

Participative governance quality over marine spaces: challenges for estuarine socioecological resilience at the Paranaguá Bay Zone

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ABSTRACT

Promoting inclusive and effective governance in regional estuaries offers an encompassing challenge within the scope of Policy analysis and its interactions within socioecological research. The integrated approach for both theoretical elements has not easily been improved, despite the increase in analytical frameworks in this theme. The Paranaguá Bay Zone (PBZ) in the state of Paraná, Brazil, is composed of a few cities, several large, protected areas, and traditional communities. On the one hand, the intensification of real estate pressures in a low demographic region is creating a wave of value conversion regarding the trends of the coastal gentrification phenomenon, notwithstanding the lower degree of intensity when compared to other Brazilian estuaries. On the other hand, it shows a lack of political representation and institutional action at the subnational level. This asymmetrical process is strongly related to historical land development and the controversial process of implementing protected areas and zoning tools. Promoting the economic rise of the territory has affected traditional communities and conservation management, requiring permanent improvement in the ability for community mobilization and juridical vigilance in the face of impacts related to such pressure. In the meantime, scholars have considered knowledge building, which brings up assessment issues on how the decision-making process has been operated and what gaps and asymmetries can be revealed for further resilience analyses. This study is an effort to approach the performance of participative governance of the estuary and is restricted to a preliminary assessment of the participative management committees designed by legislation under area-based attributions. This study is not aimed at exploring the belief systems of different social groups/stakeholders. Results have a great emphasis on methodological building and testing, which revealed the importance of imposing an inventory and hierarchy model on the multiple committees of governance and their sectorization across adjacent areas. Results also underline variables of interest and pilot indicators in the subject under analysis. Preliminary results point to the need for overcoming methodological challenges, and findings that are useful as first evidence in the comprehension of the low performance by different committees, which often operate without any regular, systematic, integrated, transparent, legitimate, and permanent agenda of Policy activities for the PBZ fisheries territory. Qualitative data and institutional memoirs should be available and categorized in government programs, whereas research efforts that look to better recognize the idiosyncrasies of community realities under the pressures of non-transparent economic drivers are much needed.

Keywords: Resilience; Inclusive Governance; Conceptual framework; Marine space, Dataless

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INTRODUCTION

Changes in the socioeconomic and ecological dynamics of coastal zones associated with climatic and/or meteorological events, as well

as factors resulting from human activities, have asymmetrically attracted the attention of specialists, managers, and the general population. These changes have increased in recent decades in comparison to other historical periods (Millennium Ecosystem Assessment, 2005; IPCC, 2021). This context has triggered two main scientific and political challenges: the first is associated with the description and understanding of such phenomena on appropriate spatial and temporal scales for stakeholder engagement; the second is directly related to the human and institutional ability to respond to such phenomena, expressed as adaptive capacity or resilience in a wide comprehension and critical approach beyond the subject of governance (McCarthy, 2001; Smit and Wandel, 2006; Engle and Lemos, 2010; Gonçalves, 2018; Polejack et al., 2021).

Ecosystem-based management (EBM) principles have contributed to more integrative approaches to the complexity of environmental or social problems in coastal and marine territories (Long et al., 2015; Andrés et al., 2023). Integrated coastal and marine management offers a holistic and strategic governance arrangement used around the world to help move beyond conventional sector-based approaches and contribute to the sustainability of complex and dynamic socio-ecological systems (Eger and Courtenay, 2021). Even though some works discuss the governance of the marine space under a transition trend perspective as global scientific organizations support interdisciplinary and holistic research to integrate human well-being as a fundamental outcome (Moon et al., 2021; Spooner et al., 2021), the discussion on the participation of actors is still little advanced and is approached in a niche way by specific case studies; e.g., small-fisheries (Jones and Seara, 2020; Yandle et al., 2020), native populations or non-governmental organizations), and management studies based on ecosystem assessment due to the growing interest of scholars related to marine spatial planning (Wen et al., 2022). The latter two scopes of analysis are close to the basic conceptual framework sought by this research, giving it a preliminary character. Even so, effective integration is inhibited by issues of knowledge, uncertainty, communication, politics,

culture, institutions, and rules. Thus, a clear mechanism is needed to link science, policy, and practice (Dale et al., 2019).

In addition to an EBM approach, it is advantageous to embody territorial and political perspectives as theoretical universes that better approximate the complexity of regional participative assessment. From the perspective of Policy research, it remains to be considered that the analytical variables for this discussion go beyond this theoretical perspective, bringing epistemological questions raised by political ecology (Bennett, 2019). This research was also adapted so as to avoid delving into the perspectives of social actors and agents in their belief systems, whether traditional inhabitants or outsiders; as well as companies and other organizations in their intentions that incur uses but not users as synonyms of indicative components in space (Santos, 2002; Massey, 2005).

Governance instances are intended to enable argumentative models and multicentral policies as alternatives to state-centered policy making (Secchi, 2013). The regulation of socioecological relations beyond mediation depends on co-management and participatory approaches (Viégas, 2013; Gammanpila et al., 2019). Effectiveness in reaching consensus building is influenced by the attitudes of local inhabitants and a wider sample group of actors and agents as users of the territory, that is, collegiate bodies with a spatial scope of action (Silva et al., 2011; Martins and Carmo, 2016; Siuves Alves and Jota Resende, 2020).

The effectiveness of a Management and/or Advisory Board focused on territorial and environmental issues has been a challenge for scholars due to the multiple externalities of disengagement, incipience, loss of cohesion, or deviation from legitimate constructions within the compositions of the representative process (Telles et al., 2011; Goelz et al., 2020). This verification requires showing the involvement and dynamics of institutions in the recent context of environmental governance (Leroy and Arts, 2006). Thus, it becomes particularly important to keep up with these important entities in the environmental and territorial governance of the Paranaguá Bay Zone (PBZ), with special representation in mapping

by geographic information systems (Barros et al., 2015), whose challenge is to increase new variables and their indicators for monitoring the quality of participatory management of estuaries as public spaces (Pomeroy and Douvere, 2008; Ehler and Douvere, 2009).

Based on the effective action of councils, committees, and collegiate agencies in which social groups are represented, specific conflict prevention agendas can occur in different areas of activity, providing participatory management in territories with a prevalence of protected areas (Oliveira Júnior, 2024). In this sense, the relational perspective of maritime space must increase to foresee political and cultural dimensions (Flannery et al., 2018), which better express the common goals of fairer and more sustainable ends (Boucquey et al., 2016).

This research is part of a multidisciplinary research project carried out from 2018 to 2021, entitled Socioecological Resilience and Sustainability of the Estuarine Complex of Paranaguá, whose central goal was to analyze the evaluation of the conditions for a participative governance process of the estuarine territory at PBZ, in southern Brazil. Although the treatment of this water area as a territory has needed conceptual efforts that are far from elementary given the complex and contradictory nature inherent in this analytical basis, the aim was to generate a diagnostic starting point concerning the parameters for the quality of participatory governance of this geographic unit of analysis that configures a zone polycentrically composed by three levels of territories: subnational jurisdiction areas (federative), environmental protected areas (normative), and community rights areas (juridical).

Effectively, the PBZ includes 14 management boards coexisting in this same space with Protected Areas, traditional and neo-traditional activities, port activities, extractive activities, and areas of urban expansion, mainly for tourist purposes. This set is a qualified miniature of the events and stressors of the coastal and marine tools of planning, as defined by the Macro Diagnosis of the Coastal Zone of Brazil (MMA, 2008). This macro-compartment includes a wide embayment and a rectified coastline with long

arches of beaches, wide coastal plains, and important estuaries such as Santos and Cananéia, Paranaguá and Guaratuba, and São Francisco do Sul, which extends from São Vicente (in the state of São Paulo) to Ponta da Vigia (in the state of Santa Catarina). On a smaller regional scale, PBZ can be seen as a great laboratory of conflicts and tensions between social and natural systems (Lana et al., 2001; Lana, 2004).

Thus, this research is based on the premise that resilience and territorial autonomy should be included in action agendas that aim at bringing science and management of marine and coastal spaces closer together to stimulate the adaptive capacity to apply environmental standards in a complex perspective (Olsson et al., 2010; Glegg et al., 2015; Wisz et al. 2020). The resolution of environmental conflicts is part of the global agenda of different organizations, such as public agencies, Universities, NGOs, and Public Authorities, reaching governance (Pattberg and Widerberg, 2015) at some point. Conflicts that, when poorly processed by management spheres, often culminate in lawsuits and/or are reproduced and have more complexity.

The main empirical problem in carrying out this research is the paradox between the normative disposal of many participative management boards guaranteed by the several Protected Areas in an estuary that are unable to fulfill their institutional, legal, and sustainable missions. However, preliminarily, it is worth noting some restrictions: the first emphasizes that this research uses an adjacent area perspective rather than a spatial perspective *stricto sensu* as it constitutes a study whose main objective is the inventory of the spatial coverage of instances of participatory governance – these will be surveyed as they have previously been evaluated based on a proximity factor that is conventionally called spatial sectors of the PBZ. The second refers to the interest in carrying out a different methodological approach, which starts from the multiple variables of estuary analysis to compose a second approach within a trilogy in which the integrated data of the empirical reality are prioritized in the achievement of a diagnostic result based on multiple evidence.

To overcome these challenges, theoretical-methodological research techniques and analysis

tools were developed to describe and evaluate the dynamics of the different territorial entities coexisting in the estuary in an effort to understand the identity and territorial configuration of that reality. The governance approach, within the thematic axis of Uses and Conflicts was intended, at first, to increase the capacity for territorial self-regulation and the advance of reformatting the political arrangement and institutions of maritime governance (Van Der Zouwen, 2006; Deng and Shi, 2023) with an integrated action of monitoring the environmental governance of the study area, including state environmental agencies and other instances of participatory governance, such as committees.

The governance approach was set up as a strategy to understand the socioeconomic and ecological dynamics of the PBZ and estimate social resilience. It was understood as the ability of local communities to respond and adapt to the socioeconomic and ecological changes present or projected for the coming decades. It is considered that socioecological resilience knowledge is fundamental and should be accompanied by its inclusion in decision-making spheres in the construction of policies and proper management instruments. Thus, broadly subsidizing analysis

of the performance of this governance was the central goal of this research.

METHODS

The Paranaguá Bay Zone is located north of the coast of the state of Paraná, southern Brazil, and is composed of two main axes: north-south along the Laranjeiras Bay and east-west along the Paranaguá Bay (Lana et al., 2001), in which some economic activities take place followed by their proper systematizations and varieties, such as fishing, tourism, industries, and ports. The study area shall be better recognized as the highly proportional protected area coverage of Paraná coast zone. This underpinning territorial aspect, composed by the influences of public policy beyond five municipalities (Antonina, Guaraqueçaba, Paranaguá, Morretes, and Pontal do Paraná), overlaps several environmental protected areas. It is noteworthy to consider that the study area consists of an important naturally conserved extension of the Atlantic Forest (Faraco and Lana, 2004; Blum et al., 2011; Contente et al., 2011; Zacarias et al., 2012; Santos et al., 2015; Miranda et al., 2019) (Figure 1), albeit at an incipient level of management consolidation (Paula et al., 2018).

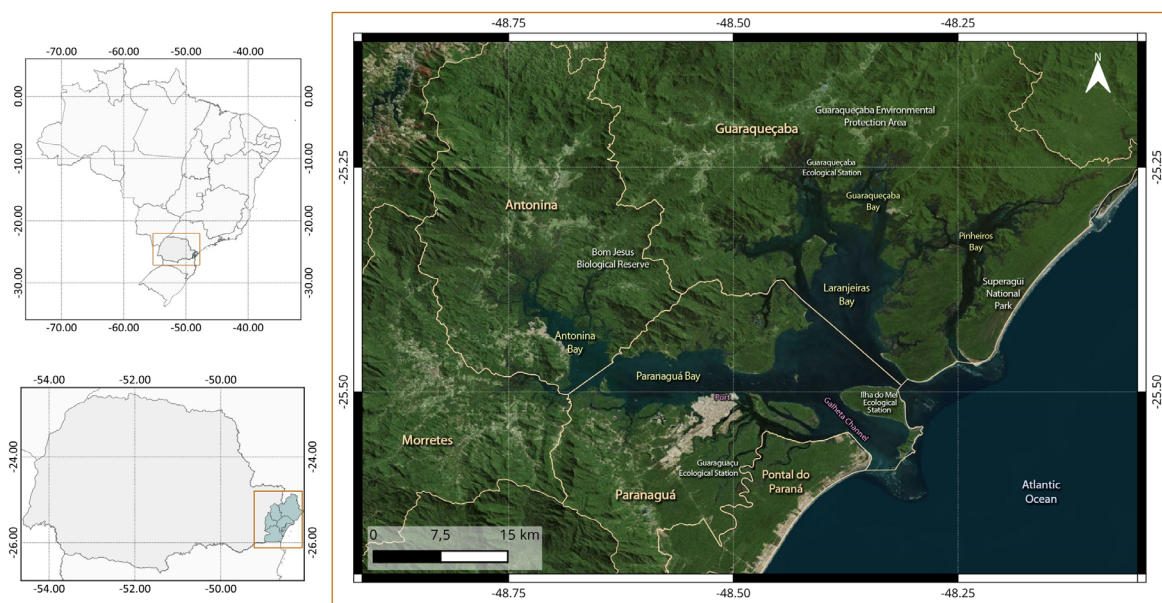


Figure 1. Paranaguá Bay Zone (PBZ) location map.

Due to the pressure of coastal and industrial urbanization, predominantly on the southern estuarine margins, mainly coming from the municipality of Paranaguá and including the adjacent coastlines of the oceanic beaches, the area starts to suffer from the impacts resulting from deforestation and pollution systems from different sources (Kolm et al., 2002; Cunha et al. 2009; Hadlich, 2011; Cabral et al., 2018; Lima, 2019; Bettim et al., 2021; Garcia and Martins, 2021; Mengatto and Nagai, 2022).

On the other hand, the communities on the northern margins (with a higher level of isolation from urban centers) around the Bays of Pinheiros and Laranjeiras include extensive areas of the environmental reserve, small fishery communities, and an economic basis around the subsistence way of life and seasonal tourism. This region is covered by several environmental protection units, called Conservation Units (Brasil, 2000). Among such reserve areas is the Superagüi National Park, which was inscribed in 1970, listed by the State Historical Heritage in 1985, and declared a Natural World Heritage Site by UNESCO in 1999 (ICMBio, 2020). These characteristics make

this location one of the least impacted within the PBZ: sediment analyses from these regions show extremely low or undetectable levels of the main markers of anthropogenic organic pollution (Santos et al., 2009; Martins et al., 2010).

Due to its many discrepant characteristics, the PBZ is recognized as a highly dynamic system both from the point of view of the natural environment and the space of human occupation, presenting different realities within the same marine-coastal territorial space.

Research on the participatory governance agencies at the PBZ focused on the estuary on a regional scale (supralocal), giving a high priority to environmental conservation. Based on a proposal in the literature for sectoring the pre-existing physical environment (Noernberg et al., 2006), multidisciplinary workshops were held, in which eight sectors comprising the PBZ were established, with this sectorization by adjacent area constituting the cartographic basis for the analysis of governance in the context of coexisting management specificities in the estuary and its ecosystem-based characteristics, aiming at this management concept (Figure 2).

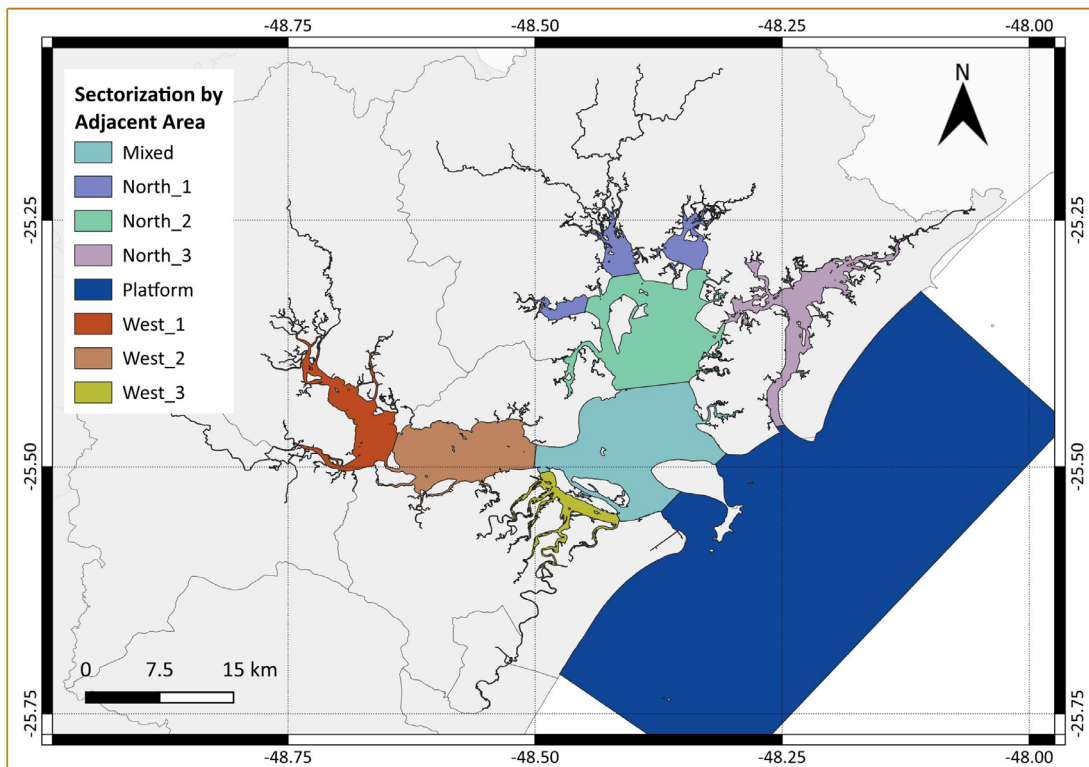


Figure 2. Sectorization by Adjacent Area of Paranaguá Bay Zone (PBZ).

The main constructive effort initially aimed to correlate performance evaluation variables of collegiate governance units, also understood as environmental councils. A first exercise arising from preliminary research on territorial governance and participation in collegiate coastal management agencies at multiple scales (municipal, state, and federal) managed to point to the fundamental elements for the analysis of the governance performance of a management council. First, there are governance principles such as representativeness, composition, and effectiveness (Telles et al., 2011).

In a second exercise, other variables were named, aiming to connect the previously mentioned principles with attributions subject to the empirical verification of the councils. From these, the desired information was elaborated and concatenated for the creation of a database for the construction of a Preliminary Quality Assessment of the Management of Non-Conventional Spaces – water surface of the estuarine territory to subsidize the subsequent ranking and performance analysis of governance as instituted in the sectorization established for the study (Figure 3, Table 1).

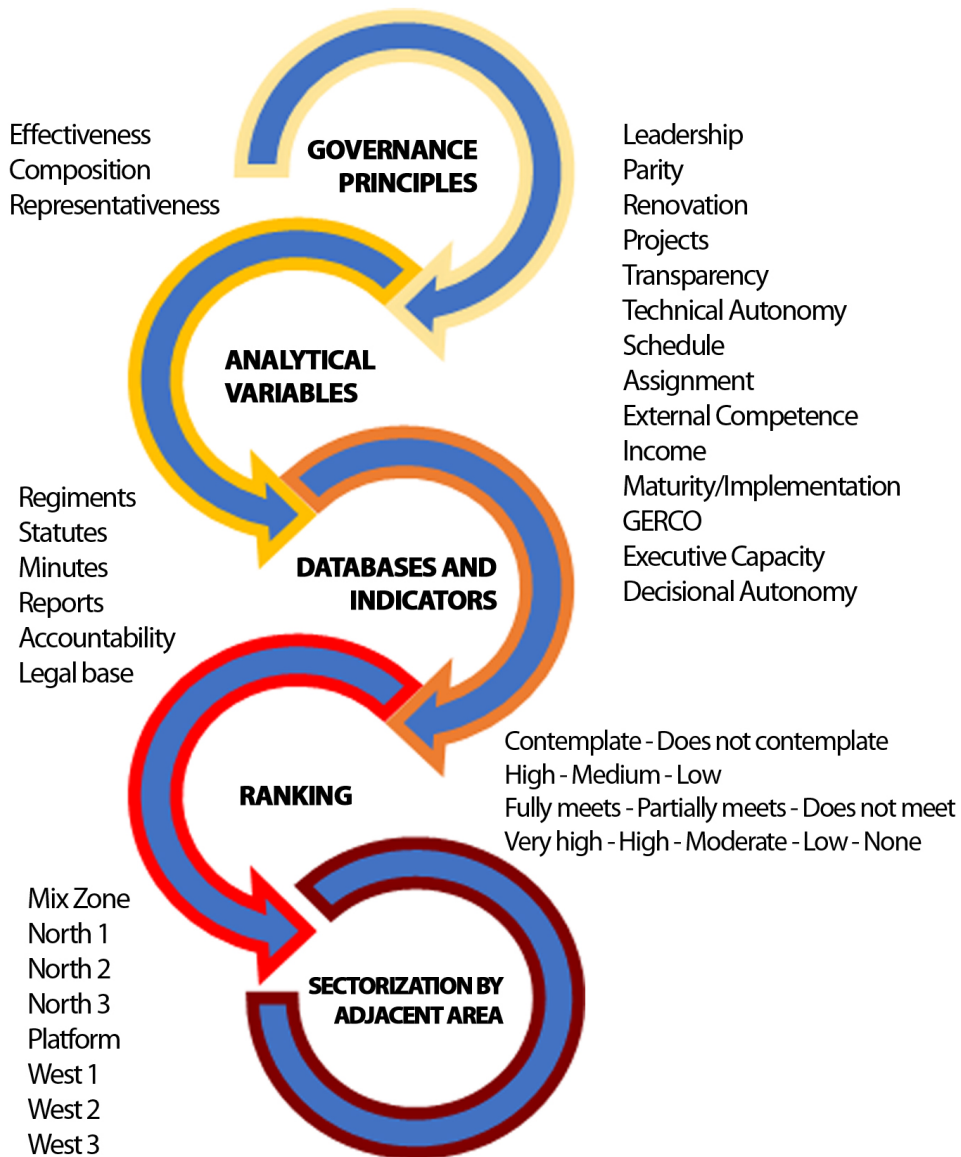


Figure 3. Conceptual model for collegiate territorial governance in the PBZ.

Table 1. Initial (preliminary) proposal for a governance performance matrix with 14 analysis variables.

Concept Criteria ¹	Variables	Data Sources	Indicator
Composition	Leadership	Regiment/Statute	Political indication; Technical indication; Vote
Composition + Representativeness	Parity	Regiment/Statute	Stakeholders vs. Socio-territorial groups
Representativeness	Renovation	Memorial Draft	Renewal occupations within the deadline
Effectiveness + Representativeness	Projects	Memorial Draft	Notices vs. Approval Criteria vs. WGs ² /Chambers
Effectiveness + Representativeness	Transparency	Memorial Draft; Ordinance; Normative Instructions; Official Website	Disclosure
Effectiveness + Representativeness	Technical Autonomy	Regiment/Statute; Memorial Draft	Forecast of strictly technical-scientific work agenda
Effectiveness	Schedule	Memorial Draft	Ordinary calendar vs. Extraordinary; Frequency of meetings
Effectiveness	Assignment	Regiment; Legal Base	Legal Attributions vs. Regimental assignments
Effectiveness	External Competence	Regiment; Memorial Draft; Legal Base (SISNAMA ²)	Articulations with other councils at diverse levels
Effectiveness	Income	Memorial Draft; Budgets; Accountability	Cash flow dynamics
Effectiveness	Maturity/Implementation	Creation Act	Age; Management Plan; Management Board; others
Effectiveness	GERCO ²	Memorial Draft	Execution of GERCO ² instruments
Effectiveness	Executive Capacity	Regimental Evolution; Memorial Draft; Normative Instructions; Products	Memorial Draft; Project Approval; Products
Effectiveness	Decisional Autonomy	Regiment/Statute	Deliberative vs. Non-deliberative

¹ According to Telles et al., 2011.

² SISNAMA: National Environment System; WGs: workgroups; GERCO: Coastal Management.

The subsequent stage consisted of collecting previously estimated secondary information to feed the analysis database. Such qualitative databases consisted of a real processing challenge: once the methodological pathways that aimed to assign values to indicators and their framing of variables were defined, they subsidized the categories that were intended to demonstrate the participatory research on quality of governance on the estuary. Considering that we are not facing an established theoretical construction, it was necessary to use a no less important conceptual support for the territorial treatment of the water surface space as a research object, resulting in a guiding conceptual model for the future mapping of the quality of participatory governance of the PBZ.

For each analysis variable, guiding questions, data sources, and indicator parameters were stipulated. Next, indicators and respective databases that could offer diverse sources of data/information for each previously categorized variable were set up. Among the indicators are the official/formal documents of the analyzed councils, which give the character of a formal governance approach to this method. These documents have basic information such as internal regulations, statutes, minutes, reports, accounting reports, and legal bases.

Once the indicators of the analysis variables were identified, they were ranked using a Likert measurement scale with degrees of agreement appropriate to the type and objective of each

analytical baseline (Bermudes et al., 2016) to evaluate variations in the performance of governance bodies, analyzing them in terms of their level of implementation and decision-making autonomy, together with their representativeness (related to the scale of territorial administration). This step was crucial in finding which variables were able to be elaborated in the analysis model considering the availability and access to the sources of information present in the indicators.

After crossing the variables with instances of territorial and environmental governance in the study area, a performance evaluation matrix was created, in which the indicators and respective valuations were defined for the diagnostic map of governance of the PBZ (Table 2). The radar charts were generated to facilitate the occurrence of participatory management councils in a decentralized order (federative autonomy: Federal, Subnational, Municipality) following a clockwise orientation.

Table 2. Precursory analysis of environmental governance performance at the Paranaguá Bay Zone (PBZ).

	Acronym and Management Board Name	Territorial Administration	Implementation Level	Representativeness	Decisional Autonomy	Space Sector (PBZ)	Reference documents
Conceptual Parameter			Existence of official regulatory documents on the functioning of the Council	List of members of the Organized Civil Society (OCS), concerning the Public Power (PP), in the composition, by regimental attribution	Capacity for decision approval by regimental attribution	Coverage polygon in estuarine space; Scope of the area by regimental assignment; Formal management territoriality	
Qualitative Ranking			The sum of variables +1: Creation decree Assignment definition Composition list Internal regulations	High – OCS > PP Medium – OCS = PP Low – OCS < PP	With decision-making ability – Deliberative Without decision-making ability – Non-deliberative	Council corresponding space sector	
Quantitative Ranking			Very high – 5 High – 4 Moderate – 3 Low – 2 None – 1	High – 3 Medium – 2 Low – 1	Deliberative – 2 Non-Deliberative – 1	Does not meet the sector – 1 Meets indirectly/ partially – 2 Fully meets – 3	
Environmental Management Councils Paranaguá Bay Zone	COSEC – Guaraqueçaba Ecological Station Advisory Board	Federal (CU ¹)	4	3	1	North_1 / North_2 / North_3	ICMBio ² Ordinance No. 3/12
	CONAPA – Guaraqueçaba Environmental Protection Area Deliberative Council	Federal (CU ¹)	4	3	2	Mix_Zone / North_1 / North_2 / North_3 / West_1 / West_2	IBAMA ² Ordinance No. 65/02
	CONPARNA – Superagüi National Park Advisory Council	Federal (CU ¹)	4	2	1	Mix_Zone / North_2 / North_3 / Platform	IBAMA ² Ordinance No. 45/06 ICMBio ² Ordinance No 11/14
	NGI North Coast – Integrated Management Center for the Paraná North Coast	Federal (CU ¹)	-	-	-	Mix_Zone / North_1 / North_2 / North_3 / West_1 / West_2	-

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	Acronym and Management Board Name	Territorial Administration	Implementation Level	Representativeness	Decisional Autonomy	Space Sector (PBZ)	Reference documents
Environmental Management Councils Paranaguá Bay Zone	COLIT – Territorial Development of the Coast of the Paraná Council	Subnational Jurisdiction (Regional)	5	1	2	Mix_Zone / North_1 / North_2 / North_3 / Platform / West_1 / West_2 / West_3	Decree No. 4605/84 Decree No. 4259/94 Law No. 7978/84
	CEMA – State Council for the Environment	Subnational Jurisdiction (Regional)	5	1	2	Mix_Zone / North_1 / North_2 / North_3 / Platform / West_1 / West_2 / West_3	Law No. 8.289/86 Law No. 8.485/87 Law No. 11.352/96 Decree No. 4.447/01 CEMA Resolution No. 069/09 CEMA Resolution No. 082/11 CEMA Resolution No. 092/13 CEMA Resolution No. 096/14 CEMA Resolution No 099/17
Environmental Management Councils Paranaguá Bay Zone	CTGERCO – Technical Chamber of Coastal Management	Subnational Jurisdiction (Regional)	4	1	1	Mix_Zone / North_1 / North_2 / North_3 / Platform / West_1 / West_2 / West_3	SEMA ² Resolution No 43/2018
	COMANDRUS – Guaraqueçaba Municipal Council for the Environment and Sustainable Development	Municipal	4	3	2	Mix_Zone / North_1 / North_2 / North_3	Law No. 190/2011 Law No. 1731/14
	COMMA – Paranaguá Municipal Environmental Council	Municipal	5	1	2	Mix_Zone / North_2 / West_2 / West_3	Law No. 3768/18 Law No. 190/11
	CMADS – Antonina Municipal Council for the Environment and Sustainable Development	Municipal	4	2	1	West_1	Law No. 17/14 Law No. 03/17

[continued]

	Acronym and Management Board Name	Territorial Administration	Implementation Level	Representativeness	Decisional Autonomy	Space Sector (PBZ)	Reference documents
Environmental Management Councils Paranaguá Bay Zone	COMMAM – Morretes Municipal Council for the Environment	Municipal	4	1	2	West_1	Law No. 496/17
	CONSEMA – Pontal do Paraná Municipal Council for the Environment	Municipal	4	3	2	Mix_Zone / Platform / West_3	Law No. 91/98 Law No. 974/09 Law No. 1.477/14 Law No. 1.804/18 Law No. 2260/02 Decree No. 1.462/02
	Lagamar Mosaic Board – Mosaic Advisory Board for the São Paulo South Coast and the Paraná North Coast	Interstate	2	NSA	2	Mix_Zone / North_1 / North_2 / North_3 / Platform / West_1 / West_2 / West_3	Ordinance No. 150/06
	CGIM – Ilha do Mel Management Board	Local/District	2	2	2	Mix_Zone / Platform	IAP ² Ordinance No. 87/05

¹ CU: Conservation Unity.

² IBAMA: Brazilian Institute of Environment and Renewable Natural Resources; ICMBio: Chico Mendes Institute for Biodiversity Conservation; SEMA: former State Secretary for the Environment, today SEDEST – Sustainable Development and Tourism Secretary; IAP: former Paraná Environmental Institute, today IAT – Water and Earth Institute.

Restricted access to information according to accessed and available databases during this research resulted in an excerpt of the universe of analysis variables. Although the analysis was conditioned to the difficulty of accessing information — and thus the restriction of essential elements to the governance performance in environmental management councils' evaluation — it was possible to advance in a precursory way in some of the pre-established variables. Thus, each of the PBZ sectors was analyzed in terms of their active councils and the respective indices raised for the variables around internal regulation, representativeness,

and autonomy (Figure 4). Finally, the regrouped results of the sectoral analyses built the map of PBZ governance performance.

The role of the three governance principles (effectiveness, composition, representativeness) depended on the analytical challenges of source and data availability and categorization. It is essential to mention the selectivity of committees considered for this analysis. Environmental attribution management councils (components of the Brazilian national environmental system) were considered in the three spheres of government (local, regional, national).

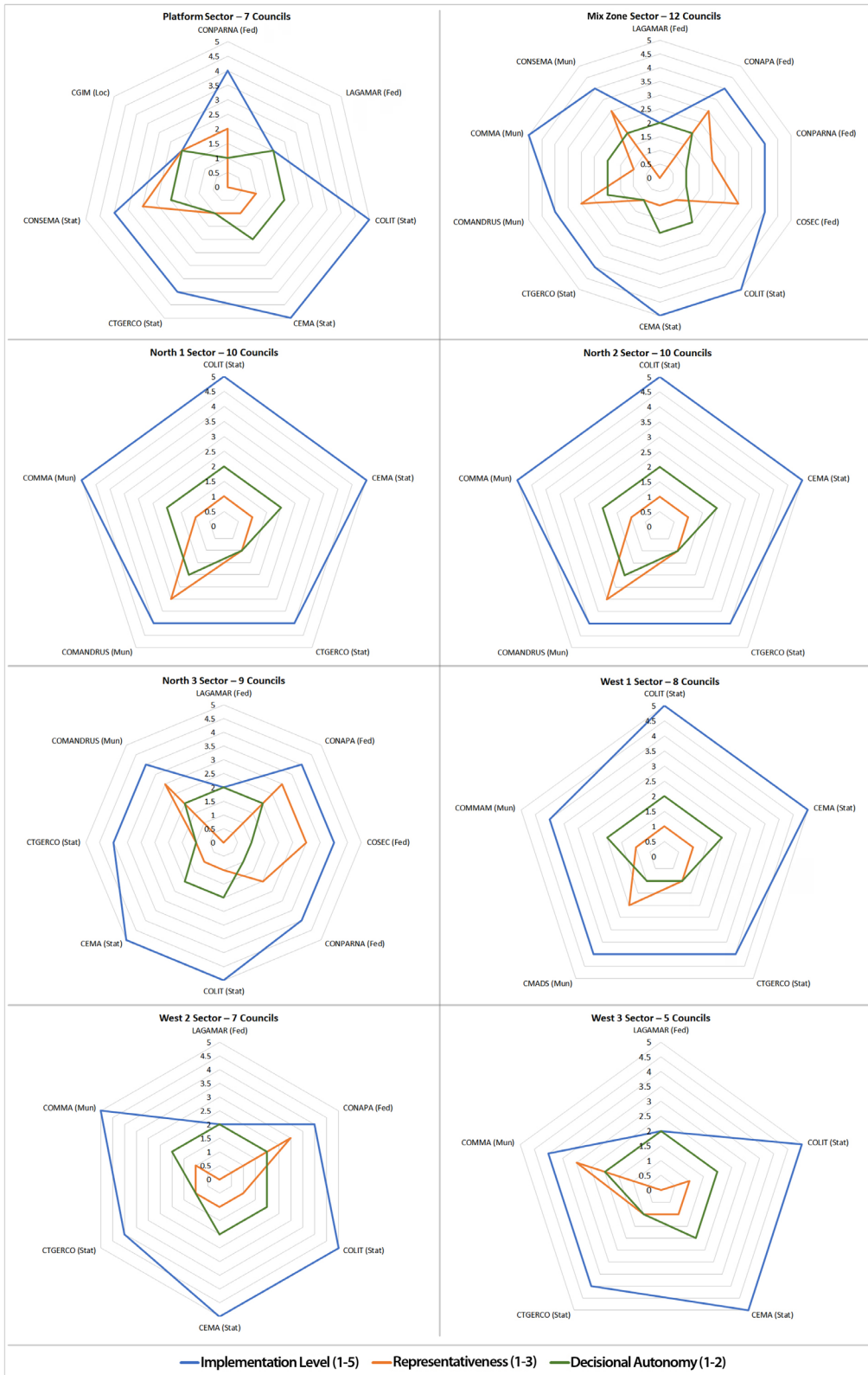


Figure 4. Sector performance in the analysis of participatory governance at PBZ.

Regarding the assessment of the level of participatory implementation, it is possible to verify that there is a predominant indication of consolidation. This analysis must consider that the results come from the whole period of the existence of the Protected Area in addition to the availability of a management plan and an operational design of the management board (names and acronyms are in Table 2). The two exceptions of the less evolved instances are directly related to the degree of specificity of the two cases (LAGAMAR and CGIM), revealing the lack of a systematized normative priority for the governance of such entities in a conception for the whole territory. The deprioritization of agendas in these cases is related to the absence of regular agendas or specific management instruments for the respective institutions. The CGIM covers two protected areas of a subnational nature but without direct autonomy from the municipal entity, therefore being district areas with a relative absence of interest groups in the political arena. On the other hand, LAGAMAR constitutes a regional category involving two different state autonomies (Paraná and São Paulo), which would require the implementation of a coastal management plan provided by law (e.g., the national coastal management policy) or interstate consortia.

The representativeness of society came from the normative list of the council's composition. This reveals an asymmetrical pattern in the estuary since the committees are differently enforced by their deliberative condition, ruling vulnerability, and financial resources. Subnational authorities are influenced by such factors, by state executive councils (e.g., CEMA, COLIT, CTGERCO) in which the representation of society is harmed due to the importance of developmental agendas uncommitted to principles of socioecological sustainability. On the other hand, representation is well assessed in councils (CONAPA and COMMANDRUS) but they have no corresponding good practices by way of any regularity of executive agendas.

In general terms, marked heterogeneity was seen for the three variables analyzed for the eight sectors, except for the North 1 and 2 sectors, which are represented by the same Environmental Management Councils and respective levels of

Territorial Administration, suggesting that these two sectors can be analyzed in a grouped way in the context of governance.

This overview shows that the aim of building a framework to assess participative governance performance in a marine ecosystem brings up the recognition of purposes that evolve the multiple aspects and complexity of methodological unconsolidated models. Overall, three main terms in this general thematic approach are defined due to this ongoing research, and the integration between them as an inherent scope is aimed at by converging the pattern of measurement variables: Participative Governance, Marine Space, and Performance Management tools.

The construction of models to convert qualitative data into ranking can be improved in addition to collecting the information due to the challenging reality. Unfederated spheres of territorial normative topics are aimed at, revealing issues outside government agendas since transparency and decision autonomy are guaranteed by regulatory institutions uncommitted to policy priorities. Community intelligibility about mechanisms of participation would be promoted by adequate communication tools. Openly, these potential products of governance require a systematized agenda to maintain advancement in the list of variables to be tested.

Polycentric conditions of participative governance promote advancement of considerations in analytical framework baselines (van der Plank, 2022). First, the different territorial statutes at the administrative level (municipality, subnational region state, Federal union) must be systematized if the different entities attend to their legal attribution within the environmental sphere. The overlap between them should be a complementary facility in terms of competence and technical capability when considering an integrated and systemic analytical framework. Notwithstanding, the reliability concerning the Policy analysis of territory under a multilevel approach remains incipient regarding the real-time state of Brazilian estuarine regions.

The creation of spaces for participatory representation beyond administrative territorial delimitation requires innovative methodological guidelines regarding commonly adopted

approaches to public policies for which the analytical scope remains under contingencies of the representation of the subnational jurisdiction (e.g., municipalities or departments). In addition to federal subnational jurisdictions, there are normative provisions for other territorialities, such as: Conservation Units, River Basins, Ecosystems of high ecological relevance, or areas prone to risks and/or disasters. Ultimately, there are territories in which the representation of civilians occurs through struggles for constitutional rights and respective jurisprudence in the intranational legal system. These include social movements, community organizations, local associations, and other forms of communitarian organization in a diversity of uses/users (Heron et al., 2019; Djosestro and Behagel, 2021; Macedo and Medeiros, 2021).

Second, an inventory of stakeholder composition in the uses and activities throughout protected areas should be assessed and qualified due to the composition of usaries concerning their relations of necessity in territorial use and the formalized vocation of the protected areas (Telles, 2023). Third and finally, the integration of data and information in a spatial database is needed as a crucial source of success in the portability of participatory territorial governance, as represented in Figure 5.

Strengthening the institutional capability of coastal governance on the Paraná coast must consider the restructuring of regional coastal governance in each federated attribution, whose essential function is to generate a gear of territorial management that is understood in its complexity and decentralizing legal principle of non-regression in Environmental Law. Conflict management guidelines and protocols must follow the normative procedures of participatory governance, which must be within the scope of the management councils of participatory committees.

CONCLUSION

Multiple social uses and conflicts around estuarine natural resources were characterized by a scientific challenge of multiple dimensions and, to some degree, generalized categorization. The need to elaborate an analytical framework relating natural resources, their uses, their

users, potential conflicts, and the ways to solve this conjunctural problem demanded efforts that transcended orthodox methodologies. Furthermore, global theories present contributions that need adaptations when the topic addressed is the participatory governance of Brazilian estuarine regions. Despite the complexity of the problem in its conjuncture, the geographical study empiric of PBZ constitutes an open field for territorial approaches and will benefit from the application of complementary analytical methods; i.e., the PBZ estuary as a territorial configuration with polycentric framework of governance analysis.

Following the relative lack of analytical models applied to Brazilian regional estuaries, this study recognizes that its broader set of elements, indicators, and data must be integrated in a coherent framework. Therefore, this research consists of a precursory study, combining a first model on governance assessment variables with preliminary results beyond some of the nuanced indicative data. Complementary approaches should add the broader goal of diagnosing the inclusiveness of participatory governance and must be aimed at the socio-ecological resilience of the estuary, including the recognized advance in studies on Marine Spatial Planning.

While synthesizing this research, the search for innovative attempts at analysis found it necessary to enforce theoretical and methodological aspects and data proceedings and analytics for regions with greater legal support than institutional presence and guarantee of rights. Theoretically, reflections were directed toward the territorial approach of estuarine space and its complex condition. Empirically, databases of predominantly qualitative information and analog documents were partially found. Methodologically, it was necessary to build a logical correlation between non-processed data and governance principles, as well as the establishment of indicators and equal valuation of them, which indeed was a set of difficult tasks to apply. In this aspect, results could be more in the sense of framework modeling innovation than consolidated diagnostic results. Institutional memory analog files should be made available and categorized in government programs, whereas research efforts that look to

better recognize the idiosyncrasies of community realities under the pressures of non-transparent economic drivers are much needed.

Therefore, results suggest openings in research agendas for scholars in which interdisciplinary exchange and further analysis are necessary, aiming at improvements through trial and error that can be based on the proposal presented by this study.

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AUTHOR CONTRIBUTIONS

D.H.Q.T.: Conceptualization; Investigation; Writing – original draft; Writing – review & editing.

L.C.A.P.: Conceptualization review; Writing – review & editing.

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