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A participative method to build bridges between sustainability science and anticipatory governance at Urdaibai Biosphere Reserve (Basque Country)

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Abstract

A key-goal for governance is the translation of knowledge into planning. We recruited 125 representatives from society, technical-political and the scientific community in a participation process focused on the Urdaibai Biosphere Reserve. We analysed their testimonials by using qualitative and quantitative methods, including Computer Assisted Qualitative Contents Analysis. We validated consensuses for future management, detailing criteria for a sustainable, collaborative, and anticipatory governance. The consensuses that stood out as most important have been the following: 1. Urdaibai should work towards human well-being and prosperity. 2. Synergies between institutions and society through participation strategies are necessary. 3. It is important to have a political leadership to guide governance. We can state that the participatory process carried out allowed participants to express shared horizons on future strategies. We present the methodology of this process as well as its results since we consider that both can be useful for managers of protected areas.

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Key words

Biosphere reserve; knowledge; anticipatory governance; public participation; shared horizon scanning

Resumen

Un objetivo clave de la gobernanza es la traducción del conocimiento en planificación. Para ello, reclutamos a 125 representantes de la sociedad, de la comunidad técnico-política y de la científica, para que tomaran parte en un proceso de participación centrado en la Reserva de la Biosfera de Urdaibai. Analizamos sus testimonios utilizando métodos cualitativos y cuantitativos, incluido el Análisis de Contenidos Cualitativos Asistido por Ordenador. Validamos consensos para la gestión futura y detallamos criterios para una gobernanza sostenible, colaborativa y anticipatoria. Los consensos que los participantes han destacado como más importantes han sido los siguientes: 1. Urdaibai debe trabajar por el bienestar y la prosperidad de sus habitantes. 2. Son necesarias sinergias entre las instituciones y la sociedad a través de estrategias de participación. 3. Es importante contar con un liderazgo político que oriente la gobernanza. Podemos afirmar que el proceso participativo llevado a cabo ha permitido a los participantes expresar horizontes compartidos sobre estrategias de futuro. Presentamos la metodología de este proceso, así como, sus resultados, ya que consideramos que ambos pueden ser de utilidad para los gestores de las áreas protegidas.

Palabras clave

Reserva de la Biosfera; conocimiento; gobernanza anticipatoria; participación pública; exploración de horizontes compartidos

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1. Introduction

Facing the challenges of climate change (Toimilla *et al.* 2020) and the deterioration of democracies (Ibarra 2011, Innerarity 2020) is an unavoidable obligation for policy makers, academia and society. In the short term, a new contract on the management of natural resources is needed to guarantee a sustainable future. At the same time, democracy needs to be legitimised through effective decision-making, broadening citizen engagement through the logic of governance and participation. Faced with this double challenge, Biosphere Reserves are privileged spaces for collaborative experimentation (Heikkila and Gerlak 2005, Leach *et al.* 2013, Massaua *et al.* 2016). Experimentation that makes it possible to go beyond planning based on the logics of efficiency and the short term to advance towards governance of well-being in a strategic key (Pierre 1999). This requires organisational designs and definitions of work challenges developed in an anticipatory (Muiderman *et al.* 2020) and collaborative (Subirats *et al.* 2009) key-approach.

The aim of this manuscript is precisely to show an approach methodology that has made it possible to define the challenges facing the Urdaibai Biosphere Reserve in an anticipatory way. Thus, after this introduction in which the literature on democratic and anticipatory governance is reviewed, the second section contextualises the case study and the research methodology. Specifically, it shows a research approach that deploys a set of quantitative, qualitative and participatory strategies to define the challenges facing this territory and the guiding principles on which the management of the Urdaibai Biosphere Reserve should be based, which are described in the results section. As will be underlined, the methodology we present allows a series of consensuses to emerge that cross both the participants linked to the institutional space and those linked to the social movements.

We believe that this manuscript, in short, shows a research model that can be replicated in other spaces for the identification of intervention strategies in an anticipatory key-approach. In the same way, it identifies a series of guiding principles and challenges that define an experimental horizon that can be extrapolated to other scenarios. In this way, we contribute to the literature that seeks to provide answers to the challenges of our time.

1.1.The Man and Biosphere UNESCO Programme (MaB)

MaB is an intergovernmental programme that aims to establish a scientific basis for enhancing the relationship between people and their surrounding environment. It combines the environmental and social sciences with a view to improving human livelihoods and safeguarding natural and managed ecosystems. This programme focuses its action on the World Network of Biosphere Reserves (WNBR) that currently counts 701 sites in 124 countries all over the world.[1] The main mission of MaB is to promote models of sustainable development through the WNBR. It also considers important to communicate experiences and facilitate the global promotion and application of these models and to support the evaluation and high-quality management of Biosphere Reserves (BRs), and their strategies and policies for sustainable

[1] For further information, please visit https://en.unesco.org/mab

development. MaB also aims to help to achieve the Sustainable Development Goals (SDGs). In this respect, it is worth highlighting that the MaB Strategy 2015-2025 is an update of the MaB Programme in the new context of the 2030 Agenda for Sustainable Development. Taking as a starting point its strategic third objective ("to facilitate sustainability science, among other issues"), the MaB requires collaboration between all the different stakeholders. BRs in particular have key roles to play in operationalizing and mainstreaming sustainability science at local and regional levels in order to build scientific knowledge, identify best practices and strengthen the interface between science and policy.

1.2. Sustainability science, citizen experience and governance

Global sustainability challenges are manifest since the 1950s at a planetary scale, in the form of the so-called "Great Acceleration" (Steffen *et al.* 2015). Zalasiewicz *et al.* 2015, defined the Anthropocene era by accelerating socioeconomic trends, such as population, overconsumption of resources and economic growth, urbanization and other aspects of global change. In this situation, sustainability science promotes problem-driven, cross-disciplinary approaches that advance the understanding of human-environment interactions (Shrivastava *et al.* 2020).

Sustainability science draws from multiple disciplines of the natural, social and political sciences. Thus, using a sustainability science approach by the use of problem-driven methodologies promotes a dialogue between science, society and management, focusing on the interactions between social and natural systems as well as the integration of multiple forms of knowledge leading to sustainable development. Moreover, collaborative ecosystem management should strive to use the best available science for implementing plans (Layzer 2008, Ostrom 2009). However, the extent to which science is actually used in collaborative partnerships has been little studied (Heikkila and Gerlak 2005, Leach *et al.* 2013, Massaua *et al.* 2016). This is challenging because participative environmental management often includes a wide range of stakeholders, with some having little understanding of scientific methods and how best to incorporate scientific and experience-based findings into policies.

Governance is key to addressing the complexity of a context in which the local scale has great opportunities (Swyngedouw 1996, Brenner 1998). "Decentralized governance" (Bevir and Rhodes 2016), or "local governance" (Subirats 2016, Blanco *et al.* 2018), is understood as the coordination of relations between academia, public and private institutions, citizens, and NGOs involved in a territory whose scope is no longer the state. This governance enables a flexible form of power, consisting of the incorporation of new stakeholders (Le Galès 2010). This is something fundamental specifically in BRs, which must articulate interests by slowing down pure commoditization policies (Telleria and Ahedo 2016). Thus, we move away from forms of hierarchical and authoritarian government (Jessop 2016) to enter a field of policy production and management adjusted to the current complexity (Innerarity 2020). If we want to consider this governance as "democratic", it must be participative (Ibarra 2011). Moreover, a management governed by the principles of sustainability that advance towards the achievement of the SDGs must be undoubtedly "anticipatory" (Fuerth 2009, Boston 2019, Muiderman *et al.* 2020). The following subsections will explain each of the two issues.

1.2.1. Democratic governance

Many authors have examined the process of transitioning from "government" to "governance" from the perspective of democratization (Kooiman 1993, Rhodes 1996, Pierre 2000, González Medina and Huete García 2018). As Jessop (2016) identified, BRs need public-private collaborations, which is essential in order to combine social and economic development and environmental conservation. Moreover, BRs require the recalibration of their intergovernmental relationships – those established between local, provincial, regional, state and international institutions – to achieve a commitment to a networked government involving decentralization. The depoliticization of administrations is also a key to allow other actors to influence decision-making. It is indeed, the meaning of this manuscript, in which we draw up shared reflections on science, society and technical and political management, and use them to determine a series of shared guiding principles (Annex I) and proposals (Annex II).

In practice, there is a continuum ranging from neoliberal management models to those that are democratic and show traits of inclusive governance (Ahedo and Telleria 2020). Pierre (1999) identifies four types of governance. The first two are incompatible with the philosophy of MaB, since the first focuses the management model on production efficiency and the second favours certain interests based on the power of corporate governance. However, the third one centres on "growth" governance. It bases its policies on medium-to-long-term economic growth, with mechanisms for negotiation and coordination between different actors around common interests. Finally, the fourth type, called the "welfare" governance model, gives greater decision-making capacity to local authorities against higher ranks; it is more cautious with public-private relations and more inclusive with the most harmed actors. It also establishes a networked approach as a key tool. In this model, the basis of governance are not particular interests but the common good. As we will see, the stakeholders of Urdaibai BR are committed to advancing this fourth model, in which local prosperity needs governance that meets the needs of ecosystems and people using a strategic look. A model of governance arises that looks beyond the short term in order to design policies that meet the challenges of the future. In this demand for strategic key governance, the stakeholders of BRs see the present as a crossroads, which results in the need to stay ahead of threats.

1.2.2. Anticipatory governance

Muiderman *et al.* (2020) identify several approaches of anticipatory governance from a literature review. These authors firstly define two axes of analysis present in the analysed models. The first axis classifies future perceptions into four categories: probable scenarios, plausible futures, perspectives that imagine plural horizons and approaches that address imaginary futures. The second axis focuses instead on the present-day possible actions: formal planning and development strategies, building social capacities, mobilization of diverse stakeholders, discursive interrogation, and search for material effects in the present. The intersection of these axes delimits the basis of the approaches identified by these authors: mitigate risks, reflect on uncertain scenarios, imagine futures, and identify the present implications from speculation about imaginary futures. Thus, following the proposed categorization, they classify four approaches to governance, from lowest to highest strategic vision: (1) Planning based on the definition of likely scenarios aimed at risk reduction. (2) Exploration of futures to

build collective capacities to reflect on uncertain futures. (3) Definition of participative futures that allow mobilizing stakeholders to co-create new futures. (4) Analysis of the potentials of the definition of imaginary futures and the visualization of their present implications. They also point out that each of these approaches require different methodologies. Thus, in the method we present here we will address the first approach through policy analysis; the second through vulnerability assessment or impact analysis; the third through participatory strategies; and the fourth through speech analysis.

1.3. A methodological example to achieve a democratic anticipatory governance: the case of the Urdaibai BR

The participative process carried out in Urdaibai BR responds to the Plan for Interpretation, Research, Training and Education for the Sustainable Development for the Urdaibai BR (Basque Government 2015). This Plan establishes the requirement to agree the scientific research with the demands of the citizens, NGOs and public and private managers (Martín-López *et al.* 2009).

The process here described likewise aims to demonstrate that the dialogue between science, management and society allows the articulation of governance (Fuerth 2009, Jessop 2016). We have carried out a rigorous analysis of the discourse of the interviewed participants, we have arranged deliberative workshops and we have deployed a collection of knowledge in the form of a congress. As a result, the participants have the possibility to agree policy proposals. By using this participatory process, we try to balance the expert knowledge of science and citizenship, that is, scientific knowledge and citizen experience. As we will see, the participants will point to the need for a collaborative and participative governance based on crosscutting, pluralistic and performative strategies. These consensual strategies deploy thus the possibilities identified by Muiderman *et al.* (2020) for anticipatory governance.

The approach of this example is also consistent with evidence of the work of the Nobel laureate Elionor Ostrom (2010) on the polycentric governance of complex economic systems (Poteete *et al.* 2010). Her methodology allows the analysis of how diverse polycentric institutions help or hinder the innovativeness, learning, adapting, trustworthiness and levels of cooperation of participants and the achievements of more effective, equitable, and sustainable outcomes at multiple scales. The case study will also show that participatory methodologies can combine the potentials of various approaches, ranging from planning based on probable and close scenarios, to questioning in relation to a future that incorporates plural coordination of views based on citizen experience (Irwin 2001). Furthermore, this example will set up a dialogue between stakeholders who traditionally start from different positions of power and discourses (McAdam *et al.* 2001, Telleria and Ahedo 2016).

Therefore, we should consider the participatory dynamics implemented as a replicable methodological example for any other territory organized through a governance structure that seek the co-production of policies for sustainable management (Parés 2017).

2. Case study area and research methods

2.1. Case study area

Urdaibai BR, declared in 1984 by UNESCO, is located on the south-eastern shore of the Bay of Biscay (43º 12' - 43º 28' N; 2º 33' W - 2º 46' W). Its limits are those of the Oka river catchment that covers an area of 220 km2. This territory mainly bases its economy on the service (61%) and industry (24%) sectors with construction (10%) and primary (4%) sectors being secondary. The region houses approximately 45,000 inhabitants and 20 municipalities, including two main towns of approximately 16,000 inhabitants (Gernika-Lumo and Bermeo) (Figure 1).

FIGURE 1

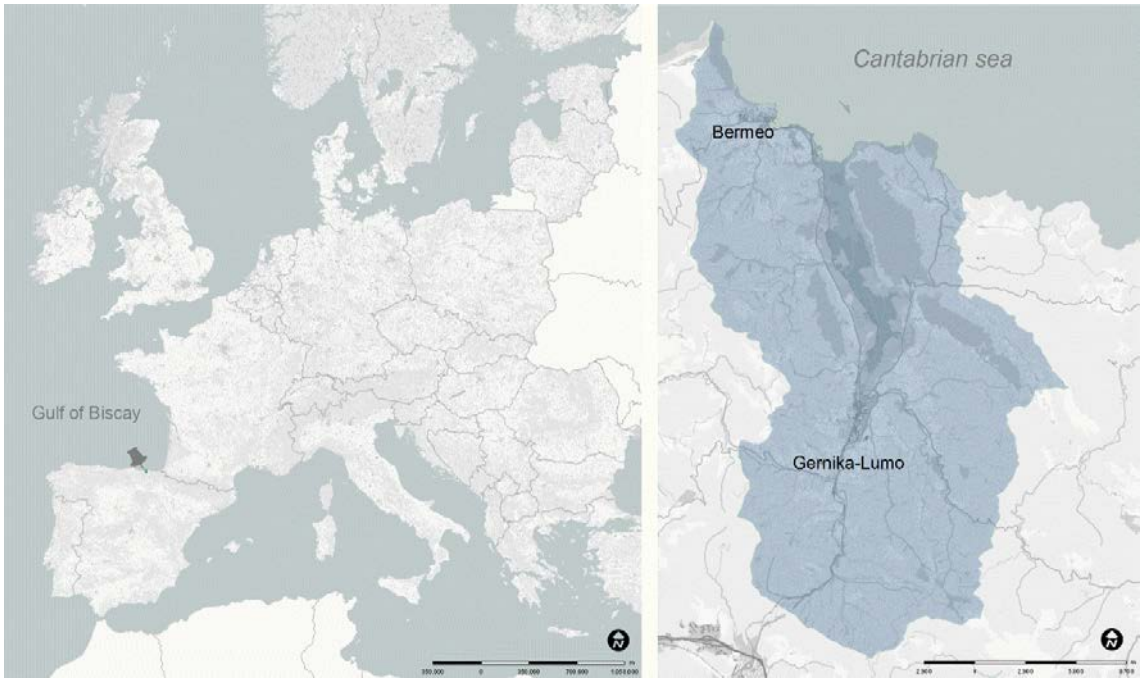


Figure 1. Location and limits of Urdaibai Biosphere Reserve.

Urdaibai BR, just as any other BRs around the world, presents three main objectives: the nature conservation, the sustainable social and economic development, and the logistical support, which relies on scientific knowledge and education for sustainability. We can consider it as a laboratory of experiences that aims to achieve a balance between nature conservation and sustainable development to improve the living conditions of its inhabitants. The Law 5/1989 of July 6, which establishes a special legal regime in order to protect and promote the recovery of all its ecosystems, regulates the land uses in this BR. Following the MaB guidelines, Urdaibai BR has a governing board who is in charge of deploying a governance strategy. The members of this board are representatives of the different local and supra-local (regional) administrations, which have policy competences as well as organizations and associations representing the economic, social and environmental interests. Another body of great importance is the cooperation council of the BR, a consultive board made up of different social groups, which acts as ombudsman, since it has the purpose of establishing a way of participation between the governing board and society.

The main objective of this governance structure is to preserve the natural, architectural, historical, cultural and artistic legacy that exists in Urdaibai BR, which is the consequence of more than 15,000 years of coexistence between humans and our natural environment (Rofes *et al.* 2014). Beyond cultural heritage, the conservation function of this BR aims to protect genetic resources, species, ecosystems and landscape. In fact, Urdaibai BR has 729 species of fauna, 821 species of flora, 86 habitats, 43 inventoried geosites and 85 endangered species or at least of community interest. Currently, cultivation of pine and eucalyptus trees occupy a substantial area (60%), having replaced natural forests (Onaindia *et al.* 2013). In sum, Urdaibai BR is a unique Atlantic landscape formed by a mosaic of coastal and fluvial environments, woodlands, agricultural fields and human rural and urban settlements.

2.2. Research methods

The commitment to co-production of policies incorporating stakeholders (Osborne and Strokosch 2013, Parés 2017, Arnanz 2018) is part of the design of participatory mechanisms to define policies (Subirats *et al.* 2009, García-Espín and Jiménez 2017). In 2019, following this main objective we implemented and analysed a participatory process with the following aims:

1. Identify the knowledge needs aligned to the SDGs grouped in four thematic axes: "planet", "society", "prosperity" and "alliance" (Figure 2).
2. Design a methodology to collect the plurality of views of the stakeholders.
3. Achieve a comprehensive perspective of the statements of the participants.
4. Collaborate in the definition of a shared horizon for governance.
5. Facilitate the dialogue between science, society and the managers of the case study area.

FIGURE 2

Figure 2. Alignment of studied thematic axes to the SDGs.

In order to achieve the stated main objective and goals and consequently, facilitate synergies between citizens, researchers and managers, we implemented a series of participatory dynamics that combine a sequence of opening and closing strategies (Ganuza *et al.* 2010) (Figure 3).

2.2.1. Opening strategy

Urdaibai BR Service, after more than thirty years of work managing Urdaibai BR, have a deep knowledge about the stakeholders of Urdaibai BR and their relationships. This management body helped the authors to select the participants. Based on this knowledge, we selected and directly contacted relevant actors from the social, scientific and management spheres. Throughout this selection and contact process, by following a strict ethic we tried to obtain a representative sample of people that will provide a representative, plural, and balanced sample of all the relevant opinions about the issues raised. The opening strategy consists of gathering and incorporating the opinions present in the territory through various instruments (Figure 3):

FIGURE 3

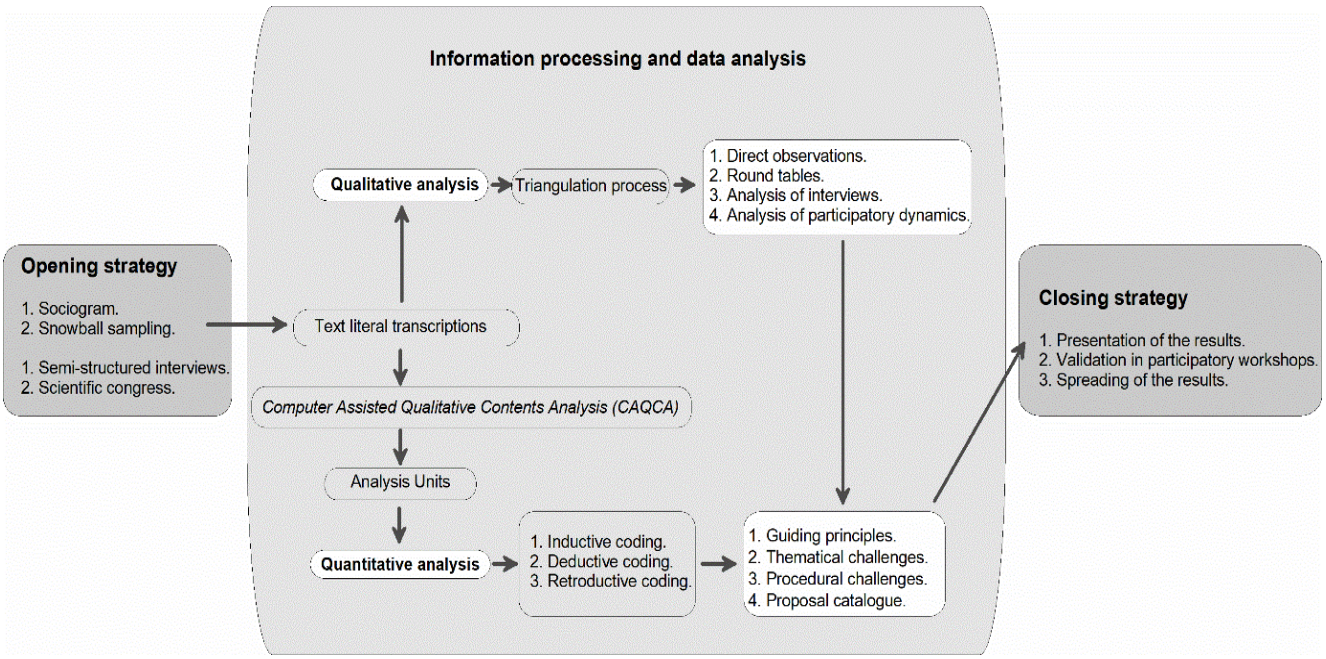


Figure 3. Conceptual framework of methodology.

- A sociogram to identify and select sets of relevant stakeholders (125 people) in order to take representative samples of: (a) from pro-development to pro-conservationist speeches; (b) positions of power: citizenship, political class or technical body; (c) concerns: environmental, economic, scientific, academic, technical and political; (d) levels of responsibility: business, social movement, local technical-political, provincial, regional; (e) role: activist, institutional, business, academic.
- Semi-structured interviews (16 meetings with 27 people, 20 men and 7 women) with technicians from the Urdaibai BR Service (case study area), the Provincial Council (local, Biscay province) and the Basque Government (regional); with local political leaders (municipalities), with social activists and movements (NGOs) and with representatives from various economic sectors (7 representatives of the Urdaibai BR; 7 of the institutions, 6 of the economic sector and 7 of the associative sector).

- Snowball sampling among people proposed by the initially selected stakeholders in order to complete the information through an on-line survey answered by 40 people.
- A scientific congress consisting of the presentation and debate of 45 scientific communications about the case study area, including the organization of round discussion tables between representatives of the scientific and management communities (8 participants).

2.2.2. Information processing and data analysis

Bowen (2009) highlights that the content analysis of written documents are a source of data for a historical view, new hypotheses, modelling support, change and development tracking as well as evidence triangulation. Consequently, we exhaustively analysed the text literal transcriptions obtained through the opening strategy using a Computer Assisted Qualitative Contents Analysis (CAQCA) tool, a well-known instrument largely used in social applied human sciences (Mackensen and Wille 1999, Krippendorff 2004, Peters and Wester 2006, Chowdhury 2014). This method involves the coding and selection of Analysis Units (AUs), such as a search for terms or a semantic examination of the content of the transcripts, to interpret and find possible relationships between the selected text fragments (Figure 3). This is what the literature calls the hermeneutical approach (Döös and Wilhelmson 2012). AUs, therefore, represent a body of the texts extracted from the transcriptions of the interviews. We designed them to mark and classify all those meanings that we seek based on our hermeneutical interest. The most of the more than 2,100 AUs identified refer to attitudes or feelings, such as the rejection of/from certain groups or the fear of certain situations (Table 1).

With an initial sample of 125 participants, using as a benchmark the application of this method in other studies with a similar number of participants, we consider that the number of AUs identified is high. We have analysed these AUs independently or interrelated to each other, and additionally, with respect to the type of stakeholder involved. By using this tool, the analyst first assesses the meaning found in the deep level of a text, and from this, reaches the superficial level, that is, the linguistic resource used. However, he cannot automatically search for the location of the texts that express the contents defined in the AUs. Thus, he has to read all texts carefully, word for word, in order to detect the information he is looking for. Therefore, the interpretation process requires a laborious work. Nevertheless, the software greatly facilitates the work of analysis because it allows the analyst to focus on complex linguistic judgments while the computer takes care of recording and ordering the data. The software also facilitates the coding of primary documents at the most diverse levels (conceptual, functional, lexical, grammatical, pragmatic, graphic, visual, auditory, phonetic, etc.), based on the hermeneutical interest of the analyst. It makes it possible to relate all the data in such a way that it allows quick testing of all kinds of hypotheses related to the interrelation of the data. The program also clearly helps to present even large amounts of data and results and to export them in various formats.

Taking as a basis the text literal transcripts, we carried out their qualitative analysis by means of a triangulation process (Flick *et al.* 2004) that secures a holistic logic compatible with rigorousness (Morse and Chung 2003). This qualitative process uses as data source direct observations carried out during the opening strategy and text literal transcriptions of all statements of the participants (Figure 3).

TABLE 1

Inductive					Deductive					Retroductive				
Node	**Sub-node**	**AUs**	**I**	**%**	**Node**	**Sub-node**	**AUs**	**I**	**%**	**Node**	**Sub-node**	**AUs**	**I**	**%**
(N1) Thematic axis (288 AUs)	*(N1.1) Alliance*	**75**	16	**26**	**(N5) *Alliance* challenges (309 AUs) (49%)**	General Alliance	**7**	3	**2**	**(N9) *Procedural challenges* (432 AUs)**	Agility	**7**	5	**2**
	(N1.2) Planet	**57**	12	**20**		Experimentality	**43**	15	**14**		Applicability	**45**	15	**10**
	(N1.3) Prosperity	**109**	16	**38**		BR philosophy	**62**	14	**20**		Political leadership	**71**	14	**17**
	(N1.4) Society	**47**	7	**16**		Institutions & governance	**94**	16	**31**		Shared horizon	**38**	12	**9**
(N2) Proposals (138 AUs) *From the interviews as well as from the other participatory dynamics*	General proposals	**12**	6	**9**		Interests	**63**	16	**20**		Integrality	**54**	15	**13**
	Alliance	**19**	7	**14**		Participation and citizenship	**40**	13	**13**		Social laboratory	**40**	14	**9**
	Planet	**18**	6	**13**	**(N6) *Planet* challenges (92 AUs) (15%)**	General Planet	**15**	6	**16**		Strategic look	**71**	15	**16**
	Prosperity	**71**	13	**51**		Species and habitats	**9**	5	**10**		Daily needs	**36**	14	**8**
	Society	**18**	5	**13**		Geosites	**6**	6	**7**		Social synergies	**70**	13	**16**
(N3) Diagnosis (186 AUs) *Diagnosis of reality*	Threats	**24**	11	**13**		Relationship Prosperity-Planet	**62**	15	**67**	**(N10) *Assessment* (302 AUs)**	Crossroad	**129**	15	**43**
	Weaknesses	**91**	15	**49**	**(N7) *Prosperity challenges* (168 AUs) (26%)**	General Prosperity	**37**	4	**22**		Negative	**99**	15	**33**
	Strengths	**14**	9	**7**		Circular economy	**8**	6	**5**		Positive	**74**	14	**24**
	Opportunities	**57**	14	**31**		Endogenous economy	**31**	13	**18**					
(N4) Knowledge challenges (103 AUs) *Type of knowledge required*	General knowledge	**35**	7	**34**		Infrastructures	**17**	7	**10**					
	Associative	**13**	5	**13**		Brand	**20**	8	**12**					
	Scientific	**26**	10	**25**		Sectors	**55**	12	**33**					
	Economical	**8**	3	**8**	**(N8) *Society challenges* (65 AUs) (10%)**	General Society	**4**	4	**6**					
	Popular	**21**	10	**20**		Vulnerable groups	**5**	5	**8**					
						Gender	**8**	7	**12**					
						Identity	**31**	9	**48**					
						Social laboratory	**17**	**8**	**26**					

Table 1. Categorized nodes and sub-nodes. AUs refers to the number of Analysis Units encoded. "I" refers to the number of interviews/discussion groups in which there are AUs associated with the aforementioned analysis node or sub-node. "%" refers to the percentage of AUs encoded.

In addition, we implemented a quantitative analysis on the most relevant chosen AUs. We followed a triple round of coding following first an inductive, then a deductive and finally a retroductive approach (Figure 3; Table 1).

In a first inductive analysis, we coded the obtained data in nodes named as follows: Thematic axes (N1); Proposals on each of these axes (N2); Diagnosis (N3); and Knowledge challenges (N4). We chose these codes according to the previously defined main objectives and specific goals of the participative process.

In a second deductive reading, we analysed the meaning of the contributions of the participants and as a result, we identified thematic challenges for each of the four selected thematic axes (N5-N8) and assessed the mood from which they reflect, assessed as negative or positive. In this second phase, we also scrutinised the dependence relationships between the thematic axes. First, we identified the relationships of dependence between the thematic axes expressed directly by the interviewees. Then, the recognised AUs were cross-referenced. This procedure allowed us to identify the thematic challenges to be quantitatively analysed next. Cross-observations between the thematic axis of diagnosis (N3) and the thematic challenge relative to knowledge (N4), as well as the relevant assessment of the thematic challenges of alliance and prosperity (N5 and N7) led us to a further retroductive third review.

In this third retroductive review, we identified procedural challenges (N9) associated with the sub-node of the alliance challenge relative to institutions and governance. We defined N9 as a key variable to limit weaknesses, take advantage of opportunities, and face a perception of crossroads in relation to the thematic axes of planet, society and, above all, prosperity. We also identified the need for a new type of assessment (N10), which is neither positive nor negative, coded as crossroads. We code as crossroads those statements made when facing a crisis, that refer to the configuration of the future in positive or negative tone based on the innovative decisions that are made in the present. This concept aligns with approaches identified in climate (Hoffman & Sgró 2011), economic (Hart 2010), sociological (Hanafi 2020) or global (Helbing 2013) issues. As we will see, it has great relevance in the logic of anticipatory governance as it refers to the need for public decision-making to address the challenges of a context interpreted as a point of no return by participants.

The quantitative representativeness provided by the computer processing as well as the results of the performed qualitative analysis have served as the basis for consensus on a series of guiding principles, thematic and procedural challenges (Annex I) and on a proposal catalogue aligned with the SDGs that responds to the sustainable management needs of Urdaibai BR (Annex II).

2.2.3. Closing strategy

The closing strategy involves a return of the obtained results to the participants, the validation and expansion of these results in participatory workshops (35 participants divided into two groups), and the spreading of them.

3. Results

Through this shared participative dynamic reflection, we have identified governance challenges (thematic and procedural) that respond to the plural interests of civil society, science and political-technical management involved in Urdaibai BR. Moreover, we have defined guiding principles that serve as a guide to manage a reality oriented towards coexistence between well-preserved environments, a social and economic development and habitability (3.1. subsection). These challenges and guiding principles emerge from a rigorous process of analysing the discourse of the participants and defining a minimum common denominator between social movements and the institutions on the one hand, and science and technical management on the other. Their value lies in their representativeness since we validated and completed them within the framework of participatory workshops. Analysing the encodings provided by the CAQCA tool has allowed us to synthesize the discourse of the participants, following the logic of anticipatory governance (Muiderman *et al.* 2020). In addition, we have gathered a catalogue composed by 172 proposals (Annex II).

3.1. Thematic axis (N1), proposals (N2) and diagnosis (N3)

A first inductive reading of the results suggests that the main concern of the stakeholders is related to the prosperity axis, since it presents the highest quantity of AUs regarding both thematic axes (N1, 109 AUs, 38%, Table 1) and proposals on this axis (N2, 71 AUs 51%). The stakeholders focused their speeches next on the alliances axis (N1, 75 AUs, 26%), while the planet and society axes received less attention (N1, 57 AUs, 20% and 47 AUs, 16% respectively). The stakeholders proposed fewer proposals in relation to the alliance, planet and society thematic axes (N2, about 13% each). A smaller percentage of proposals (N2, 9%) focused on aspects transversal to all axes.

Additionally, in Table 1 we can see that across all thematic axes actors predominantly diagnose weakness (N3, 91 AUs, 49%), even though opportunities are also identified (N3, 57 AUs, 31%). In addition, stakeholders identify in smaller numbers threats (N3, 24 AUs, 24%) and strengths (N3, 14 AUs, 7%). The identified opportunities and the need to deal with threats explain that the majority of the assessment is that of crossroads (N10, 129 AUs, 43%). Likewise, the greater institutional power over social agents to establish strategies that address uncertainty situations explains why the crossroads assessment is more important in the former (47% vs 37% respectively, Figure 4A). Social agents, consequently, centralize valuation in the negative (40%, Figure 4A) because of their less powerful gaze. The positive ratings of the two groups of actors are similar, around 23% (Figure 4A).

FIGURE 4

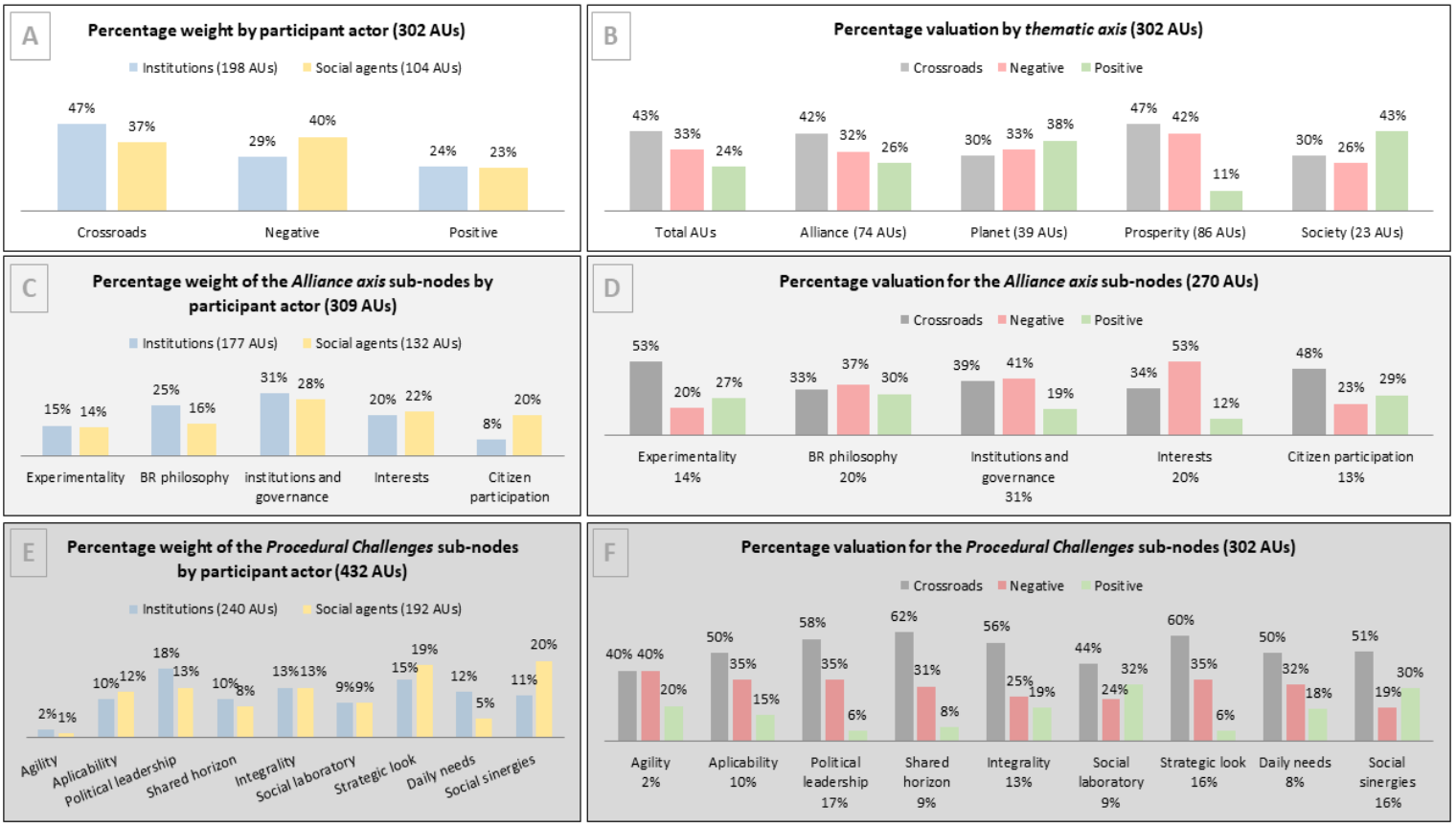
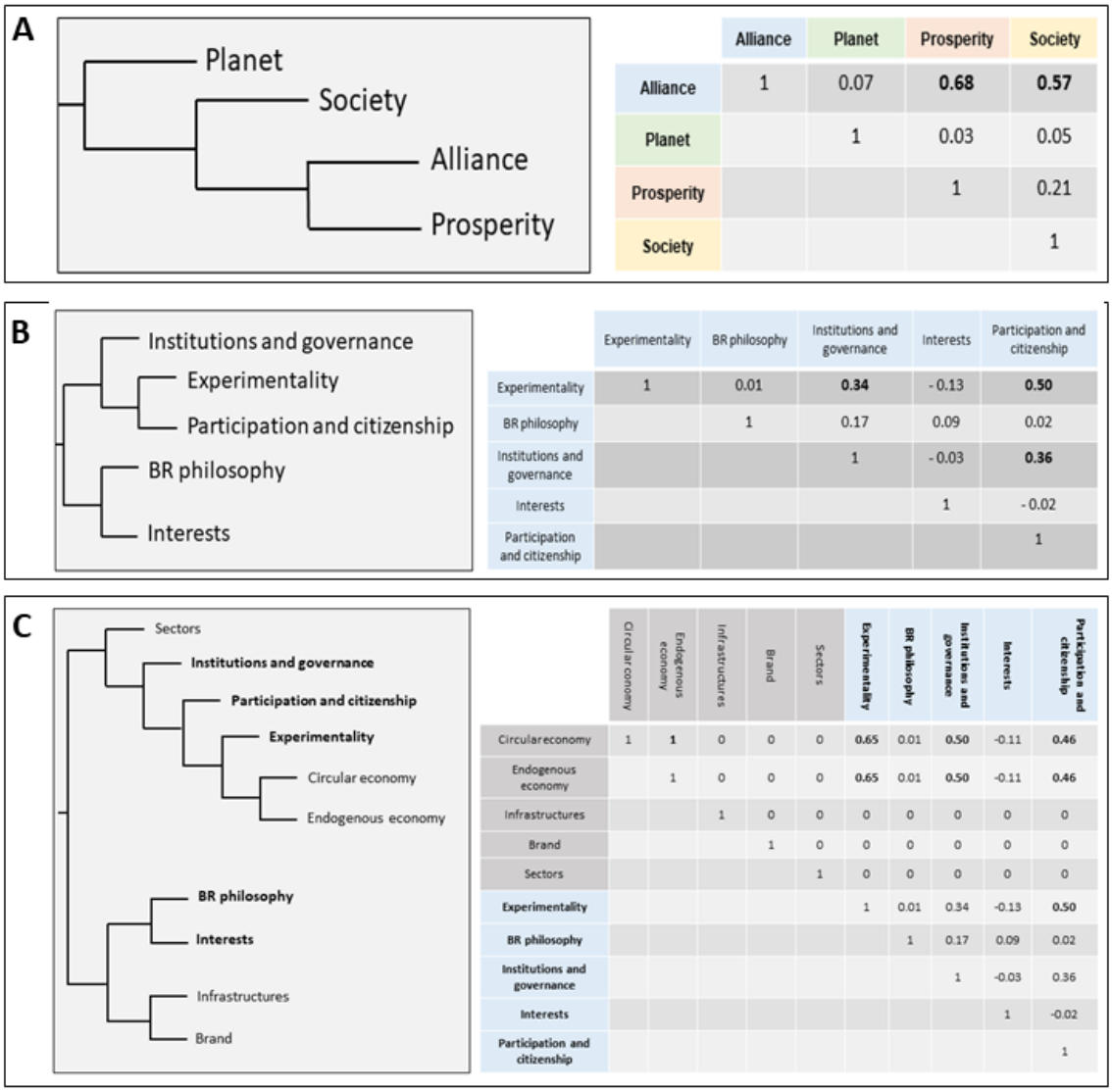


Figure 4. Example of some relevant cross-analyses. A. Percentage weight by participant actor; B. Percentage valuation by thematic axis; C. Percentage weight of the Alliance axis sub-nodes by participant actor; D. Percentage valuation for the Alliance axis sub-nodes; E. Percentage weight of the Procedural Challenges sub-nodes by participant actor; F. Percentage valuation for the Procedural Challenges sub-nodes.

When assessing the thematic axes, the highest crossroads assessment refers to the axes of Prosperity (47%) and Alliances (42%) (Figure 4B). The axes of Planet and Society present the most positive valuations (38% and 43% respectively). This highlights the importance of Urdaibai BR as a social laboratory, and of society in advancing the conciliation between Society and Planet. The fact that the most negative assessment refers to the prosperity axis (42%) indicates that it depends strongly on the Alliance and Society axes. We can observe this dependency specifically in Figure 5A, which shows a relatively high correlation between this axis and the axes of Alliances (0.68) and Society (0.57). This means that a third round can detect procedural challenges (N9) linked to political leadership (71 AUs, 17%, Table 1), social synergies (70 AUs, 16%, Table 1) and strategic look (71 AUs, 16%, Table 1), which present the highest values. The results of the qualitative analysis of the interviews also highlight this correlation.

FIGURE 5



	Alliance	Planet	Prosperity	Society
Alliance	1	0.07	**0.68**	**0.57**
Planet		1	0.03	0.05
Prosperity			1	0.21
Society				1

	Experimentality	BR philosophy	Institutions and governance	Interests	Participation and citizenship
Experimentality	1	0.01	**0.34**	-0.13	**0.50**
BR philosophy		1	0.17	0.09	0.02
Institutions and governance			1	-0.03	**0.36**
Interests				1	-0.02
Participation and citizenship					1

	Circular economy	Endogenous economy	Infrastructures	Brand	Sectors	Experimentality	BR philosophy	Institutions and governance	Interests	Participation and citizenship
Circular economy	1	1	0	0	0	0.65	0.01	0.50	-0.11	0.46
Endogenous economy		1	0	0	0	0.65	0.01	0.50	-0.11	0.46
Infrastructures			1	0	0	0	0	0	0	0
Brand				1	0	0	0	0	0	0
Sectors					1	0	0	0	0	0
Experimentality						1	0.01	0.34	-0.13	0.50
BR philosophy							1	0.17	0.09	0.02
Institutions and governance								1	-0.03	0.36
Interests									1	-0.02
Participation and citizenship										1

Figure 5. Example of node clusters by word similarity (left), with their corresponding Pearson correlations (right) A. Relationship between Thematic axes; B. Relationship between Alliance Challenges sub-nodes; C. Relationship between Alliance Challenges sub-nodes and Prosperity Challenges sub-nodes.

3.2. Thematic challenges (N5-N8)

The second reading of the results identifies specific challenges for each thematic axis. The higher discursive volume focuses on the challenges associated with the alliance axis (N5, 309 AUs, 49%, Table 1). Of the discourse, 31% (94 AUs) refer to institutions and governance; 20% (63 AUs) to the management of conflicting interests, which is the essence of collaborative governance and well-being; and another 20% (62 AUs) to work on the Urdaibai BR philosophy, i.e. the compatibility between development and conservation. Thus, the stakeholders identify alliance as a mechanism to answer to several interests through a logic that allows the cohabitation of economic and social development and nature conservation. In addition, to improve this polycentric governance, actors identify as necessary both participation and citizenship (13%, 40 AUs) and experimentality (14%, 43 AUs), thus exposing the ability to extrapolate to other

territories what has been proposed for the Urdaibai BR. The identified challenges are very specific, with very few general challenges (2%, 7 AUs) arising in the analysis.

If we analyse the discourses by actors, we observe a common ground between institutional and social agents (Figure 4C). Both show similar percentage weights in relation to institutions and governance (31% and 28% respectively), interests (20% and 22%) and experimentality (15% and 14%). An imbalance occurs in relation to citizen participation, which presents higher weight from social agents (20% vs. 8%) and conversely, in relation to the philosophy of Urdaibai BR, which presents higher weight from institutional agents (25% vs 16%). Thus, we can infer that social agents, because of their position, encourage participation while institutional ones give more relevance to a BR philosophy that they are in charge of managing.

When we analyse the discourses based on their assessment (Figure 4 D), the aspect with the most negative valuation is the existence of several interests (53%). Assessment of institutions and governance have more balanced values (39% positive, 41% negative), while the weight of the crossroad valuation is relatively significant (19%). This assessment appears to relate institutions and governance to the need to respond to interests. As a complement to strengthening institutions and governance, the actors state positive assessments with respect to the philosophy of the reserve (30%), citizen participation (29%) and experimentality (27%). We infer similar results from the analysis of the correlations between the alliance challenges shown in Figure 5B. Actors find a significant correlation between experimentality, participation, and citizenship (0.50); between experimentality, institutions, and governance (0.36); as well as between participation and citizenship and institutions and governance (0.34). It therefore seems that actors see it necessary to use the vocation of BR as an area of experimentation based on participative governance policies driven from institutions.

The challenges associated with the axis of prosperity represents a percentage of 26% (N7, 168 AUs; Table 1). The challenges that receive the most attention are those related to the productive sectors (55 AUs, 33%) and to achieving prosperity through transversal actions (37 AUs, 22%). There is also interest in challenges related to the empowerment of the endogenous economy (31 AUs, 18%) and to a lesser extent about the development of a brand for the territory (20 AUs, 12%) and infrastructures that boost the economy (17 AUs, 10%). The empowerment of the circular economy does not a priori seem to be a priority challenge (8 AUs, 5%). However, if we correlate prosperity challenges with alliance challenges (Figure 5 C), we see that the circular economy and the endogenous economy are strongly related to experimentality (0.65 each), institutions and governance (0.5 each), and participation and citizenship (0.46 each). This data suggests that actors believe that the empowerment of the circular endogenous economy should be a challenge for institutions with the support of social actors through pilot projects in the territory.

The challenges associated with the planet axis represent 15% of all thematic challenges (N6, 92 AUs; Table 1). Of these, the highest percentages relate to challenges that link the axes of prosperity and planet (62 AUs, 67%) and other general challenges (15 AUs, 16%). Challenges related to species and habitat conservation (9 AUs, 10%) and geosites (6 AUs, 7%) reveal less significance. This data is paradoxical, since the concern of institutions and citizens about the conservation of the planet led to the declaration of space as BR. It

seems that, after more than 25 years of the declaration, the concerns of the actors have changed as they clearly give more importance to the axes of prosperity and alliances. Apparently, nowadays there is a positive perception in the actors regarding the favourable state of conservation of nature. Probably this is why they do not consider it as a main challenge, and instead place the focus on the challenges related to prosperity and alliances that they see as a primary necessity.

The challenges associated with the axis of society are those that receive the least attention, a 10% of all (N8, 65 AUs; Table 1). Among them, the most significant is the need of the actors to achieve a sense of belonging and identity with respect to the territory (31 AUs, 48%), as well as the interpretation of BR as a social laboratory (17 AUs, 26%). Participants relegated to the background gender equality challenges (8 AUs, 12%) and attention to the most vulnerable sectors of the population (5 AUs, 8%).

3.3. Procedural challenges for alliances (N9)

At a third reading, we focused on identifying the procedural challenges underlying the governance strategy (N9, Table 1) where we identify 432 AUs. Their percentage values are very homogeneous around a mean of 11%, indicating the importance of all of them. Specifically, the speech focused on clearly political aspects such as the need for political leadership (71 AUs, 17%), for strategic look (71 AUs, 16%) and for the implementation of social synergies (70 AUs, 16%). They also express methodological challenges such as the commitment to comprehensive strategies to vertebrate environmental, economic and social aspects, that is, integrality (54 AUs, 13%), the applicability of measures (45 AUs, 10%) and the definition of future shared horizons (38 AUs, 9%). Finally, they also propose tactical challenges such as the definition of the territory as a social laboratory of experiences to be exported (40 AUs, 9%) and the guidance of actions towards daily needs (36 AUs, 8%).

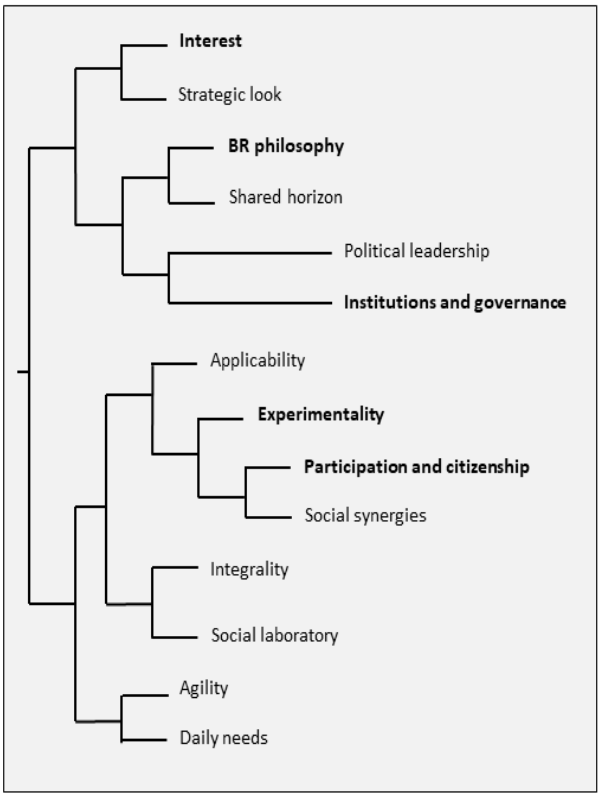
If we evaluate these procedural challenges by actors (Figure 4E) we observe that the institutions and social agents agree on the applicability (10% vs 12%), the shared horizon (10% vs 8%), the integrality (13% each) and the social laboratory (9% each). However, we detect opinion differences that can be understood based on the position of each agent: social agents give more weight to the strategic look (19% vs 15%) and to the social synergies (20% vs 11%), while institutional agents give more importance to daily needs (12% vs 5%) and to political leadership (18% vs 13%). From qualitative analysis in this regard, there are areas of consensus between these two groups of actors: in the workshops carried out, social agents recognized the importance of political leadership and the need to attend to the daily needs. In addition, in roundtables, the institutional side recognizes the importance of the shared horizon and social participation.

If we observe Figure 4F, we can interpret that actors consider the majority of the procedural challenges as a crossroads, e.g., political leadership (58%), shared horizon (62%), strategic look (60%), integrality (56%) and social synergy (51%). Therefore, these are fundamental elements of the discourse of the participants for the definition of guiding principles (Annex I) in terms of anticipation for the management of Urdaibai BR. This vision of crossroads reinforces the anticipatory nature of the speeches of the participants.

We can also perceive that the social laboratory (32%) and the social synergy (30%) present the most positive assessments. Therefore, we can infer that the actors see the democratic nature of governance as an opportunity. The applicability (35%), the political leadership (35%) and the strategic look (35%) among others, are negatively valued. This seems to indicate that there is the possibility of changing its course since, as already mentioned, the valuation as a crossroads of these challenges is significantly high.

If we correlate these procedural challenges with the challenges of the axis that presents the most attention, that is, with that of alliances (Figure 6), we see very significant correlations. For example, the challenge of implementing the biosphere reserve philosophy strongly relates to the procedural challenges of having a shared horizon (0.93) and a strategic look (0.55). The challenge of having robust institutions working through governance correlates with the need for political leadership (0.59) and the need to generate social synergies (0.49), and the challenge of encouraging participation and empowering citizens presents a strong correlation with the challenge of strengthening social synergies (0.70).

FIGURE 6



	Agility	Applicability	Political leadership	Shared horizon	Integrality	Social laboratory	Strategic look	Daily needs	Social synergies	Experimentality	BR philosophy	Institutions and governance	Interests	Participation and citizenship
Agility	1	0	0	0	0	0	0	0	0	0	0	0	0	0
Applicability		1	-0.04	-0.01	0.10	0.01	0.13	0	0.16	**0.30**	0.03	0.07	0.22	**0.36**
Political leadership			1	0.18	0.01	0.11	0.07	0	0.07	0.08	**0.20**	**0.59**	0.02	0.02
Shared horizon				1	0.08	0.06	**0.54**	0	0.08	0.02	**0.93**	0.16	0.12	0.01
Integrality					1	0.07	0.24	0	0.29	0.05	0.16	0.10	-0.02	**0.29**
Social laboratory						1	-0.01	0	0.07	0.24	0.11	**0.35**	-0.03	0.05
Strategic look							1	0	**0.32**	0.01	**0.55**	0.20	**0.64**	0.29
Daily needs								1	0	0	0	0	0	0
Social synergies									1	**0.31**	0.20	**0.49**	0.11	**0.70**
Experimentality										1	0.07	0.41	-0.04	**0.55**
BR philosophy											1	0.22	0.13	0.09
Institutions and governance												1	0.06	**0.45**
Interests													1	0.07
Participation and citizenship														1

Figure 6. Example of node clusters by word similarity (left), with their corresponding Pearson correlations (right) for Alliance Challenges sub-nodes and Procedural Challenges sub-nodes.

3.4. Building bridges between science and anticipatory management

From the participatory process, 103 AUs have been collected regarding the need to address knowledge challenges from science that are deemed necessary for the good management of BR (N4, Table 1). Most of them (35 AUs, 34%) relate to the need to delve into multidisciplinary knowledge. However, there is a predominance of the need for purely scientific knowledge (26 AUs, 25%), and also to rescue or maintain popular

knowledge (21 AUs, 20%). Associative knowledge is observed as moderately necessary (13 AUs, 13%) while the knowledge needs regarding the economy seem not to attract too much attention (8 AUs, 8%).

4. Discussion and Conclusion

Text processing allows us to draw the correlation of node sets. Specifically, the left side of Figure 6 shows the interrelationships between the challenges associated with the alliance axis and the procedural challenges. The first observable fact is how the alliance challenges correlate with the procedural ones in two main sets. The first set refers to the anticipatory governance and the second to its democratic and social dimension. Regarding anticipatory governance, we can see strong links between procedural and alliance challenges in the following nodes: political direction to reinforce institutional logic and governance; shared horizon based on the principles of the philosophy of the Urdaibai BR; and strategic look as a way to align interests.

As for the second set, the procedural challenge of social synergy is associated with the challenge of participation and citizenship, from where we understand the experimental nature of the strategies addressed. This links strongly with the applicability demanded to the studies and policies, with the need to use agile dynamics associated with meeting everyday needs, and with the idea of considering BRs as social-environmental laboratories.

Quantitative analysis therefore helps us define a model of anticipatory democratic governance based on compatibility between nature conservation and social and economic development. This model may explain the possibility of reaching consensus among stakeholders on the guiding principles for the management of the territory identified.

On this basis, we defined a number of preliminary strategic orientations, supported by the analysis of interviews and completed with other open dynamics such as surveys. In the congress, we validated them and complemented them by participatory workshops. Subsequently, we added the presentations and round tables made during the process to the body of information. All this results in guiding principles (Annex I) that reflect a consensual commitment to anticipatory and sustainable cooperative governance tailored to speeches by stakeholders. With this, we can highlight the most important consensuses and discuss them based on recent theoretical approaches, showing their applicability to other contexts. In any case, before we dwell on the main conclusions, we would like to underline a number of virtues of the approach implemented, as well as its limitations. On the one hand, the combination of quantitative (survey), qualitative (interviews) and participatory (congress and workshops) strategies has made it possible to mobilise and bring together perspectives from different positions (experiential, technical and scientific knowledge, or institutional and activist roles, among others). This combination, in turn, has made it possible to approach reality from the short term and the strategic horizon, as well as from planning and prefiguration. Without this methodological plurality, neither the agreements nor such an ambitious horizon would have been possible. However, the process of closure and the search for agreements implemented should be complemented by more far-reaching strategies in deliberative terms. In this sense, the popularity of mini-publics linked to climate action can serve as an incentive to advance

in the realisation of the challenges identified through processes of citizen deliberation. Having said this, we will now delimit the main conclusions of the process by linking them to the existing literature.

In relation to the horizon, the participatory workshop agreed that the central framework for the sustainable management of Urdaibai BR would be "improving quality of life to ensure an inclusive sustainable development model". "Life" was placed "at the centre of public policy", and the BR was identified as a "space of protection and its inhabitants subject to protection". These approaches fit with the proposals focused on the crisis of care (Pérez Orozco 2006, Isaksen *et al.* 2008), the role of ecosystem services in economic development (Gómez-Baggethun *et al.* 2009) and citizen empowerment strategies in community development processes (Sintomer 2007, Marchioni 2018, Ahedo 2022). We define these guiding principles as a horizon that combines elements of the performative model and co-creation in the terms of Muiderman (2020) and which is based on the need to profile imaginary futures that require social mobilization and political involvement (see Annex I).

According to this approach, another guiding principle for consensual management is the "need to deepen synergies between institutional actors and civil society, facilitating a flowing relationship from top (institution) to bottom (society), but also from bottom to above". This relationship, as Van der Meer and Van Ingen (2008) showed, allows participatory mechanisms to become citizenship schools. However, Font and Galais (2011) pointed out that one of the variables of the success of these processes is the existence of social movements in the field. These social movements exist in the Urdaibai BR, where there is a strong associative fabric (Alberdi *et al.* 2020), and they have been present in the considerations of the participants and in the congress itself, with the projection of a documentary called "Oreka bizian" ("Living in balance", in Basque) within the program "Conflicting Territories". In this approach halfway between mobilization and capacity building, Stutzer and Frey (2006) pointed out that in participatory strategies satisfaction also depends on the process and not just on the outcome. This importance of the process was addressed in the congress as well as in the workshop, in which BRs were defined as "complex spaces in balance that, in parallel with limitations, offer potential as laboratories of good living".

The institutional role is central to the fourth approximation (anticipatory governance) of Muiderman (2020). Another of the guiding principles accepted by the participants is in line with it: "inclusive sustainable development requires a clear and strongly vertebrated institutional commitment that can guarantee, pilot and enhance the institutional recognition and leadership of the specificity and experimental vocation of the management model". Thus, participants signified the centrality of governance in order to enhance the opportunities and guide the weaknesses of the territory in a context of crossroads. We are talking, then, about the regulation of self-regulation (Jessop 1998): that is, the direction of governance. To this end, political initiative is crucial in terms of colliding (Dunsire 1993) or co-production (Osborne and Strokosch 2013) of policies. This institutional political direction is necessary in order to guide meta-governance based on the organization of dialogue between stakeholders, articulating citizen responsibility and scientific expertise. Political power has, in this sense, a key capacity in this "strategic

selectivity" (Jessop 2016) to the extent that it is able to coordinate the process, seeking democratic governance and ensuring the representation of less-favoured stakeholders.

Besides, we consider the link between participation, governance and political direction defining strategic horizons. Thus, another identified guiding key-principle is a development model understood "from an integral perspective, with a "glocal" vocation and based on a long-term strategic orientation that should not set aside immediate social needs". Regarding the latter statement, authors such as Ji (2019) or Dobbin and Lubell (2019) are showing that environmental strategies have immediate impacts on the life quality of population and help advance redistributive environmental justice strategies. However, beyond the immediate, the long-term look is essential from the perspective of the search for climate welfare futures (Ostrom 2009, Granjou *et al.* 2017). This guiding principle is committed to anticipatory governance strategies, understood as one of the most advanced proposals in the area of scientific innovation (Macnaghten *et al.* 2014) as they relate research, science, and innovation, and exploit collective knowledge capabilities (Guston 2014). Many of the 172 proposals (Annex II) compiled in this research raise precisely the need for trend and anticipatory studies in the environmental, demographic and economic fields.

Our research shows that thanks to the guiding principles listed, participants are willing to go beyond "probable" or "plausible" scenarios and opt to define "pluralistic scenarios", which incorporate the mobilization of society. At the same time, they also propose "performative" scenarios, which force political transformation. The research design itself shows a combination of the potential tools associated with the four types of approaches to anticipatory governance. That is, an analysis of discourses and narratives; which fits the "performative model"; participatory strategies present in the workshops, related to the "pluralistic" model; congressional presentations, which are oriented towards the "plausible" approach; and a document (Annex II) which fits the "probable" approach. In this way, we follow a reasoning that goes from interrogation (present in the round tables) to mobilization (with the presentation of documentaries of social movements in the congress), advancing the construction of capacities (through the workshops) without losing sight of the planning.

The research method presented, which seeks to build bridges between science, society and management, shows that it is possible to advance in the definition of guiding principles with civil society through participatory strategies. These guiding principles can encourage policymakers to implement an anticipatory strategic governance based on the incorporation of both scientific expertise and citizen knowledge. Scientific knowledge and citizen participation, therefore, are not only compatible but are necessary for a governance that, in the context of current complex societies, must be anticipatory and democratic in the co-production of policies.

We consider the participatory method described and its results as a useful tool for other researchers, whether in other BRs or in any other territory, to build bridges between scientific, technical and experimental knowledge and management planning, strategies and actions.

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Annex I: Guiding principles and thematic and procedural challenges

We have analysed the issues addressed in the participatory process from a general perspective. This analysis makes a series of thematic challenges visible, associated with the planet, prosperity, alliances and society axes. This process has allowed the identification of procedural challenges, of transversal nature, that should guide knowledge management in the Urdaibai BR.

All these results have also been analysed differentiating the various sectors involved: social or institutional, political or technical, social movements or economic actors. In this way, we have been able to identify where each actor type focuses its attention, the knowledge needs and the challenges that management faces. Throughout the text, we have described the source of the information with the following acronyms: Interviews and discussion groups (I-DG); Survey (S); Congress Presentations (P); Congress Round Tables (RT) and Closing Workshop (CW).

The detailed reading of the I-DG allows us to identify the central nodes of the participants. We processed these nodes from a thematic perspective. Later, we crossed them with actor types. After the presentation of these preliminary nodes, we organised a CW in which thirty-five people took part, most of them from the field of science and to a lesser extent the social fabric. Prior to this workshop, and as a pivot for the communications presented, we organised two RTs with the participation of the managers of the territory.

Guiding principles

The guiding principles are the elements made explicit by the participants throughout the participatory dynamic, which define the shared horizon that should guide the sustainable management of the Urdaibai BR. These guiding principles frame, guide and define the meaning of the extracted knowledge in order to guarantee its link to management, based on the plural expectations of the various actors involved.

We support its justification and relevance by the transversal elements identified by the treatment of qualitative information. This coding system has made possible to quantify the importance that each actor gives to each dimension of the analysis, especially in reference to the nodes coded as knowledge, thematic and procedural challenges.

Consequently, these are transversal principles, which respond to the joint expectations of the participants, seeking to guarantee a comprehensive view. We structure the principles as follows: general framework, development and governance models and knowledge model. We identify the information sources for each guiding principle in brackets.

General framework

By the treatment of information obtained we summarize a series of general guiding principles, which serve as a general framework from which to place governance policies in the Urdaibai BR.

The general guiding principle states that it is necessary to improve the quality of life in order to guarantee an inclusive and sustainable development model. This requires

respect and care for all forms of life and their socio-ecosystems (RT). The following aspects can further define this guiding principle:

- To give importance to life. For example, address needs and vulnerabilities, advance in preventive health management or enhance well-being (RT).
- To give importance to the ways of life. We must guarantee a balance that allows socio-economic development and respect for the environment. The sustainable management of the urban and the non-urbanized areas, the adaptation to the singularities of the mountain, the estuary and the sea and achieving a balance between economic sectors are also topics of interest. (RT, P, I-DG). In short, the actors would seek to understand the Urdaibai BR not so much as a protected space, but as a "protective space" of life, considered as an open and porous environment (RT).

Development and governance models

We analysed the prosperity challenge that underpins the mentioned general guiding principle as a variable whose evolution will depend on the partnership and governance models of the Urdaibai BR. Consequently, a series of specific principles arise from this question:

- Advancing in inclusive sustainable development requires a clear and strongly structured institutional commitment, which allows guaranteeing, piloting and promoting the institutional recognition and leadership of the specificity and experimental vocation of the management model (RT, I-DG).
- This requires a deepening of synergies between institutional stakeholders and society, facilitating a fluid relationship from top (institution) to bottom (society), but also from bottom to top (RT, P, I-DG).
- However, it also requires recognizing that despite the challenges, there is a path travelled in the Urdaibai BR that must be valued (RT, I-DG).
- Likewise, it is necessary to strengthen citizen networks, establishing mechanisms for the horizontal structuring of society, which make it possible to match languages, times, spaces, knowledge and scales (RT, P, I-DG).
- For this, it is necessary to overcome institutional, mental, and structural barriers, and to guide management in the Urdaibai BR to facilitate the emergence of shared leadership (RT).
- In this line, environmental knowledge of its inhabitants, including traditional and local knowledge, must be incorporated from a broad and comprehensive view of the various types of knowledge (RT, P, I-DG).
- Likewise, it is necessary to work convince and explain the meaning of the World Network of BR (WNBR) as complex spaces in balance that, in parallel to the limitations, offer potential as laboratories of "good living" (RT).
- All this should be achieved by reinforcing a shared identity, and a feeling of belonging and pride linked not only to the region, but to the philosophy of the WNBR as well, this being essential in a context of global change (RT, P, IDG).

Knowledge model

If we want to advance in the sustainable and inclusive management of the Urdaibai BR, deepen the governance model and address the challenges of prosperity, alliances, planet and society, we need knowledge. In this line, we identify a series of guiding principles for the acquisition of knowledge, a fundamental challenge of which is to achieve synergies between science, management and society. This requires a close, but broad and transdisciplinary connection in the relationship between knowledge and management (RT, P, I-DG):

- To connect knowledge and management, it is necessary to add the gaze and voice of society in action. This process is not so much about creating bidirectional bridges, but rather about creating multidirectional networks with three relevant nodes: science, management and society in action (RT).
- It is necessary that this relationship between knowledge and management consider the temporal dimension, in order to avoid the distance between the vertiginous times of management and the necessary slowness of progress and work that underlies the acquisition of knowledge (RT).
- We should establish brokerage, adaptation, translation and communication mechanisms. It is necessary to contextualize the present from the past and from the needs of the future; to articulate a common language, based on listening and recognition between science, management and civil society; to enhance and make visible the benefits of this knowledge model; and to adapt knowledge to local needs and potential (RT).
- Finally, we must ensure the prospective nature of all studies and interventions by paying attention not only to the present but also to the long-term consequences, potentialities and threats (RT, IDG).

Challenges

As we have pointed out, we articulate the results of this research in four axes that align with the SDGs:

- Prosperity (reduction of inequalities; decent work and economic growth; industry, innovation and infrastructure; responsible consumption and production).
- Alliances (quality education; sustainable cities and communities; peace, justice and strong institutions; partnerships for the goals).
- Planet (clean water and sanitation; affordable and clean energy; climate action; life below water; life on land).
- Society (no poverty; good health and well-being; gender equality; zero hunger).

Transversal challenges

We articulate transversal challenges in two closely interwoven axes: the challenges to advance knowledge and the challenges that refer to management. Transversal knowledge challenges are the following:

- To consider local needs and knowledge (RT, I-DG, P).
- To guarantee the applicability of research to management, especially in small municipalities (RT, I-DG, P).
- To reinforce the role that the educational and sociocultural space has and may have in making the potentialities of a sustainable and inclusive management visible (RT, I-DG, P).

Transversal management challenges also emerges based on the need to advance in the articulation of plural views from a networked architecture:

- To achieve a shared and strategic horizon among the managers involved, accompanied by an inter-institutional political commitment (IDG, RT).
- To reinforce the laboratory nature of the Urdaibai BR for the comprehensive management of the territory and as an extrapolated example (I-DG, RT).
- To structure and articulate (institutionally) synergies between resources, experiences, knowledge and needs (I-DG).
- To promote stable participatory spaces, capable of articulating a shared we (EI, T, MR), which are attractive to sectors such as youth or the elderly, traditionally absent from deliberative logic (RT).
- To differentiate the causes from the effects, and focus on the underlying causes. The change in the effects without affecting the causes is counterproductive (T).

From a procedural point of view, the crossing of transversal knowledge and management needs are the following:

- To order, disseminate and take advantage of the knowledge acquired in terms of scientific research, social experimentation and innovation and traditional knowledge (I-DG).
- From a strategic perspective, it needs to overcome short-term logics in the management and bet on long-range approaches that incorporate cost/benefit perspectives in the medium and long term (I-DG, RT).

Specific challenges

The actors also define a series of general criteria for knowledge and management:

- To focus more on the basic problems and the processes and not so much on their symptoms.
- To undertake a critical reflection on what is not working in the Urdaibai BR, especially, in relation to the laboratory function and experimentation in sustainability and the ways to advance economic development.
- To recognize the figure of the BR as an engine of change and as a transforming element and at the same time, to use and take more advantage of the connection with the WNBR.

Knowledge challenges

We present a series of challenges related to knowledge management. All of them rest on a series of premises such as the applicability of science and the synergy between ways

of knowing and the democratization of knowledge. The knowledge challenges identified are:

- To organize the knowledge acquired to make the absences and needs visible (RT, I-DG).
- To translate scientific knowledge into the language of the population (RT, I-DG)
- To advance in other ways of doing science, not only based on technical and specialized studies, but which is also fed by statistical studies, interviews or other means to innovate in the ways from which knowledge is generated (P, RT). To this end, the actors need the commitment to overcome the artificial separation between basic science and applied science and the move from passive to active forms of research (RT, P).
- To avoid excessively formal or technical language, which alienates citizens and prevents the meaning of the acquired knowledge from being visible. To translate excessively formal language accordingly. They advanced as an example, a proposal to take advantage of the local Basque language as an opportunity to reach the citizens, and at the same time, help them value Basque as a work tool (RT).
- To design a shared strategy with the educational space (local and global) to spread and feed the philosophy of the BR to the new generations, based on co-responsibility and pride of belonging to it (I-DG, RT).
- To orient the opportunities and needs of the scientific knowledge to sustainable, environmental and social management, guaranteeing the applicability and return of the knowledge acquired (RT, I-DG).
- To carry out qualitative approaches that allow addressing elements such as identity, idiosyncrasy, history and experiential knowledge: to carry out longitudinal monitoring to analyse trends in mobility, employment opportunities, demographics, the evolution of ecosystems, etc. (P, RT, I-DG). To incorporate an intersectional view in the investigations that reveal the vulnerabilities associated with age, gender, economic situation, culture, language, citizenship, etc. (P, RT).
- To articulate, structure and organize the management of the interests and needs shared between the Universities and the institutional, economic and social agents that are committed to improving the environmental and life quality in the Urdaibai BR (I-DG).

Thematic challenges

The integral logic that underlies the management of the Urdaibai BR makes it necessary to draw a complex look that facilitates synergies between the various thematic axes. Thus, we define a series of thematic challenges. However, there are challenges associated with thematic networks, which are necessary in order to engage participation and collaboration. In the congress two round tables were set up, the first addressed the planet and alliances axis, the second prosperity and society. In order to deepen the understanding of thematic relationships, we modify the relationship scheme by rearranging the four thematic axes into two thematic groups different from those in the

roundtables: planet and prosperity, on the one hand, and society and alliances, in the other. Then, we list the challenges associated with the relationship between axes.

Challenges of the planet and prosperity axes

The identified challenges for planet axis are address the effects of climate change on ecosystems, the quality of life and the landscape, guaranteeing the continuity of the current opportunities of the Urdaibai BR.

- To attend to deterioration of the mountain, the forests, the estuary and the coastline (RT, I-DG). The participants greatly emphasized this challenge.
- To monitor specific environmental challenges, such as evolution of land use, pollution, water deficit, presence and evolution of alien species, loss of diversity and landscape, overexploitation of resources and evolution of the coastline. (RT, MR, P, I-DG).

Regarding the prosperity axis, the participants proposed a series of specific and general challenges. The orientation defined by the guiding principle that seeks to turn the Urdaibai BR into an example of transition towards a new model of sustainable and quality development supports all these challenges.

- To strengthen the primary sector, taking into account its historical importance and its potential for development. To overcome its current loss of traction, with viable alternatives that compensate for the limitations derived from conservation. We should pay special attention to its transmission to young generations to generate employment alternatives. (RT, P, I-DG).
- To establish recognition, valuation and compensation mechanisms that guarantee the continuity and profitability of employment niches whose management is subject to limitations related to the protection of the environment. In this way, the effort in environmental care would return in the form of recognition, compensation and protection of people (P, EI, IN).
- To create compensation mechanisms for the primary sector, such as creating a touristic eco-tax.
- To search, promote and reinforce mechanisms of circular, endogenous and inclusive economy. This economy should respond to the local needs, taking advantage of current resources and the potential of the environment, for the generation of new employment niches that allow living and working in the RBU (RT, P, I-DG).
- To attract human and socio-economic capital to face local depopulation and specific (or seasonal) clogging that does not generate value (EI).

In a transversal way to both axes - planet and prosperity- we observe a series of challenges:

- To overcome short-term economic developments (in forestry, tourism especially) and infrastructures (particularly roads and equipment), assuming a comprehensive prospective logic (respectful of the environment, history, identity) that attends to the environment and long term (I-DG).

- To bet on a strategy of becoming a reference on a *glocal* (global and local) scale that highlights the quality and difference of a pioneering form of management, production and structuring when facing the planetary challenges of climate change and the deterioration of ecosystems and local communities (I-DG, RT).
- To promote, disseminate and support creativity, innovation and quality providing resources to explore low mobility employment and activity niches supported by social, cultural and associative capital (I-DG RT).

Challenges of the society and alliances axes

Regarding the Society axis, we identify some specific challenges (RT, I-DG, P):

- To pay special attention to the needs of the most vulnerable sectors and incorporate the gender perspective into the integral management of the Urdaibai BR.
- To re-evaluate the principles of cooperatives, community culture and language as key axes for structuring and promoting the local and the common.
- To protect, recognize and strengthen the differential elements at a cultural, ethnographic and experiential level, attending to citizen knowledge, especially of the elderly, in order to generate a shared identity and find answers from the past to current challenges.
- To know the needs, concerns and expectations of citizens in a continuous and dynamic way in order to give agile responses.

In relation to the alliance axis, we define other challenges (RT, I-DG, P):

- To review the governance model to provide it with transversal views, agility, and the capacity for interaction and synergy with society.
- To guarantee the representation of local interests in governance systems, limiting the impact of interest groups outside the territory, as well as strategic developments that follow extra-territorial logics.
- To guarantee an inter-institutional political leadership that acts as a tractor in the revision, adaptation and consolidation of the governance model, in order to enhance the laboratory and experimental character of the Urdaibai BR. This inter-institutional leadership has its touchstone in the design of a strategy capable of overcoming the dispersion of competences.
- To articulate agile intergovernmental and inter-municipal management mechanisms that overcome competency conflicts and conflicting interests.
- To identify and promote shared elements that structure plural expectations (rural/urban; nucleus/estuary/coastline; youth/elderly people).
- To achieve healthier municipalities with better quality of life indicators.

Given that a key element in advancing the partnerships is the relationship between institutions and civil society, we identify a series of transversal challenges for the society and partnerships axes:

- To study the autonomous initiatives of civil society and the community fabric, in order to identify good practices that can replicate on a regional and global scale.
- To elaborate a longitudinal analysis on various social parameters, vulnerability parameters, and on the interest or needs of the population (social observatory).
- To take advantage of the logic of social, associative and cultural experimentation as a laboratory to connect people and draw synergies.
- To take care of and value the initiatives of civil society in which bottom-up logic that takes advantage of social capital complement top-down management.
- To create stable strategies for community development and citizen participation at various scales (municipal, thematic, territorial and regional) that, in addition to structuring a "we", increase citizen co-responsibility and institutional commitment to meet the expectations of the inhabitants of the Urdaibai BR.

Annex II. Proposal catalogue

This section identifies the specific proposals in which participants have identified areas of research needed to fill key gaps on scientific knowledge in order to promote the implementation of sustainable management of the Urdaibai BR. We obtained the proposals detailed below from the surveys, the presentations, the round tables, the congress workshops and the 16 interviews and discussion groups carried out. The participants explicitly identified some of the proposals and we inferred others from the statements made in the interviews, from the quantitative treatment of the obtained information.

Planet axis

Retrospective and prospective tracing studies of ecosystems, paying special attention to the effects of climate change: working from the logic of processes

1. Collect existing research on monitoring of species and mapping, in order to retake relevant elements for management.
2. Deepen the study of invertebrate animals.
3. Study the potential and the environmental value of old forests on biodiversity.
4. Analyse the evolution of the species most sensitive to changes in ecosystems.
5. Study the quality of deadwood and its forms of decomposition. Analyse its relationship with the maintenance of natural heritage.
6. Perform a prospective and trend analysis of the consequences of climate change on species and ecosystems, paying special attention to the estuary and aquifers as well as the life below water through an analysis of the potential consequences of climate change, taking into account the special characteristics of the most vulnerable population sectors.
7. Perform longitudinal studies on identification of soil losses and soil deterioration, evolution of invasive species, overexploitation of resources, loss of biodiversity, loss and/or recovery of landscapes, erosion of slopes, changes in flooding, water deficit, water quality and overexploitation of aquifers.

Studies on the impact of the human footprint on natural heritage from a socioeconomic perspective

1. Study the impact of the human footprint on natural heritage and, specifically, the impact of sports and tourism activities and seasonal mobility on the estuary.
2. Study the medium and long-term impact of the intensive forestry model on ecosystems.
3. Perform a historical study to identify the relationship between the change in land occupation associated with agriculture and its transformation for the intensive wood industry.
4. Study the environmental costs of waste transport and intensive waste treatment models.
5. Measure, through monitoring cores, the human impact on sedimentary records because of changes in uses, in order to identify the silting of the marsh due to erosions caused by, for example, forest policy.

6. Analyse the changes in livestock uses (except sheep), and their impact on the growth of bushes, on the deterioration of the landscape on the slopes, and on biodiversity.
7. Research how the forest plantations, specifically those of eucalyptus, are influencing the functioning of the terrestrial and marine ecosystems of the reserve.
8. Study the usage habits and consumption of natural resources of seasonal use, such as water, energy and infrastructures, in order to make adjusted calculations between need and possibility.
9. Research the reduction of environmental risks generated by the current exploitation models of the primary sector (e.g., pre-purification of waste in cattle farms, reforestation with eucalyptus).
10. Investigate the relationship between the housing policy, which makes intensive use of residential land, and the rising cost of land. Investigate its relationship with the crisis in the primary sector.
11. Study the benefits and quantify the return of the production model of the primary sector in the care and sustainability of ecosystems. Study and quantify the value generated by the management of the environment by the primary sector (roads, boundaries, etc.) as a first step to study compensatory, pedagogical and co-responsible strategies.

Research on finding the environmentally and economically sustainable promoter elements in the primary and forestry sector in the medium and long term.

1. Research more sustainable substitutes for pine and eucalyptus.
2. Analyse new forestry species and forms of sustainable forest production.
3. Study the beneficial effects of the environment on the physical and mental health of the population.
4. Study the potential and benefits of livestock activity and expansion of opportunity niches (tourism, education) to highlight the value of the sector.
5. Analyse participatory strategies and citizen co-responsibility models in the sponsorship of ecosystems through programs shared with the social, educational and institutional fabric.
6. Study strategies for the flow of scientific information towards society and potential visitors: archaeological dissemination sessions, logs and virtual tours, and training of guides, among others.
7. Study ways to promote and encourage non-polluting industry-production instead of polluting industry-production, as well as to facilitate decarbonisation and circular economy.
8. Study the potential that the forest system provides for water treatment and other green infrastructures.
9. Research bio-mimesis and circularity mechanisms, from nature to production and consumption.
10. Study the implementation of close, affordable, non-mono-political energy supply systems with limited transportation needs and oriented towards social justice.

Studies and measurements on the short and long-term impact of the decisions made in energy, infrastructure and management matters

1. Update the cartography of the ecosystems present in the reserve, especially the habitats of community interest, indicating their state of conservation.
2. Work a proposal to include the climate risk maps in the Gernika-Markina Partial Territorial Plan, in order to guarantee the resilience of the territory.
3. Analyse the consequences of certain legal frameworks and models in the loss or recovery of experiential ecological knowledge.
4. Research the institutional difficulties underlying the difficulty in implementing the Sanitation Plan.
5. Elaborate a retrospective study of facilities linked to the planet (e.g. Bird Center) in order to identify strengths and new opportunities (e.g. Water Museum).
6. Study the environmental impact of the Zadorra/Ordunte water transfers.
7. Study the water deficit in the area as well as the quality of the water.
8. Study the regeneration capacity of aquifers.
9. Study the water footprint and the water cycle.
10. Study how to innovate on the capture and recycling of water.
11. Study the water contributions to the estuary through quantification and monitoring.
12. Study the sedimentary load in order to make trend analysis on the regeneration of the marsh and the creation of new ecosystems.
13. Analyse the consequences of changes in production in the primary sector on sediment inputs.
14. Study the perception of the psychological, social and quality of water in society.
15. Measure the CO_2 concentration in large and small purification systems.
16. Measure the impact of infrastructures (e.g. Autzagane phase 2 and Sollube tunnels) and other megaprojects (e.g. Guggenheim 2) in the Biosphere of the region.
17. Measure the contamination of aquifers and investigate sustainable alternatives for the use of water (e.g., environmental impacts of the transfer of the Oka River and/or of the incorporation into the Bilbao Water Consortium).
18. Measure the soil loss due to occupation and the erosion due to forest monoculture.
19. Assess the impact of other urban and industrial operations on land, its use, its price and the evolution of ecosystems.
20. Assess the costs and benefits as well as their adaptation to the management model of the future infrastructures.
21. Assess the mobility needs of the inhabitants of the area from a gender and generational perspective.
22. Profile the users of existing road infrastructures, taking into account the intensity of their uses to prioritize future interventions.

Prosperity axis

Studies related to infrastructures: prospective, feasibility, applicability and return studies

1. Analyse mobility flows according to gender, age, occupation and other sociological variables, in order to establish the volume of stable population and the number that travels to or from work or comes for leisure.
2. Elaborate a comprehensive mobility plan for the region aimed at reducing emissions and encompass a global and inclusive vision.
3. Elaborate an electric mobility plan on a regional scale.
4. Study the use of the railway and propose strategies to maximize its use.
5. Elaborate a differentiated analysis of mobility on the two riverbanks.
6. Research public transport deficits and the effect on the most vulnerable sectors. Search for innovative improvement proposals.
7. Rethink infrastructure and mobility plans (roads, intra-regional and extra-regional connections, use of bicycles, public transport, etc.).
8. Design an open and participatory methodology for a serene, deep, transparent debate about the Guggenheim 2 project.
9. Study existing and proposed infrastructures and the consequences of their scale.
10. Advance in the implementation in the Urdaibai BR of the European Charter for Sustainable Tourism.
11. Analyse tourist flows, the carrying capacity of spaces and the consequences of the saturation of the spaces.
12. Study how to manage saturated spaces in terms of use, redirecting tourists towards less crowded ones.
13. Study the sustainable tourism strategies, and analyse the costs and benefits of mass tourism sites (e.g. Gaztelugatxe) and seasonal resources (e.g. beaches) from both an economic and an experiential point of view.
14. Research and promote other forms of tourism beyond the proposals of the tour operators, launching activities to promote local initiatives for sustainable tourism.
15. Analyse the impact of platforms such as Airbnb on the Urdaibai BR.
16. Design strategies to promote horizontal forms of tourism (e.g. house exchanges).
17. Search for a formula to promote the recognition of the quality and relevance of some professions and sectors, taking as a reference the transformations in the field of gastronomy.
18. Elaborate an analysis of demand and supply in the tourism sector, from an environmental perspective, to reinforce, redirect or compensate existing practices.
19. Take advantage of the laboratory aspect of the BR in order to innovate in the overall quality and professional quality of traditionally undervalued sectors (e.g., care, hospitality), with specific training programs adapted to the opportunities of the territory.

20. Analyse formulas to create quality employment and a better distribution of the wealth generated by both the canning industry in Bermeo and the cooperative companies in the Gernika-Lumo area.
21. Research the professional distribution from a gender perspective (care, feminized canning industry), both in the territory and outside the territory.
22. Identify the good practices on how to promote food sovereignty.
23. Research the mechanisms needed to leverage the capacities of the multiple cultural alternatives and artistic and social creation that exist in the region to continue promoting alternative social and cultural projects that can serve as a reference to other places.
24. Elaborate a prospective study of the generation gaps that occur in the economic activities of the region in order to understand wage, territorial and sectoral inequalities.
25. Identify the threats of current policies and initiatives that stimulate the concentration of land in large forest explorations and large urbanization developments.
26. Identify the threats in current practices such as land concentration, land abandonment, unsustainable extractives models and trends in mobility associated with occasional tourism.
27. Elaborate a prospective analysis of the consequences of the easing models in the management of developable land that are not protection zones.
28. Research the evolution during the last decades of all the economic, social and developmental indicators of the land planning category of Rural Settlements and compare them with the figures for the other land categories.
29. Study the potentialities and development niches of the division of farmhouses, with a prior prospective analysis of its impact and needs, to guide its development.
30. Investigate the daily needs of those people with mobility difficulties or located in disperse areas, to generate employment niches associated with home services (e.g.: small repairs, food assistance, etc.).
31. Study the recovery and/or adaptation of infrastructures (e.g. disused schools) for new employment niches, with the aim of generating employment that does not require mobility, training nor synergies with the university.
32. Quantify the impact of aids for the recovery and reform of the farmhouses and rural plots in exchange for their temporary public or private transfer.
33. Perform a preliminary assessment of the applicability of the implemented projects and the research studies being carried out in the Urdaibai BR, as well as follow-up and monitoring of their development.
34. Generate impact evaluation studies from a gender perspective.
35. Study the applicability of developed research and establish a quality seal.
36. Generate a cartographic study of services (institutional, social, commercial, etc.) to detect territorial saturations and deficits.
37. Identify agile and mobile mechanisms to provide social services in areas with significant service deficits and for population sectors with mobility difficulties.

Studies that take advantage of the opportunities and help offset the costs of environmental management

1. Eco-taxation: study of opportunities.
2. Local currency: feasibility study.
3. Seals of quality in production, local brand, internationalization of local production and commitment to the logic of close consumption.
4. Compile previous evaluation studies about the applicability of projects and research, and follow-up and monitor their development.
5. Compile previous evaluation studies on the proposals for equipment, infrastructures, etc. from a gender perspective.
6. Perform a feasibility analysis (and, where appropriate, design) of higher education training programs linked to existing resources (e.g. Master in Agro-ecology).
7. Reach agreements with training centres for the implementation of pilot economic development projects (e.g. Star Apps incubator).
8. Research the design of an endogenous and circular development strategy, based on the principles of the reserve, which could attract new employment niches with low impact and high value, and that goes beyond tourism development.
9. Launch a business incubator for technological enterprises.
10. Elaborate a sociological analysis of the needs of the inhabitants of the area for economic promotion in the services sector.
11. Study mechanisms for compensation and assistance for the re-use of residential properties and for sustainable management (e.g., restore aids to the primary sector for the positive impact on the environment of sustainable management and for the added difficulties of production and distribution: "Eco-mpensation").

Innovation and training programs

1. Study the existing training programs and employment priorities in the region in order to design training and employment programs well suited to expectations. Make sure to take a forward-looking approach at future gaps (e.g. generational gaps, wage inequalities).
2. Create youth employment plans aimed at promoting access to land, naturalist conservation and rural activities.
3. Study the potentialities and local and supra-local needs of green employment linked to forest management, energy, water and/or the primary sector, taking into account the scarcity of companies with specialized knowledge existing in the Basque Country.
4. Generate positive arguments about the quality and relevance of the primary sector.
5. Research good sustainable practices from other areas of the planet (e.g., mobile slaughterhouses).

Forward looking training and innovation projects

1. Design of youth employment plans which generate self-sustainable models over time and that meet medium-term sociological needs in the area and the expectations and capabilities of youth.
2. Elaborate an analysis of the needs of the inhabitants of the area for economic promotion in the services sector.
3. Research the training needs of the primary sector in order to face the challenges and guarantee its economic sustainability and innovation.
4. Investigate methods for cost reduction, profitability increase and promotion of the synergies of the farmers.
5. Elaborate a prospective analysis of the effects of any infrastructure or economic development intervention or project on the identity, culture and community structure.

Society axis

Prospective and retrospective sociological analysis

1. Perform a longitudinal study of quality-of-life indicators. Analysis of quality-of-life indicators at the municipal level.
2. Identify the degraded urban spaces for their economic reactivation.
3. Identify social needs in dispersed population centres.
4. Study the vulnerabilities and care needs of the inhabitants of the BR to correct inequalities. Provide employment-generating responses.
5. Perform periodic sociological studies on demographics, mobility, departures and arrivals, economic activity, needs and expectations.
6. A research of interurban roads and analysis of the feasibility of recovery and adaptation projects for sustainable mobility (e.g., bike lines, walk paths, re-use of old roads).
7. An analysis of good urban planning practices aimed at improving the quality of life, for replication in other municipalities (e.g., minor interventions, urbanization reforms).
8. A research of the forms of residence in order to identify priorities in which the cost-benefit relationship preferentially affects the most vulnerable sectors that live and work or want to work in the region.
9. Build a map of noise pollution.
10. Study the potential of de-growth as an instrument to generate land value.
11. Build a map of community services to identify saturated spaces and deficient spaces and overcome the centripetal pull towards Gernika-Lumo.
12. Study the expectations, routines, needs and urgencies faced by the various professional sectors, in order to establish public policies and generate employment niches.
13. Perform a sociological analysis of the expectations and interests of the youth to implement public policies or training programs linked to local employment.
14. Study training deficits in higher education of central elements of the Reserve (e.g., biotopes, agro-economy, circular economy) and analyse the viability of agreements with universities for the design of specialized degrees.

15. Study the knowledge of women in the cultural, economic and associative sphere.
16. Recover the knowledge of the elderly for their recognition and use in the management of current reality.
17. Build a catalogue of real and lost cultural heritage, and design recovery strategies for such heritage.
18. Conduct a participatory study in order to identify the driving elements capable of generating a shared identity linked to the principles of the Urdaibai Biosphere Reserve.
19. Perform studies aimed at knowing; recognizing and taking advantage of the approach to the environment of children and young people in order to meet their expectations and make them feel part of the project (e.g., observatories or councils for youth and/or children).
20. Identify and enhanced social initiatives that work for the defence of the common interest.
21. Detect minimum common denominators, shared common threads and symbols associated with the principles of the Urdaibai BR, which serve to create a regional brand assumed as their own by citizens.

Gender perspective, vulnerability and community care

1. Analyse intra-municipal and inter-municipal mobility from a gender perspective.
2. Study the use of space of women, as well as their modes of management (e.g., private, family, institutional, associative).
3. Study the knowledge of women in the cultural, economic and associative sphere.
4. Enhance the visibility of the role of women scientists in the region.
5. Study the needs of the elderly with the aim to establish community care strategies, healthcare facilities and professional employment niches.
6. Study the needs of the elderly from a gender perspective.
7. Perform vulnerability and diversity studies from an inter-sectional perspective.
8. Study ways to foster joint parental responsibility in the care of children and the creation of employment niches related to it.
9. Analyse the situation of migrant groups and implement at adequate public policies.
10. Perform studies to make visible some of the social inequalities. For instance, labour inequalities and the feminization of certain jobs; sexist violence; discrimination in the field of culture and leisure suffered by women; problems and challenges of the aging of the population; lack of inclusion of groups and migrants; drug use; problems regarding access to housing, among others. Make proposals and take measures in order to correct these situations.
11. Study pockets of poverty.
12. Study energy poverty.
13. Study health indicators from an intersectional perspective.
14. Study dietary habits in order to detect unhealthy patterns of the vulnerable sectors.

15. A study of non-monetarized community care strategies (e.g. working-time banks).
16. Develop strategies for local self-sufficiency.

Alliances axis

Studies for improving management and inter-institutional governance

1. Analyse competence problems and institutional deficits in the fulfilment of institutional commitments.
2. Identify institutional leadership indicators at the different government levels.
3. Identify innovative formulas for land management, which adapt to the local reality.
4. Identify agile mechanisms for dialogue between citizens and supra-local institutions.
5. Establish a debate methodology for collective, open and participatory reflection on the development model.
6. Analyse from a gender perspective the forms of female management and leadership, for their identification and strengthening.
7. Build a catalogue of all research carried out in Urdaibai BR and study its applicability and dissemination.
8. Build a catalogue of projects, designed and then abandoned, with the aim of rethinking and potentially continuing them.

Studies to facilitate synergies, citizen participation and community strengthening

1. Build a catalogue of good practices in the area of participation and autonomous citizen co-responsibility (e.g., initiatives of social movements, cooperatives). Study their possible replication and/or adaptation to other municipalities.
2. Build a catalogue of good practices, including international examples, regarding Slow Cities and Smart Cities models.
3. Research the shared use between municipalities of mobile and multipurpose infrastructures for occasional economic, cultural or sports activities/services for citizens.
4. Develop teaching guides and teaching units, which incorporate in the educational system the logic of the Science of sustainability and the reality of the Urdaibai BR.
5. Develop agile mechanisms for bottom-up communication, returning and recognition, and identify good practices for their replication.
6. Make the role of the Urdaibai BR visible to the public in the World Network of Biospheres Reserves.
7. Create community development plans at the local and supra-local scale.
8. Study the creation of "safe walking paths" for vulnerable sectors (children, elderly people) that involve institutions, civil society and businesses.
9. Promote sectoral and generational citizen forums.
10. Elaborate a citizen observatory.
11. Establish a childhood council.

12. Study a participatory budgeting strategy linked to the perspective of comprehensive management and with a supra-municipal vocation, in order to generate value at the Urdaibai BR level.
13. Design a methodology for participatory diagnosis within the framework of the territorial planning elaboration processes.
14. Establish strategic participatory processes for the design of eco-futures.
15. Promote the creation of a "school of citizenship", with the purpose of promoting participation, gender equality and co-responsibility of care.

Studies that generate synergies, achieve alliances and referentiality

1. Study the possibility of creating bilateral "research quality certifications" between universities and management bodies which certify the applicability in the sustainability of research.
2. Analyse the relationship between the educational framework and the Urdaibai BR For instance: deficits in pedagogical programs, needs of higher education and opportunities in the territory, and training needs for a green economy.
3. Build a catalogue of good practices in sustainable urban management, integration of culture, economy and environment, and social innovation and cooperative tradition. Communicated and disseminate such good practices transversely.
4. Study a community strategy to form a "we" based on the principles of the Urdaibai BR, that allows the transition from "mine" to "ours", and where "many people collaborate in little and not a few collaborate in a lot".