 members representing the affiliated organisations, with the following governing structures: (i) General Assembly; (ii) Presidency; (iii) Secretariat; (iv) Technical Advisory Chamber (CAT) and Institutional Support Technical Chamber (CTAI); and (v) Advisory Council. Regarding the Water Agency, in 2023, the Committee established the 'Instituto Água Conecta' as the executive entity responsible for administrative and accounting activities. Until 2019, this role was performed by the Piava Foundation, which was planned in 1999, established in 2001, and implemented in 2005.

5 Materials and Methods

This research adopts a qualitative-quantitative, descriptive, and exploratory approach, structured in two stages: (i) description and analysis of the Committee's activities based on secondary data collected from official documents such as minutes, attendance lists from ordinary and extraordinary general assemblies, and internal regulations; and (ii) evaluation of the Committee members' perceptions regarding water governance, through the application of semi-structured questionnaires.

The first stage consisted of a qualitative documentary analysis, using minutes provided by the Itajaí Committee. The research design was based on Bardin's content analysis method (2016), aimed at understanding the decisions taken, the most discussed topics, and the level of participation and engagement of Committee members. This method involves systematic and critical analysis of meeting minutes, which may include references to other relevant documents such as reports, memoranda, and contracts. Documentary analysis is widely used in organisational studies and can offer valuable insights into processes and decision-making (Bardin, 2016).

For this study, 46 minutes of ordinary general assemblies, 38 minutes of extraordinary general assemblies, and 85 attendance lists were collected, covering

the period from 1998 to 2022. After collection, the documents were reviewed, and relevant data were selected, including: date, meeting location, meeting type, and most discussed topics. This qualitative step culminated in a quantitative analysis of the themes addressed during the assemblies, identifying the Committee's main interests and priorities.

In the second stage, the study analysed the perceptions of the 2022–2026 member representatives regarding water governance in the BHRI. A descriptive quantitative study was conducted to collect primary data using semi-structured questionnaires with the various stakeholders involved, complemented by a review of official Committee documents.

The sample was chosen to efficiently gather information from the Committee's membership base, which consists of 50 organisations: 20 representing water users, 20 representing the basin's population, and 10 from public institutions at state and federal levels. The research aimed to apply one questionnaire per organisation, targeting all 50 member organisations of the 2022–2026 Committee.

The analysis model applied was based on the Local Governance Barometer (LGB) developed by Bloom, Sunseri, and Leonard (2007), with adaptations as outlined in Table 1.

Table 1 – Units of Analysis According to the Local Governance Barometer (LGB)

Category	**Focus of Analysis**
Effectiveness and Planning	Refers to the capacity to produce effects/impacts. Effectiveness equals the sum of efficiency and efficacy.
Rules and Laws	Relates to state authority, indicating when government decisions are limited and guided by laws and regulations.
Accountability and Transparency	Concerns the requirement for the administration to report on its actions.
Participation, Engagement, and Equity	Covers actions by various social forces to influence the formation, execution, monitoring, and evaluation of public policies.
Technical	Pertains to member competencies and the physical and technical infrastructure available; includes the ability to access, assess, and use information ethically and wisely in context.

Source: Adapted from Bloom, Sunseri, and Leonard (2007) by the authors (2024).

Adaptations to the original LGB model included combining the 'Equity' and 'Participation and Engagement' dimensions and introducing a new 'Technical' dimension to reflect the specific context of the Itajaí Committee. A strong technical foundation—mediated by technological knowledge—is essential for participatory and democratic decision-making (Morais; Fadul; Cerqueira, 2018).

The questionnaire consisted of 18 questions to profile the respondent, followed by 20 items distributed across the five governance dimensions (LGB) to assess perceptions of water governance. These 20 items were divided as follows: Effectiveness and Planning (4), Rules and Laws (4), Accountability and Transparency (4), Participation, Engagement and Equity (4), and Technical (4). Each item focused on a specific aspect of good water basin governance, as derived from the LGB

methodology. To classify governance perception levels, the study applied the perception scale developed by Vieira, Visentini, and Cunha (2022), shown in Table 2.

Table 2 – Perception Scale for Water Governance Evaluation

Governance Perception Level	Member's Classification
0–35%	Very Negative
35%–50%	Negative
50%–65%	Neutral
65%–80%	Positive
>80%	Very Positive

Source: Adapted from Vieira, Visentini, and Cunha (2022).

A total of 29 Committee representatives were contacted, representing nearly 60% of the members. Of these, 12 agreed to participate in the study: 4 from water users, 4 from the basin population, and 4 from public administration bodies. To ensure ethical standards, the research project was submitted to the Brazilian Ethics Platform, under Certificate of Presentation for Ethical Consideration (CAAE) no. 63978122.9.0000.5370, and approved under opinion no. 5.741.406.

Analyses were conducted descriptively, aiming to summarise and present the data clearly and objectively (Santos & Kumada, 2021). This facilitated understanding of patterns and trends. The results identified the key strengths and weaknesses affecting water governance in the BHRI. Based on these findings, strategies were proposed to strengthen governance within the basin.

6 Results and Discussion

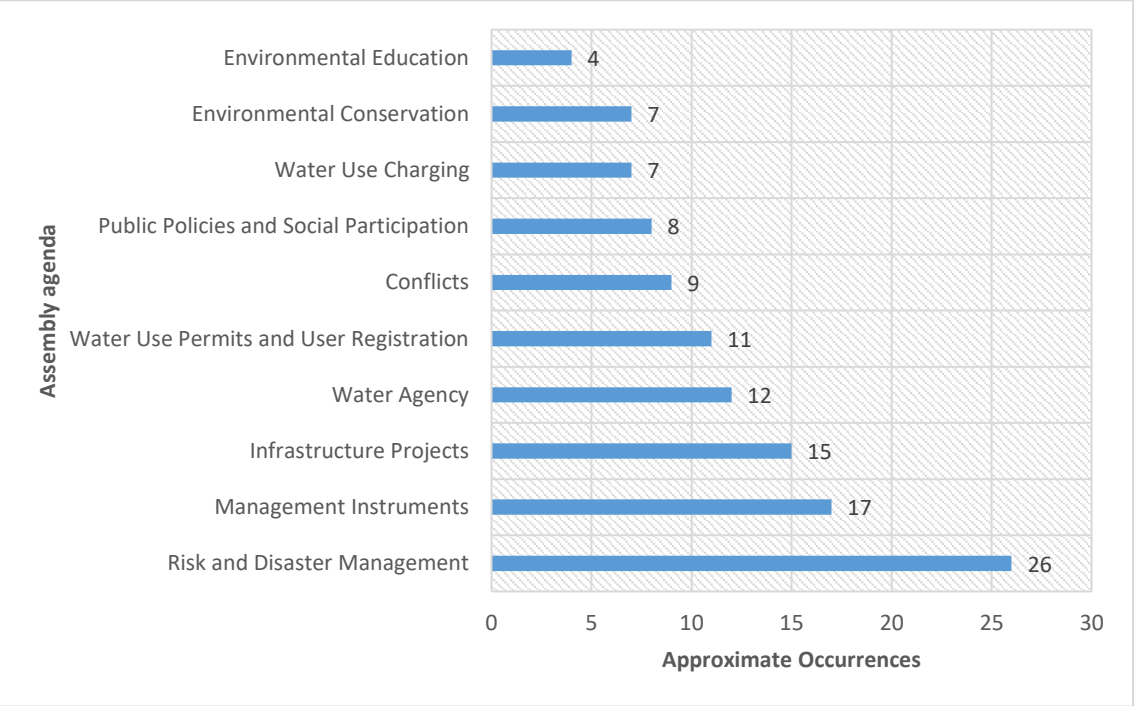
The documentary analysis of the Committee's meeting minutes revealed several key themes essential to water resource management and sustainable regional development (SRD). From 1998 to 2004, the main topics included flood prevention and control agreements and flood monitoring systems. Other prominent issues were dam safety, conflicts with Indigenous peoples, and charging for water use. The construction of the Salto Pilão Hydropower Plant was a recurring topic, as was the establishment of technical committees and the development of basin plans.

Between 2005 and 2010, discussions deepened with the implementation of projects addressing dam safety and flood management. The Piava Project stood out for its proposal to reform the Water Agency. Environmental concerns, such as the recovery of riparian forests and registration of water users, were also addressed. The implementation of water granting models and action plans aimed at disaster prevention became more prominent, especially following the 2008 disaster.

From 2011 to 2016, the agenda remained focused on water management and protection, with greater emphasis on water use charges and dam safety. The Committee discussed sustainable water use, integration of urban drainage policies, and enhanced water quality monitoring systems. From 2017 to 2022, priority was given to integrated water resource management and climate change adaptation, including the reclassification of the Serra do Itajaí National Park, strengthening water granting policies, and the adoption of more inclusive and participatory management models. Throughout the Committee's history, Disaster Risk Management (DRM) has

remained a core theme, despite the State Civil Defence's long-standing absence from the assemblies.

Figure 2 – Quantitative Analysis of Deliberative Topics in the Minutes of the Itajaí River Basin Management Committee



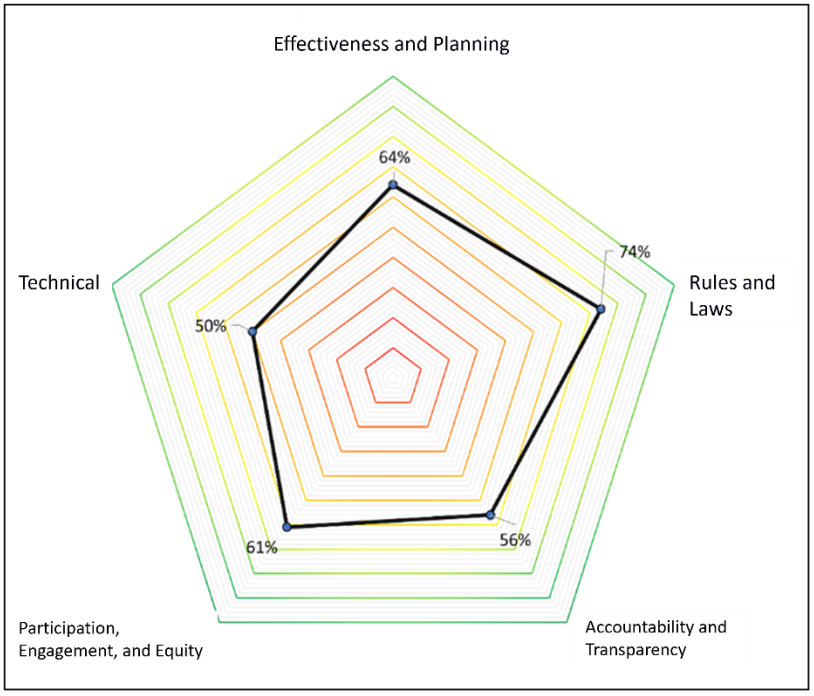
Source: Authors.

The analysis of the most frequent themes in the Committee's minutes highlights a strong emphasis on Disaster Risk Management (26 occurrences), reflecting ongoing concern with the prevention and mitigation of extreme events such as floods, which are characteristic of the region. Management Instruments (17) and Infrastructure Projects (15) were also prevalent, evidencing efforts to structure water governance and support physical interventions aimed at water security. Themes such as the Water Agency (12) and Water Use Permits and User Registration (11) reflect attention to establishing legal and operational control mechanisms over water use. Meanwhile, Conflicts (9) and Public Policies and Social Participation (8) underscore the complexity of integrated management involving multiple stakeholders and interests. In contrast, topics such as Charging for Water Use (7), Environmental Conservation (7), and Environmental Education (4) appeared less frequently, suggesting a need for greater emphasis in the Committee's agenda. This thematic distribution indicates a predominantly technical and institutional approach focused on regulation, safety, and infrastructure, while environmental, social, and educational dimensions remain underrepresented.

Regarding the members' perceptions, the governance evaluation of the Itajaí Committee yielded mixed results, with positive assessments in some dimensions and negative in others. Perceptions were neutral in Effectiveness and Planning (64%). Rules and Laws received a positive rating (74%). Accountability and Transparency (56%) and Participation, Engagement, and Equity (61%) were rated positively, while

the Technical dimension received a negative evaluation (49.8%). Additionally, water user representatives had an overall negative perception of the Committee's water governance, while basin population representatives viewed it positively. State and federal public administration representatives expressed a neutral perception. Overall, the Committee's governance was rated as neutral, with a score of 61%.

Figure 3 – Overall Result of the Local Governance Barometer for the Itajaí Committee



Source: Authors.

In the Effectiveness and Planning dimension, the Committee was seen as committed to its schedule, but significant challenges stemmed from insufficient financial resources, hindering project implementation such as awareness campaigns like Water Week. Conflict resolution remains limited due to conflicting interests among members. Equity is also undermined by low participation from vulnerable groups such as the Xokleng Indigenous people, who, despite formal representation, rarely attend meetings. Balancing the diverse interests of water users has also proven difficult, intensifying conflicts.

Despite these challenges, the Committee has implemented several positive actions: execution of the basin plan, training of technical chambers, promotion of Water Week, engagement in classification of water bodies, studies on water quality, dam operation, and socio-environmental conditions related to disasters. These initiatives show a commitment to regional sustainable development, although their effectiveness depends on overcoming structural challenges and increasing stakeholder engagement.

In the Rules and Laws dimension, the Committee complies with the State Water Resources Council regulations (Santa Catarina, 2017), respecting roles, responsibilities, structure, and composition. However, while economic instruments for water use have been discussed, they remain unimplemented. Members generally

find the legal framework clear and adhered to, though some segments argue it is not properly aligned with the BHRI's water resources plan, leading to internal conflicts and discrepancies.

In the Accountability and Transparency dimension, although annual reports and activity statements are prepared, dissemination to the wider public is deficient. Documents lack detail and transparency in financial and decision-making disclosures. Since 2017, accountability topics have been absent from meeting minutes. The Committee's website does not adequately provide access to reports or information on elections, board composition, or responsibilities of the Água Conecta Institute. Although financial challenges and decisions are occasionally disclosed, the transparency and legitimacy of electoral processes remain limited.

The dimension revealed low involvement from several sectors, especially public bodies and basin population representatives, resulting in weak representation. Women comprise only 22% of Committee members, indicating a significant gender imbalance. Water users participate regularly, and the executive board is highly active in projects, education, and meetings. However, overall attendance remains below 50%, with public sector participation around 30%, below the threshold for effective deliberation.

In the Technical dimension, the Committee demonstrates limited capacity to address water use conflicts and the impacts of economic activities. Until February 2023, its headquarters lacked internet infrastructure. Members highlighted the lack of involvement in regional urban planning and the shortage of equipment and tools needed to operate efficiently. Key weaknesses include inadequate funding for equipment and tools and the need to update the basin plan.

Among the major barriers to SRD, the absence of water use charges is especially critical. The National Water Resources Policy (Law no. 9.433/1997) provides for such charges not as taxes or tariffs, but as a mechanism for collaborative governance and remuneration for using a public good (Marques et al., 2021; Martins, 2024). Resources raised through water use charges can fund protection and restoration projects, directly supporting SRD (Abers & Keck, 2004).

Jacobs (1995) describes the successful experience of the Mekong Committee in Cambodia, which significantly contributed to sustainable development despite environmental, political, and economic challenges. Water use regulation and pricing helped strengthen water management and offered valuable insights for water planners and researchers (Mekong River Commission, 2011).

In contrast, states such as São Paulo and Ceará have applied water use charges ineffectively, with current rates failing to encourage rational use (Teixeira, Azevedo & Julien, 2021). Criticism also arises over the term 'water use charge,' which many consider a fee for resource availability rather than consumption. In the absence of revenue from such charges, successful basin committees rely on other forms of capital—human and social—developing partnerships and small projects (e.g. environmental education and sanitation) to address local issues.

Water basin committees often have symbolic decision-making authority, as they typically function in a consultative rather than executive capacity. Thus, their recommendations depend on political will and approval by governmental authorities. According to Empinotti (2011, p.204), 'the state becomes a key actor in the delegitimisation and transformation of basin committees into unattractive

negotiation spaces.' Instead of providing constructive support, the state may undermine stakeholder trust through inaction, self-interest, or lack of commitment.

Basin committees operate in shared governance systems, playing a vital planning and stakeholder engagement role, but face limits due to lack of executive power—especially in financial or legislative matters (Abers & Keck, 2004). Technically sound decisions often require political backing and entail distributional consequences that benefit some groups over others (Lemos, 2003; Pinheiro, 2021). Thus, water management cannot ignore or downplay political dynamics. Committees must navigate power asymmetries, conflicting interests, and the need to build consensus.

Low participation and engagement—especially from basin population and public administration representatives—result from inadequate representation and equity in decision-making. Without engagement, the impacts of economic activities on watercourses cannot be mitigated. However, this is not unique to the Itajaí Committee; similar problems are widespread in Brazil (Empinotti, 2011).

An emblematic case of social participation occurred in the Delaware River Basin, USA, where civil society representation was formally institutionalised, giving voice to stakeholders in management planning and strategic decisions (Moore, 2021). Public mobilisation successfully blocked the Tocks Island Dam project, transforming the area into the Delaware Water Gap National Recreation Area—a model of environmental and cultural preservation.

Another notable example is the Pixquiac River Basin Committee in Xalapa, Mexico, founded in 2006 in response to environmental degradation. Adopting a commons-based and co-management approach, the committee brought together residents, NGOs, academics, and public authorities. Its activities included environmental education, reforestation, water quality monitoring, and ecological land-use planning. It also contributed to creating protected areas and urban parks, becoming a national reference in combining technical and local knowledge to address environmental and climate challenges collaboratively.

Nevertheless, basin-based, centralised, or market-oriented governance models often fail to capture complex water interactions and socio-political flows. They may overlook land use, actor dynamics, and equity in water access. New geographical concepts, such as hydrosocial territories, offer more integrated approaches by linking power relations with the materiality of water. This allows a more productive dialogue between water governance and Latin America's tradition of resistance (Empinotti et al., 2021).

In this context, to strengthen governance, the following recommendations are suggested for the Itajaí Committee:

I. **Address the lack of financial resources for the Committee:**Resume discussions on the application of economic instruments for water use; implement cost-sharing mechanisms for multipurpose water infrastructure among the benefiting institutions; enforce administrative penalties on those who overexploit water resources, pollute, or degrade rivers and streams.
II. **Minimize conflicts over water use:** Create and implement an effective system for resolving conflicts related to water use; develop and execute a

comprehensive plan for sustainable water use in collaboration with all stakeholders; broaden continuous dialogue and negotiation among actors.

III. **Increase transparency in the Committee's decisions and activities:** Develop an online transparency portal through which members and stakeholders can access detailed information about decisions made, ongoing projects, and relevant documents; establish a disclosure policy; provide comprehensive documentation of decision-making processes, including proposals, arguments, and voting outcomes; define an internal communication plan; and establish an external communication strategy.

IV. **Ensure broad participation of members in the Committee's general assemblies:** Increase overall participation rates in assemblies to above 70%, considering that representatives from public institutions currently participate at a rate of only 30%, and representatives of the basin's population at less than 50%; encourage participation from Indigenous communities, the National Indian Foundation (FUNAI), and the state civil defense, among others.

V. **Promote representativeness and equity in the Committee's decision-making process:** Reduce the disparity in participation rates among representative sectors; encourage the involvement of the general public (guests and non-members); increase the number of women as primary and/or alternate members of the committee to reach close to 50%.

VI. **Equip the Committee/Water Agency with tools and modern work methods:** Acquire updated technologies; train members in the effective use of new technological tools and work methodologies; adopt agile work methods to enhance flexibility, efficiency, and innovation in the Committee's operations.

The assessment of governance in the Itajaí Committee reveals significant challenges in water resource management, particularly regarding the lack of financial resources and low participation from key public institutions and social sectors. These issues contribute to unbalanced governance, where the interests of water users prevail, undermining the implementation of sustainable actions. The absence of financial capacity and ineffective conflict resolution mechanisms exacerbate the situation, hindering the development of effective water management solutions for the basin. Enhancing transparency, communication, and stakeholder engagement is essential to strengthen governance and ensure water sustainability, promoting inclusion, equity, and efficiency in decision-making.

7 Final Considerations

The governance assessment of the Itajaí Committee reveals both progress and challenges in managing the water resources of the Itajaí River Basin (BHRI). The Committee plays an important role in promoting Sustainable Regional Development (SRD), through initiatives such as implementing the basin plan, technical training, educational events, and discussions on strategic topics like flood monitoring, dam safety, and water quality. These efforts reflect a commitment to sustainability and integrated water management, contributing to public awareness and mobilisation. In this context, the Committee has undoubtedly contributed to SRD in the Itajaí Valley, especially regarding integrated regional development and disaster risk reduction.

However, mixed governance results highlight structural weaknesses that limit the Committee's effectiveness. Financial constraints hinder project implementation and awareness initiatives. Low participation from key stakeholders—particularly basin residents, public agencies, and vulnerable groups such as the Xokleng—results in unbalanced representation and dominance by water users' interests. The lack of equity is evident in the male-dominated membership (78%) and insufficient Indigenous participation, making it difficult to reach consensus and resolve conflicts. The Technical dimension is undermined by inadequate infrastructure and limited capacity for innovative solutions to mitigate the impacts of economic activities on water resources. Although accountability occurs annually, transparency is limited by the insufficient dissemination and accessibility of information on the Committee's website. The Committee's consultative nature, combined with its dependence on external political decisions, reduces its autonomy and weakens its influence on SRD. This situation is exacerbated by limited public participation, which makes the Committee less attractive and relevant as a negotiation and deliberation forum.

Despite these limitations, the study identifies opportunities for improvement. The proposed recommendations—such as resuming discussions on water use charges, increasing transparency via an online portal, boosting meeting participation above 70%, promoting gender equity, and providing technical training—are crucial steps toward strengthening governance. Adopting agile methodologies, fostering continuous dialogue with stakeholders, and incorporating concepts like hydrosocial territories can offer more inclusive approaches suited to BHRI's complexity.

This study has several limitations. Firstly, the number of applied questionnaires was restricted: only twelve were conducted, which does not represent the full Committee membership. This limitation stems from both the research timeline and difficulties in obtaining responses despite follow-up emails. Another limitation concerns the design of the semi-structured questionnaire, which restricted participants' answers to predefined options. This may have limited the expression of nuances and contextual details. Moreover, qualitative analysis of open responses can be challenging, especially with larger data volumes.

In summary, the Itajaí Committee has potential to lead sustainable water governance but must overcome financial, participatory, and structural barriers. Implementing the proposed strategies, supported by a collaborative and technically sound approach, is essential to ensure effective water governance. This will promote equity, transparency, and resilience in the BHRI. Only then can the Committee consolidate its relevance in SRD and make a lasting contribution to sustainable development in the Itajaí Valley.

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