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Abstract: Broadening citizen participation in biodiversity governance is often presented as a priority by public institutions. Citizens' engagement in policy design fostering the protection of biodiversity would indeed allow two-way knowledge transfers between expert knowledge and local knowledge; it would also enable citizens to influence collective choices; and it would finally lead to inclusive decision-making processes. However, the achievement of these promises depends strongly on the capacity of public participation exercises to be fair and efficient. By focusing on these two concepts, this paper aims to contribute to identifying obstacles and tools for public participation in biodiversity governance through a comparative analysis of two case studies. The first one consists of three one-day open space technology meetings, which aimed to engage citizens in orienting biodiversity research during Paris COP21. The second one was a two-year long experiment of Citizens Committees-based participatory governance led by the French Office for Biodiversity. These two case studies are representative of two complementary dimensions of biodiversity governance: the orientation of scientific research and the regulation of individual and collective actions through laws, rules and institutional communication. Among other insights, our results determine the existence of strong skepticism regarding the political outputs of public participation, which is reinforced when the objectives and the means of the exercises are not clear enough. Second, we argue that the efficiency of participative biodiversity governance depends on the capacity of institutions to propose diversity of citizen engagement formats and objectives in order to reflect the diversity of citizens' motivations and preferences.

Keywords: public participation; biodiversity conservation; citizen science; environment policy

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1. Introduction

In its 2019 report, the IPBES highlights the need for "transformative changes" to protect biodiversity. These transformative changes need innovative approaches to governance, which should be "informed", in the sense that they should rest on "legitimate and credible" knowledge, anchored on lived situations and not only on scientific expertise [1]. They should also be "inclusive", i.e., include, in each step, people who are impacted by the discussed measures [1] (chapter 6: 27). These two dimensions point to an adaptation of our governance tool; that is, the ensemble of (private, public, associative) institutions and processes in charge of identifying issues and tensions regarding biodiversity, and of formulating and applying rules to solve or regulate them. Following the IPBES report, these governance tools point to more public participation in public policy decisions regarding biodiversity governance.

1.1. Public Participation as a Concept and Practice

The notion of public participation in political decision-making processes was first theorized in the 1960s, with the notion of participatory democracy [2,3], and later with the

notion of "deliberative democracy", in the late 1990s and early 2000s [4] even if the two concepts followed distinct historical paths and may be in tension [5]. Concrete practices of participation are characterized by a huge diversity in procedures [6]. For instance, [7] listed thirty-nine different "techniques". Similarly, the classical handbook "Participatory Methods Toolkit. A practitioner's manual" [8] gives a detailed list of thirteen participative "methods". Many academic efforts have been carried out since the 1960s to classify these different modes of public participation as distinct "ladders" [9], "mechanisms" [6] or positions on a "map" [10] of public participation exercises. These typologies generally share common key criteria to characterize public participation [11]): (i) the sense of circulation of knowledge or information (are participants passive recipients, or does the participation exercise aim at a bilateral transformation of opinions through the sharing of knowledge, expertise or experience?); (ii) the way citizens are selected (are they randomly chosen or are they well identified stakeholders?); (iii) the overall objectives of the instrument (exchange of knowledge and expertise or concrete policy decision), among others. Correlative to these descriptive criteria, efforts were made to develop normative concepts to evaluate the "effectiveness" of public participation: as noted by [6], such effectiveness depends both on the "fairness" of the exercise, and on its "efficiency" with regard to its intended purpose (p. 262). The concept of fairness relates to the perception of those engaged in the exercise that it was conducted honestly; that is, with a plan to (i) include a representative or appropriate sample of the affected population and (ii) to allow participation to have a real impact on policy decisions (p. 262). The concept of efficiency highlights the appropriateness of the proposed tools to achieve public participation objectives. Obviously, criteria of efficiency are susceptible to be as diverse as the aims of these participation exercises (p. 263). Generally speaking, the fairness and efficiency of public participation depend on the criteria characterizing the exercise—notably, the flow of knowledge and information, the selection of participants and the overall objectives of public participation [6].

1.2. Participation in Biodiversity Governance

Different kinds of initiatives have been developed so far to promote citizens participation in biodiversity governance—that is, following IPCC's definition, "the full range of means for deciding, managing, implementing and monitoring policies and measures" [12]. For instance, the rise of environmental citizen science, defined as "the non-professional involvement of volunteers in the scientific process" [13] is seen as "a unique opportunity (. . .) to involve the public in EU policy-making" (Idem). However, despite the exponential growth of these participative practices for biodiversity knowledge production [14], citizen participation remains mostly limited to data collection, and public involvement in other research stages is still rare [15]. In particular, as shown by [16] in a quantitative study of scientists' motivations to engage into biodiversity citizen science programs, "the potential of *co-creating* or *co-designing* the research projects [is] rarely harnessed" [16] (p. 183, *our emphasis*). Yet, the choice of which scientific questions should be addressed is a central step of the policy making process: indeed, the kind of knowledge and expertise we acquire regarding biodiversity directly determines the issues which are considered important in a given context, and the tools that can be used to address them [16] (p. 183). Following this view, we argue that fostering citizen participation in the design of research questions and projects then constitutes the *first tool* to democratize environmental and biodiversity policy. A *second tool* for public participation in biodiversity governance lies in the very process of the decision making of public administrations. The formulation and application of environmental rules and regulations, but also the diffusion of values or social representations, could indeed include citizens' views, interests or perspectives more directly [17]. Complying with IPBES' call for more *public participation* in public policy decisions regarding biodiversity governance thus needs to develop *fair* and *efficient* participation both in guiding research about biodiversity and the environment, and in decision-making processes regarding environment laws, rules or public communication.

1.3. Our Objectives: Identifying Obstacles and Tools for Public Participation through the Analysis of Two Case Studies

1.3.1. Research Questions

Our objective is to contribute to identifying obstacles and tools for public participation in biodiversity governance through the analysis of well-chosen case studies, and to discuss them in light of the two exigencies of fairness and efficiency (Rowe and Frewer 2005). Our approach is centered on the hypothesis that one can derive some *general* arguments about public participation in biodiversity governance from the study of singular examples. The relevance of this example-based approach is justified by the fact that, as we highlighted previously, every participation exercise is highly context-dependent, in the sense that it can only be evaluated with regard to its own objectives, to the surrounding institutional context and to the chosen method. Consequently, scientific understanding and assessment of public participation practice is enriched by the careful analysis of singular examples. That said, this study aims to contribute to the following overarching research question:

(Q) What are the features of fair and efficient public participation in biodiversity governance, regarding both setting up the research agenda and the decision-making process led by environment agencies?

Let us pinpoint this general question. Like [6] we consider the concepts of fairness and efficiency as central to evaluating public participation in policy making. We also consider (with [6], p. 265) that the efficiency of a public participation exercise partly depends on (a) the selection of the participants (does it maximize the number of relevant participants?); (b) the way information elicitation is facilitated (does it maximize the collection of relevant information from participants?); (c) the way relevant information is transferred to the participants from the sponsors/organizers. These criteria may be clarified in the specific case of biodiversity governance. First, if we refer to IPBES' recommendations, the selection of participants (point (a)) should be "inclusive", i.e., include, at each step, people who are impacted by the measures discussed [1] (chapter 6: 27). Second, regarding point (b), public participation may also foster public learning regarding biodiversity as a complex scientific concept [18]. It should also facilitate public understanding of scientific discourses, promote the use of scientific arguments in public debate and promote public awareness of biodiversity issues [19] as well as the kind of learning needed to lead individual or collective actions (so-called "social learning", [20]). Reciprocal (point c) participation may help give a voice to forms of local, traditional or usage-based environmental knowledge, which can inform the decision-making process [21]. Following the IPBES report, governance should indeed be "informed", in the sense that it should rest on "legitimate and credible" knowledge, anchored on lived situations and not only on scientific expertise [1] (chapter 6: 24). Thus, we have selected the three following research questions to conduct the analysis of case studies of public participation in biodiversity governance:

(Q1) Who are the participants in these exercises? What are their hopes, motivations and expectations? This question refers to point (a) of the efficiency criteria, as well as to the fairness criteria.

(Q2) What kinds of knowledge are involved in these exercises, and how is it shared? This question refers to point (b) and (c) of the efficiency criteria

(Q3) What are participants' outcomes in terms of scientific and social learning? This question refers to dimensions (b) of the efficiency criteria.

1.3.2. Our Case Studies

We have chosen to explore two real-world participative biodiversity governance exercises led in France, in relation with researchers from the National Museum of Natural History (MNHN). The first exercise was led by the French National Center for Scientific Research and the French National Museum of Natural History in the context of the 2015 COP21 in Paris (France). It consisted of three open space technology one-day meetings which aimed to engage citizens in biodiversity research policy by setting-up citizen science protocols. The second one was a two year-long participatory governance initiative led by

the French Office for Biodiversity (OFB). Three citizen committees were constituted (one at national level and two at more local levels), which were associated with the corresponding agencies' activities over two years (2019–2020). These two examples of case studies are quite distinct at various levels: their temporality (one day vs. two years), their organization (open space technology meetings vs. citizen committees), and their goals (participating in biodiversity research orientation vs. associating citizens with the design of public policies). However, their comparison is relevant to our purposes for at least two reasons. First, they both were born from a similar "top-down" plan: in both cases, national institutions decided to associate ordinary citizens with pre-existing processes or organizations. Second, and more importantly, each of them focuses on one of the two distinct levels or dimensions of biodiversity governance: setting up the research agenda (three open-space technology meetings), and the decision-making process by State environment agencies (three citizen committees within public environment agencies). These two reasons justify the relevance of our two case studies to tackle question (Q) through (Q1), (Q2) and (Q3). The paper is structured as follows. We first present the context and organization of the two case studies, and we justify the different methods we used to analyze them (Section 2). In Section 3, we sequentially answer (Q1), (Q2) and (Q3). Finally, we try to scale up these results by discussing them from the perspective of the general research question (Q) (Section 4).

2. Materials and Methods

The two case studies we analyze here were designed independently by two distinct institutions and conceived as pilot exercises by these organizer institutions. However, as we explain in the Results section, it has to be noted that the means and long-term objectives of these exercises were not clearly defined before their launch; consequently, their political outcomes and/or follow-up are very limited to date.

2.1. The COP21 Open-Space Technology Meetings

In the context of the Paris COP21, in 2015, the French national agency for scientific research (CNRS) decided to associate citizens to the co-construction of citizen science protocols devised to study biodiversity. The National Museum of Natural History (MNHN), which has a large amount of expertise in managing biodiversity citizen science programs, was in charge of the organization of this "co-created science" project (following [22]'s typology of citizen science).

One of the originalities of this exercise is its use of a participative democracy tool (open-space technology, [23]) to foster public participation in the setting of the research agenda. Three open-space technology one-day meetings were organized in Paris (3 April 2015), Corte (Corsica Island, 25 April 2015) and Marseille (9 June 2015). To recruit participants, a dedicated website was designed, which presented the general approach and the places and dates of the meetings. This website was circulated through CNRS communication services, some environmental associations and public agencies. In all three cases, the organization was as follows. During phase 1 (first part of the day), some participants proposed research questions to be discussed. With one facilitator's assistance, participants constituted different groups, working on each of these ideas. Following open-space technology principles, participants could leave their group and join another one whenever they wanted. After a time of discussion, each group wrote and publicly reported the issues they wanted to address through citizen science (examples: "How could we get an air-quality indicator in the Parisian metropolitan area?"; "How is global warming changing tree-species repartition in Corsica?"). During phase 2, new groups were constituted to elaborate scientific protocols for future implementation. For instance, regarding the two previous questions, the two following protocols were proposed: constructing collaborative maps of lichen species in Paris' trees and identifying and signaling trees' maximal altitude for every species. Table 1 gives some quantitative information about the three open-space technology meetings.

Table 1. Number of participants and production during the three 2015 open-space technology forums.

	Number of Participants	Number of Ideas after Phase 1	Number of Protocols after Phase 2
Paris (3 April 2015)	45	16	5
Corte (25 April 2015)	22	6	5
Marseille (9 June 2015)	25	8	3

2.2. The ARBs and OFB's Citizen Committees

The French Office for Biodiversity (OFB) is a public agency, under the authority of the ministries responsible for Ecology and Agriculture and Food. Its official missions are divided into five complementary roles (see https://ofb.gouv.fr/en, accessed on 8 May 2022):

(i) Sharing knowledge, research and expertise about species, habitats and their uses;
(ii) Policing environmental and wildlife health;
(iii) Supporting the implementation of public policies;
(iv) Assisting and supporting protected natural area managers;
(v) Supporting stakeholders and mobilizing civil society. The Biodiversity Regional Agencies of Biodiversity (ARB) have quite similar roles, but more locally within the 18 French regions.

In 2019, the OFB launched an initiative to foster citizens' direct inclusion in its activities, under the form of one Citizens Committee (associated with the national OFB agency), and two Regional Citizens Committees, associated with two regional biodiversity agencies (ARB Ile-de-France and ARB Occitanie). These committees' ambitious idea was to engage groups of citizens in the long term while constructing public policies (orientations of the OFB's and ARBs' policy and budget). In practice, these committees rather focused on writing "items of advice" regarding specific issues (see Table 2). Experimentations took place in two steps. During the first phase (phase 1, from May to December 2019), the three citizen committees met to define their own exact role, functioning and organization rules. The second phase, when committees concretely conducted their missions, lasted from January to December 2020 (phase 2). Committees' meetings were dedicated to the elaboration of written advice, based on "referrals" proposed by the institution (OFB and ARB) or "auto-referrals" coming from citizens themselves.

The recruitment of member citizens was delegated to a polling company, with an initial objective of socio-demographic representativeness. Citizens were compensated (EUR 60 per day). Because of the COVD-19 epidemic, many of these meetings were organized online.

Table 2. Citizen Committee's activities from the French Office for Biodiversity (OFB) and the two Regional Citizen Committees from two Regional Agencies of Biodiversity (ARBs), from the Ile-de-France (ARB1) and Occitane (ARB2) regions.

	OFB	ARB 1	ARB 2
Number of citizen members	Beginning: 13 End: 7	Beginning: 10 End: 6	Beginning: 9 End: 6
Number of phase 1 meetings	3 meetings (9:00 a.m.–4:30 p.m.)	3 meetings (9:00 a.m.–4:30 p.m.)	3 meetings (9:00 a.m.–4:30 p.m.)
Number of phase 2 meetings	9 3 h-meetings (7 online)	7 1 to 3 h-meetings (5 online)	6 1.5 h-online meetings

Table 2. *Cont.*

	OFB	ARB 1	ARB 2
Citizen committees' production during phase 2	2 Referrals *Themes*: a—Readability of the OFB document about 'Exotic and Invading Species' b—Diversification of the users of the National Office for Biodiversity (ONB) by changing the corresponding website 1 Auto-referral *Theme:* Accompanying eco-representative pupils' mission in primary schools	1 Referral *Theme:* Nature restoration in the Paris region	2 Referrals *Themes:* a—Recommendations for the publications of the upcoming Biodiversity Regional Observatory. b—Recommendations about nature restoration and biodiversity protection at the regional scale (*Occitanie* region).

2.3. Methods

These independent exercises were taken as a research object by an interdisciplinary team of social researchers and ecologists from the MNHN. Our approach mobilizes a mix of qualitative and quantitative analysis to answer questions (Q1), (Q2) and (Q3).

- Participant observations were performed during the three one-day COP21 open-space technology meetings, during every OFB and ARBs committees' meetings (from April 2019 to December 2020), as well as during the final restitution meeting with 11 participants from the OFB, ARB1 and ARB2 citizen committees, on 29 September 2021. These observations were conducted to grasp the motivations of the participants (Q1) and the kind of knowledge and information exchanged (Q2).
- Semi-directive interviews were conducted with participants of the OFB, ARB1 and ARB2 citizen committees (28 interviews). They were all conducted by a sole researcher, between the end of phase 1 (first year) and the beginning of phase 2 (second year). These interviews were designed to assess citizen committees' participants' expectations, motivations and evaluations.
- Comprehensive interviews were led with three participants at the end of phase 2 (third year), in order to obtain in-depth information regarding their life trajectories and their relation with their motivations and expectations.
- Semi-directed and comprehensive interviews were initially mobilized to collect information about participants' motivations (Q1) and participants' outcomes of the exercises ((Q2) and (Q3)).

They were analyzed by following qualitative content analysis, and more specifically via thematic analysis (Nowell et al., 2017 [24]). In order to clarify the meaning(s) contained in the documents and interview transcripts, we transposed the elements of this corpus into a certain number of themes representative of the analyzed content and the studied issues. All these themes and sub-themes form an analysis grid. The corpus is then read and categorized according to this analysis grid. The discursive examination of the corpus classified by theme is completed, for some of the topics we discuss in this paper, via descriptive statistical analyses (frequency of appearance). This approach allowed us to draw an exhaustive map of topics and opinions expressed by the panel of respondents, which is adapted to answer (Q1), (Q2) and (Q3). Let us note here that we do not present quantitative analysis of frequency of different themes here (except for answering (Q1)). The reason is that the objective of our paper is to identify different tools and obstacles to the development of a fair and efficient participative governance of biodiversity. We do not aim to quantify the relative importance of each of the themes or topics we identify, since this certainly depends a lot on the context and objectives of the exercise and would not be relevant when generalizing our results.

- An online survey was proposed to the participants in the COP 21 open-space technology meeting in order to assess their motivations, interests, life trajectories and attitudes towards science and the environment. This survey was designed with LimeSurvey, and all answers were anonymized. Data treatment was performed by using the R software. Originally, the survey included 42 questions. As part of the current study, we selected 18 relevant questions:
    i. Four of them collected socio-demographic information (Age, Gender, Education level).
    ii. Two questions assessed respondents' knowledge of biodiversity: "Are you able to define the term 'Biodiversity'?" (Yes/No); "If yes, please give your definition". A 0 to 5 quantitative scale was constructed on the basis respondents' words and ideas. (We used the following scale: 0—no definition; 1—the definition includes no relevant notion; 2—the definition includes the notion of diversity or that of species; 3—the definition includes the notion of diversity and that of species; 4—the definition includes the notion of diversity and that of species and interactions; 5—the definition includes the notion of diversity at different scales and that of species and interactions under different forms).
    iii. Two questions assessed respondents' familiarity with science: "How often do you read scientific publications?" (from 1—Never; to 5—Every week); "How often do you attend scientific conferences?" (from 1—Never; to 5—Every week)
    iv. Two questions measured respondents' attitudes regarding public engagement with science: "How strong is citizens' implication in scientific research?" (from 1—Non-existent; to 5—Very high): "How important for society do you think this implication is" (from 1—Essential; to 5—Undesirable).
    v. Two questions focused on respondents' anxiety regarding biodiversity: "Do you feel anxious for French biodiversity?" (from 1—Not at all; to 5—Very anxious); "Do you feel anxious for worldwide biodiversity?" (from 1—Not at all; to 5—Very anxious).
    vi. Six questions assessed respondents' evaluation of open-space technology meetings as a learning tool and as a way to foster discussions.
    vii. One question asked, "Which position did you take during the open-space technology meeting?" (open question).

Answers to sections (ii) and (iii) were averaged to generate an indicator of the expertise level regarding science in general (*Expertise* variable).

At the end of each Open-space technology meeting, participants were asked to answer the survey questions. Among the 92 participants, we obtained 48 complete responses. The same survey was also disseminated more broadly to an audience engaged in environmental issues, through environment associations' Facebook pages, such as CliMates (https://www.weareclimates.org/, accessed on 8 May 2022). We received 237 complete answers from non-participants in the open-space technology meetings.

3. Results

3.1. (Q1) Who Were the Participants in These Experiments?

3.1.1. COP21 Open-Space Technology Meetings

Answers collected in the survey from participants of the three meetings are balanced regarding gender (23 men and 25 women). This sample shows an over-representation of the 20–29-year-old class (35% vs. 11% in the general French population (https://www.insee.fr/fr/statistiques/2381474#figure1_radio2, accessed on 8 May 2022) and the 60–69-year-old class (18% vs. 11% in the general population). More importantly, participants had a very high education level: 79% of respondents hold a Master's or PhD degree. This education level was not statistically different from the group of respondents who did not participate in the open-space technology meeting: after classifying respondents' education level into four categories (graduate school, bachelor, Master's, PhD), we found no statistically significant difference in the two populations in terms of education (chi2 = 2.07, ddl = 3, p-value = 0.56).

Participants who answered the survey showed high anxiety for worldwide biodiversity: among 48 respondents, 10 were "rather anxious" and 38 were "very anxious". A similar anxiety level was found when respondents were asked about their anxiety regarding biodiversity in France (chi2 statistics = 8.24, ddl = 4, *p*-value = 0.08).

Regarding interest in public engagement in science, 93.5% of respondents to the survey considered that citizens' participation in scientific research is desirable, very desirable or essential. By contrast, 97.6% of the respondent deemed this participation as currently low, very low or non-existent. Interestingly, these responses were uncorrelated with their expertise levels, as measured by the *Expertise* variable. This suggests that enthusiasm for participation is independent of proximity to (knowledge and interest in-) the science. A key finding of the survey is that, in contrast with this high motivation for public participation in science, only a minority of participants declared being optimistic regarding the concrete effects of their engagement. To the question "my participation will have an influence on setting-up a biodiversity observatory in my region", only 14 (over 48) responded "I rather agree" or "I totally agree". In other words, only 25% of respondents believed that the open-space technology meetings would concretely improve public influence on the orientation of scientific research.

The latter result echoes recurrent criticism expressed during meetings, addressing the lack of representativeness of open-space technology events. During the Paris meeting, a group was formed in the morning. It reviewed the methods to be used to engage lay citizens in participating. Many participants highlighted their specific posture of already engaged citizens towards participation in science:

> "*We are all concerned by these issues, here. We should ask people who are not concerned. Concerned people think in lieu of other people and take decisions for them, or try to imagine how to motivate non-concerned people. And only afterwards, we impose things—and that is why it does not work*" (Participant observations, Paris meeting, 03/04/2015, morning session).

In the same group, several participants then insisted on the obstacle—for those people who are described are being far-removed from science—of using a vocabulary perceived as excessively technical:

> "*Participating in a scientific protocol is frightening for people. It would be necessary to avoid words like 'Protocols*" (Paris meeting, 03/04/2015, morning session).

> "*It is necessary to change the formulation of the same thing: we should remove scientific words such as 'protocol' or 'biodiversity'. Simplifying, for people to be less afraid*" (Paris meeting, 03/04/2015, morning session).

Many participants expressed the feeling of being part of a specific group of citizens already aware of biodiversity issues:

> "*We all agree that for people who are not aware, what matters is environment education*" (Paris meeting, 03/04/2015, morning session);

> "*This method [exposed in the proposed protocol] would enable people who are not already aware to be reached*" (Paris meeting, 03/04/2015, morning session).

> *This topic of environmental education or awareness was also pregnant in the final written scientific protocols proposals. These notions were explicitly addressed in five (over thirteen) documents. Four documents clearly expressed a commitment to inclusiveness: for instance, scientific protocols should "talk to people in their own language" (one protocol from the Paris meeting); be "open to as many people as possible" (one protocol from the Marseille meeting), or "attract people that do not know scientific protocols"* (one protocol from the Paris meeting).

> *At the Paris meeting, several participants spoke to facilitators during the lunch break, to express their regret for the lack of participants' representativeness (with respect to the whole population). Besides, at the end of the one-day Marseille's meeting, participants*

> *asked how the chosen protocols would be funded. They were highly disappointed when the facilitator answered that no fund had been planned so far* (Marseille's meeting, final general discussion, 09/06/2015).
>
> *Another important source of disappointment expressed by participants was the lack of clarity of their contributions' final value and interest. During the afternoon sessions, when participants' groups discussed the scientific protocols, some participants insisted on the risk of proposing a protocol that already existed: "And what if our idea was already being implemented? What is the point of our discussion in that case?" (Paris meeting, 03/04/2015, afternoon session); "why should we work on the protocol if so many things already exist?"* (Marseille, final general discussion, 09/06/2015).

3.1.2. OFB/ARBs Citizen Committees

During the first session of the three OFB and ARBs citizen committees (phase 1) and during interviews, the 32 participants were asked to explain their initial motivations for joining the experiment. Overall, 23 participants highlighted their "interest in the subject", 11 indicated they had "time available to participate", 9 evoked their willingness to "acquire knowledge", 8 talked about their "curiosity" about this participative arena, and 7 their desire to be an "actor" of institutional and political changes. We did not record any sign of skepticism or hostility regarding pro-biodiversity policies. Regardless of the overall interest for issues related to biodiversity, participative observations and interviews highlighted participants' hope that their engagement could have a concrete impact:

> "*I'm waiting for factual and precise information. I'm waiting to see whether it will be useful at all*" (ARB 2, first meeting, 22/05/2019)
>
> "*I wanted to see what ideas would emerge from these meetings (. . .), to see what public authorities would do with another report*" (ARB 1, first meeting, 19/04/2019).

This hope and desire to participate in politico-social changes was nevertheless clearly associated with a form of caution, or distrust, regarding these committees' political outputs, as expressed by many participants:

> "*The question indeed is 'what will be the use of these meetings'?*" (a participant of ARB 2, interview on 07/07/2019)
>
> "*From the start I asked, 'now, will it be useful at all? What means have you got?'. This is one of the questions I asked at once because, if it's just more claptrap, I doubt I'll be interested in it*" (participant of ARB 1, interview 25/07/2019)

It is also worth noting that out of 32 participating respondents at the beginning of the experiment, 15 left the experiment before the end. Out of the participants who decided to leave the experiment, those who stayed in frequently expressed their willingness to concretely tackle the subject matter, and mentioned their perceived lack of clarity of the experiment's objectives:

> "*I am curious to know what they are expecting from us . . . After these three meetings, what are we going to do?*" (a participant in ARB 1, interview 28/06/2019)
>
> "*I came back with a colleague [from the first meeting], and we talked about that: why were we here? To create a project, to learn some stuff? We did not know . . . As I understood it, we were ambassadors from the committee, but to what extent? These are a lot of unanswered questions*" (a participant of ARB 2, interview 04/07/2019).

The first phase, when committees defined their exact role and mission (prototyping), felt particularly frustrating for participants, who manifested a lack of interest in this approach; they considered it too conceptual or theoretical:

> "*I did not expect there would be so many meetings about the Citizen Committee's functioning, rather than about the subject matter (biodiversity, the committee's missions) . . . It dragged on. They should have imposed it to us, or have come up with something more clearly defined*" (a participant of OFB, interview 31/07/2019).

> "*We spent a lot of time working on prototyping, it was horrible. When shall we start tackling the subject matter?*" (a participant of OFB, interview 14/05/2019).

3.1.3. Interpretation

Who were the participants in these experiments and why were they engaged? What are their motivations and expectations? First, despite differences in their recruitment, participants in both initiatives exhibited great interest in—or high awareness of—biodiversity issues. Importantly, a central common point is the mix of hope and disillusion regarding these participative arenas' concrete outputs. Regarding open-space technology meetings, we found a strong mismatch between participants' general enthusiasm for public engagement in science and the common feeling that this engagement will not concretely influence the orientation of biodiversity scientific research. Furthermore, during the open space technology meetings, a recurrent topic was the difficulty to engage people that are not already familiar with science, and/or aware of biodiversity issues. This lack of representativeness is perceived, by participants, as an obstacle to the objectives of the open-space technology meetings—that is, giving lay citizens the ability to influence the orientations of scientific research. More generally, the risk of excluding lay citizens from participation in biodiversity research is also notable in the final documents proposed by participants, which often insist on the need to make protocols quite accessible and inclusive. A third element of disappointment was the lack of information regarding existing protocols, which is seen as a limit to the real usefulness of participation. The OFB and ARBs citizen committees' follow-up shows similar dynamics: participants express a mix of hope of impacting political decisions regarding biodiversity, and a form of distrust or suspicion regarding their participation' political outputs. The demand for precise, concrete actions goes hand in hand with criticism of the clarity deficit as to the committees' role. This was particularly the case during the prototyping phase, where participants were asked to define the committees' functioning. Many citizens left the experiment at that moment, and others often expressed their skepticism regarding the usefulness of this phase: interviews showed a global demand for a more clear and prescriptive way of leading experiments by public institutions.

3.2. (Q2) What Kinds of Knowledge Were Involved in These Exercises?

3.2.1. COP21 Open-Space Technology Meetings

When the survey asked participants of the COP21 meetings about the Open-space technology as a tool for dialogue, answers were rather—or very—positive in 24 answers out of 36. Among the concerns raised by the most skeptical respondents, their participation's lack of guidelines and framing was the more frequent issue (mentioned by seven respondents). The dominance of "experts", "researchers" or "specialist" in the discussions was criticized in six answers. From the survey, we could also analyze how participants situated themselves, depending on their level of familiarity with biodiversity and science in general (variable *Expertise*). We found that participants with a level of "expertise" superior to 2, 23% presented themselves during the meeting as members of an association, 19% as "scientists" and 58% as "citizens". By contrast, among respondents with a level of "expertise" inferior or equal to 2, 89% presented themselves as "citizens". This result suggests that participants having a degree of proximity with sciences tend to explicitly endorse or (at least) recognize this role in discussions. This point is confirmed by participative observations led over all three meetings. Two kinds of dynamics were observed in discussion groups. In the first ensemble of groups (the majority), discussions were directed by participants with strong expertise in the subject matter (scientists, citizen science programs managers and natural areas managers). These individuals, while explicitly naming their professional activity, often proposed the topic to be discussed (in phase 1) and facilitated debates (in phase 1 and phase 2): framing of the topic, time management and drafting of the synthesis. This scheme applied to all groups during the Corte meeting (all five discussion groups were led by four technicians from local public administration and one farmer), and to several groups in the Paris and Marseille meetings. On the contrary, some groups operated without

leading experts. In these cases, speaking times proved more egalitarian. However, these groups had more difficulties converging towards a precise definition of the problem (during morning sessions) and a corresponding scientific protocol (during afternoon sessions). In these groups, the starting ideas did not give rise to a concrete proposal at the end of the day, and the participants sometimes explicitly regretted the absence of a leading expert in their group: "We wish we had a scientist with us!" (Paris meeting, 03/04/2015, morning session). More generally, participants sometimes expressed the need for scientific information during the discussions: "It is important to tell us these kinds of things [the fact that the ocean plankton can be visible under some conditions], we are not experts" (Marseille meeting, 09/06/2015).

3.2.2. OFB/ARBs' Citizen Committees

Participative observations during OFB/ARBs' meetings and interviews of the participants give interesting elements regarding citizens' perceptions of their role, their respect for expert scientists on the one hand, and for the administration of biodiversity agencies on the other. First, citizens often expressed difficulty understanding OFB and ARB' functioning sufficiently for them to propose subject matters for discussion (auto-referrals) that were actually relevant to these institutions' missions:

> "*Some participants, because they do not know enough about public institutions, do not know exactly the possible extent of OFB's action, and do not know what role citizen committees could play*" (participant of OFB, interview 26/07/2019).

> "*I have difficulties in conceiving we are part of OFB's governance tools, without knowing the OFB*" (participant of OFB, interview 24/01/2019).

This feeling of being somewhat at a loss within a big public institution entails a demand for clear instructions and framing (see 4.a):

> "*Failing a proper frame, this kind of meeting is unproductive; in the absence of a master of ceremonies that would know how to manage it, it is complicated to get ideas to emerge*" (participant of ARB2, interview 02/07/2019).

> "*I thought (. . .) they would suggest a roadmap*" (participant of OFB, interview 06/08/2019)

However, this demand for external framing and knowledge input involves frequent criticism of the gap between citizens and experts during meetings ("These people are the best on these topics, but then they are so good they are too far-removed from citizens", participant of OFB, interview 03/06/2019), and criticism of the lack of freedom participants felt:

> "*I noticed that during the official meeting, some people in the group censored themselves. At mealtimes, they spoke more freely. I heard 'we'd rather not to stick out' (. . .). They are prudent (. . .). It is quite normal: we are brought into this whole thing that is new to us, it is institutional, we wouldn't dare*" (participant of ARB1, interview, 10/07/2019)

Second, participants clearly set limits to their participation by contrasting it with the decision-making process itself: interviews often highlighted that citizens' role was not to exercise governance by making concrete decisions in accordance with OFB and ARBs missions:

> "*I do not have to decide whether police powers . . . It has nothing to do with me*" (a participant of OFB, interview 20/05/2019).

> "*We can suggest ideas, and ARB might take them into consideration, and may inform OFB of them, which could have an effect*" (a participant of ARB 2, interview 04/07/2019).

> "*Maybe it is mistaken to make people believe they will be able to influence things (. . .) What we just did by discussing biodiversity at our modest level, has nothing to do with*

> *policy-making (. . .). I think this is not a case of demagogy, when people are told their ideas will be applied*" (participant of OFB, interview 26/07/2019).

According to the respondents, citizens' role is rather to inform institutions of their views and needs, and also provide their specific lay perspective:

> "*We give our advice. That's the way I see my action within the citizen committee*" (a participant of OFB, second meeting, 26/09/2019).

> "*Another interesting aspect is the possibility to refer some subjects to a higher level. That's what I did during the second meeting (. . .). We can give advice, but it can be ignored*" (participant of OFB, second meeting, 26/09/2019)

> "*What is so very complicated within administrations is to think in a simple way (. . .). One of a citizen group's virtues is that one or some persons will necessarily say things that sound commonplace at first, but what is also incredible is that no one had come up with that simple idea. That's the benefit of a fresh, new perspective*" (a participant of OFB, interview 20/05/2019)

On the other hand, several participants expressed their desire to perform concrete actions instead of simply giving advice:

> "*I would like to be an actor of change (. . .). I do not care for a consultant role, I would like simple projects to be defined, and to actively take part in them. When it comes to increase young people's awareness, we could contact schools (. . .), go and see municipalities and try to work hand in hand with them*" (a participant of OFB, interview 02/07/2021).

3.2.3. Interpretation

One first notable element arising both from the COP21 and OFB/ARB initiatives is the tension between a need for guidance and expert knowledge input, and the risk of limiting participants' expression. On the one hand, participants ask for more clarity in the exact role of their assemblies and a tighter framing of their activities. They also ask for relevant information (for instance, about existing citizen science programs in COP21 open-space technology meetings, or about OFB and ARB's roles and missions). On the other hand, participants also felt the place taken by experts or meetings' facilitators and organizers inhibited their free expression.

Second, our research highlighted that their role as citizens providing advice, offering non-expert perspectives, or expressing needs or preferences was at odds with their participation in the decision-making process itself. It seems participants mostly situate themselves in the first category, and sometimes explicitly reject stronger participation in biodiversity governance: in OFB/ARB's case, we reported frequent reluctance to engage in these agencies' proper institutional missions (discussing budgets, orienting institutions' missions). Regarding COP21 open-space technology meetings, various participants clearly expressed the limits of their roles and stated they should not endorse the scientists' mission of setting up research protocols (observations conducted during the Paris meeting). Finally, in both cases, participants highlighted the concrete role they should play in increasing non-participants' awareness by helping public institutions with concrete actions (for instance in schools, as regards OFB/ARB's citizen committees), or by proposing citizen science protocols likely to attract people not already committed to biodiversity and the environment (case of the COP21 open-space technology meetings).

3.3. (Q3) What Were Participants' Outcomes?

3.3.1. 'COP21' Open-Space Technology Meetings

The survey provides some information about participants' outcomes from open-space technology meetings. Out of 48 respondents, 64.3% considered they had learnt something during meetings ("I rather agree" or "I totally agree" to the question "The open-space technology meeting was useful for my learning"); 46.4% thought the others had learnt something and 50% deemed they now had a better understanding of science/society

relationships. Additionally, 60.7% responded that these exercises contributed to their personal fulfillment. These results should be interpreted with awareness of participant groups' specific composition—over-educated and already engaged in biodiversity issues.

3.3.2. OFB Citizen Committees

Interviews and participative observations within OFB and ARBs citizen committees revealed great heterogeneity of outcomes for participants. First, our data indicated that some participants did acquire knowledge about the definition of biodiversity, its current state, and the functioning of some ecosystems:

> "*Very rapidly you learn things, you say 'Oh, right, that's the way it works', and then you talk about that*" (an OFB participant, interview 20/05/2019).

> "*The Citizen Committee helped me become aware of this renowned life chain, of these ecosystems. I really became aware of them*" (an OFB participant, interview, 20/05/2019).

Some of them changed their attitudes and behaviors accordingly: for instance, one participant in the OFB committee indicated he had changed some of his gardening practices (such as avoiding killing ants, "who do have a role to play, certainly", 20/05/2021). Another participant stated: "today, my behavior with respect to nature has changed a lot. Though I have done a lot of gardening in my life! However, my behavior has drastically changed". He also indicated that "clearly [he] do[es] not cut off branches the way he used to" (an OFB participant, interview 20/05/2019). Interestingly, some citizens stated their participation did not change their attitudes, because they already were very engaged in favor of environment issues:

> "*Many people say their participation in the citizen committee has resulted in concrete actions. I do not have the impression that participation had this effect on myself. I was already very sensitized, and have already done a lot of things before*" (an OFB participant, restitution meeting, 29/09/2021).

Some citizens were surprised and "reassured" to discover that "so many" people work on biodiversity (an ARB 2 participant, June 2019). The citizen committee contributed to help them discover the existence of ecology and biodiversity as proper research fields: "I felt that many people was asking this question, that of the planet's subsistence" (ARB 1 participant, second meeting, 25/06/2019).

For some participants, participation also fostered a form of politicization (in the sense of active commitment to public actions that go beyond individual concerns). The most notable example is that of two participants who implemented a mini-forest plantation project in a school. One of them explicitly stated that his engagement had existed "since and thanks to the OFB citizen committee" (participant of the OFB, 20/05/2020). Another project was developed which aimed to introduce greening plans into local urban planning documents. To defend his project, the promoter exchanged with scientists, local administrators, local executives, and NGOs. He states: "In September I am going to try and contact the town's associations. Additionally, it might well be thanks to these [ARB citizen committee] meetings that I have aimed to do more" (ARB 1 participant, 28/06/2019). More generally, several participants expressed their satisfaction or pride about expressing themselves, and to engage in a group of people for collective interest:

> "*I was proud to make my voice heard and I guess the people who were there were also proud to make their voice heard*" (an ARB 2 participant, interview 03/07/2019).

> "*It was satisfying to make my voice heard and to hear other people from different origins also having something to say. It was somewhat reassuring because we do not often spend time with people motivated by the collective interest. It is reassuring and rewarding to say we are part of them*" (an ARB 2 participant, interview 03/07/2019).

In contrast with this positive feedback, many participants also felt very disillusioned. As stated previously, 15 citizens out of 32 left the experiments early. It is not easy to assess,

on the basis of our data, what exact reasons caused these decisions: lack of time, lack of motivation for the subject matter or real disillusion regarding the overall organization of the committees and the groups' achievements. We have already described the disillusions relative to the first prototyping phase (4.a) or the frequent skepticism regarding the citizen committee's usefulness. Such skepticism sometimes gave rise to intense criticism of the committees' role and functioning; "after all that we said, I do not understand how we are going to protect biodiversity" (an OFB participant, third meeting); "I thought we could change things cogently, in agreement with each of us; and propose true solutions to the Ministry of Ecology. It was not the case at all" (an OFB participant, interview 06/01/2019).

3.3.3. Interpretation

These deliberative experiments' personal outcomes turn out to be very variable with respect to individual aspirations and life trajectories: environmental education and awareness, political awakening or disillusion. Beyond the qualification of these different impacts, a central issue to be discussed (Section 4) revolves around the real usefulness of these outcomes regarding these deliberative experiments' initial objectives.

4. Discussion

Our objective in this paper was to contribute to identifying obstacles and tools for public participation in biodiversity governance (regarding both setting up the research agenda, and the decision-making process of environment agencies) through the analysis of two case studies. To do so, we organized our qualitative/quantitative research around three intermediary research questions: What are the profiles and motivations of the participants (Q1)? What kind of knowledge is exchanged, and how (Q2)? What are participants' outcomes of these exercises (Q3)? The results we obtained for each of these research questions can now be scaled-up and compared to existing literature about public participation in biodiversity governance. We articulate our discussion around the concepts of fairness and efficiency of participative exercises.

4.1. Fairness

The data we collected give us interesting information about two dimensions of participants' perceptions of the fairness of the exercises, in the sense of [6] (Let us remember the following: according to [6] the concept of fairness of public participation "concerns the perceptions of those involved in the engagement exercise and/or the wider public and whether they believe that the exercise has been honestly conducted with serious intent to collect the views of an appropriate sample of the affected population and to act on those views" (p. 262)): the perceived political utility of citizens' engagement (will public participation be used to influence the decision-making process?), and the perceived representativeness of the participants' group.

Regarding the first dimension, our results show that participants interrogate the finality of their engagement, and we found a form of skepticism about the usefulness of their participation in terms of action (formulation of rules, communication action, or development of a scientific protocol). This skepticism or disillusion of citizens regarding the concrete political influence of their participation is well documented in the literature. [25] have shown, on the basis of a contrasted vignette experiment, that about 20% of European citizens are "skeptical" or "critics" of citizens' participation in policymaking. They show that this attitude is mainly expressed by educated citizens who are interested in politics, but who manifest a form of elitism and a distrust in the abilities of ordinary citizens to participate efficiently in decision making. Our case studies complete this socio-demographic explanation by offering some insights about the internal features of the participative exercises which may generate or reinforce this skepticism. First, the different institutions we considered—CNRS, OFB and ARBs—all decided to engage in ambitious participative processes where citizens are offered a high degree of liberty in framing their very roles in these processes. As it turns out, this large amount of liberty was frequently interpreted

by citizens as a sign of lack of clarity regarding the way the exercises will be concretely used. Indeed, an important result of our research is that citizens tend to ask for (a) a clearer formulation of their participation objectives (what kind of outputs are expected of them by institutions, and how these outputs will be used?); (b) a better framing, at the very beginning, of their role within the process (compared to the scientific experts' and/or the administration's). We show this lack of clear guidance feeds into a form of skepticism about the usefulness of these deliberative assemblies. It may also lead to disappointments and disillusions for citizens who were not ready to engage in the proposed type of participation. Our hypothesis is that this framing issue is directly due to a lack of clarity, on the part of institutions themselves, as to the roles citizens might play in designing biodiversity public policies. Second, it is worth noting that the referrals proposed by agencies to citizens committees mainly focused on the reception of their communication by the public at large (website, public documents . . .); that is, a mission that is quite far-removed from real agencies' co-governance (see Table 2). Finally, if some socio-demographic factors might explain part of public skepticism regarding the political value of public participation [25], the internal features of these exercises (the lack of clarity of their objectives, and the lack of framing of participants' roles) seem to generate or reinforce this skeptical or critical attitude.

The second dimension of participation's fairness is the perceived "representativeness" of the participants' group. Representativeness is a common evaluation criterion for public participation [6], even if this concept is far from being consensual: what does it mean for a participant group to be "representative"? We first need to distinguish—e.g., with [17]—between "being representative of interests" and "representing interests". It is often considered that an ideal public participation exercise should seek the first kind of representation, that is, giving a voice to the whole range of views that may exist [17] (p. 213). We found that participants of the COP21 open-technology meetings spontaneously expressed their perceptions about the representativeness of the exercise, by sharing their views about (a) the absence of those citizens who, while being directly affected by biodiversity loss, do not feel concerned by environment issues; (b) the way of making citizen science protocols more attractive for those individuals to engage in them. Interestingly, linked to this perceived lack of representativeness, participants tend to consider in the discussion the (assumed) interests of these *others* that do not participate, rather that expressing their *own* interests (that is, the kind of citizen science protocols they would like to engage in). The exercise was thus biased in two ways: first, the assembly was not (demographically) representative of the whole population (which is potentially impacted by the loss of biodiversity); and second, participants have chosen to make assumptions about *others'* views, opinions or interests.

In contrast, the OFB and ARBs citizen committees were explicitly designed to involve a representative sample of the whole French population. However, finally, the groups were mostly composed of citizens who already had an interest in biodiversity and the environment; additionally, half of them exited the experiments after only a few sessions. What was the motivation of this progressive filtering of participants? The first, well known answer is the difficulty of mobilizing citizens who are not already engaged in active forms of citizenship, or already strongly engaged regarding the specific issue at stake [17]. However, our research suggests that this difficulty might be partly overcome by proposing a diversity of activities, including less demanding ones. Indeed, citizens who left the OFB/ARBs experiments often expressed their willingness to engage in more concrete action under the guidance of public institutions (for instance, communicating about biodiversity in schools). More generally, we found in both exercises a rejection, on the behalf of some of the participants, of their role in the most advanced phases of scientific or political decisions. Notably, the quite frequent reluctance to participate actively in the OFB/ARB's administrative missions (such as discussing budget) show that participants are far from being unanimously in demand of extreme form of citizen control over public policies through public deliberation. This result might be interpreted via the perspective of the so-called "Arnstein gap" in public participation—that is, the fact that actual participation

exercises would be situated in a relatively low position within [9]'s ladders of participation compared to citizens' expectations [26]. Our findings point to a more qualified view on the discrepancy between citizens' expectations and current participation exercises: deliberative assemblies may be considered by participants as a too intense mode of public engagement (which does not mean that it is impossible to elaborate more representative deliberative arenas, see for instance [27]). More precisely, it appears that the public participation exercise which was chosen by the OFB/ARBs environmental agencies did not correspond to the diversity of expectations of the participants regarding both the modalities and the variety of potential objectives of public participation (being part of the decision-making process, being engaged in the institutional communication about biodiversity, etc.) This finding is interesting since it opens an original perspective on the notions of inclusivity and/or representativeness in participatory exercises. These notions are indeed usually tackled from two perspectives: (i) the socio-demographic characteristics of the participants with regard to the whole population which is affected by the problem or the decision at stake [6]; (ii) the multiplicity of the (sometimes diverging) interests regarding this issue [28]. Our results suggest that inclusivity and representativeness may also be a matter of taking into account the diversity of expectations regarding the objectives of participation on a given topic or field of political action. We develop this recommendation in the conclusion section.

4.2. Efficiency

The concept of efficiency in public participation might be formalized as referring to "maximizing the relevant information (knowledge and/or opinions) from the maximum number of relevant sources to the other parties, with the efficient processing of that information by the receivers (the sponsors and participants) and the combining of it into an accurate composite" [6] (p. 264). This definition comprises at least two distinct dimensions: that of the efficiency of the flow of information, and that of the achievement of the exercise's objective.

Regarding the first dimension, both COP21 and OFB/ARB's experiments showed these kinds of participative arenas have the potential to foster public learning about biodiversity as a scientific object. This result confirms existing evidence that actual, effective participation in political processes increases people's knowledge and understanding [29]. Various studies in literature yet insist on the fact that this flow of information from the organizer to the participants is often suboptimal because of the use of technical, specialized terms instead of "lay language" [21] (p. 1052). Our results confirm the difficulty of mobilizing the accurate level of technicity in experts' communication: more precisely, participants themselves identified a form of tension between the need for scientific expertise and technical information (which is clearly expressed by the participants), and the risk of maintaining top-down communication channels where lay citizens' expression is inhibited (because of self-censorship, or more directly because of the place experts take in discussions).

Regarding the participants of experts or organizers information flow, we determined the idea that participants' role is to provide a citizen perspective or point of view as a recurring topic: various participants stated that the value of their engagement is to offer a form of common sense or simple, fresh or naive thought which opposes the cumbersome administrative way of thinking of environmental problems. This result is interesting, since it provides another justification for public participation out of the most classical ones: giving visibility to social needs [30], offering more legitimacy to political decisions [31], or eliciting local or lay knowledge [32].

Regarding the second dimension of public participation efficiency (the achievement of the exercise's objective), our results first highlight the importance of clearly setting the objectives of public participation and the material and political means available to reach them. In the case of the COP21 Open technology meetings, public participation was not integrated within a larger process of decision making (which would have offered funds to develop citizen science programs). This lack of following up of the exercise feeds into the skepticism or delusion regarding participants' real political impact. This limit of

participative instruments is well known: as noted by [33] (p. 73), participative exercises are frequently set up by state agencies which are finally not capable of implementing the decisions or concretely taking participants' opinions into account. A challenge for organizing agencies is to be as transparent as possible both on the objectives and the means of the participative exercise. This exigency of transparency is a central issue for many participative instruments, even at a much larger scale: recently, for instance, the Citizen Convention on Climate (a deliberative mini-public exercise hold in France from October 2019 to June 2019, https://www.conventioncitoyennepourleclimat.fr/en/, accessed on 8 May 2022), was criticized for not submitting citizens' recommendations "unfiltered" to Parliament as was initially scheduled [27].

Furthermore, it appears that the lack of external guidance (regarding what is expected from participants) was an important obstacle to larger citizen mobilization (as shown by the numerous citizens who left the exercise before its end). A second important point concerns the internal organization of the participation exercises. Often stated in both case studies was the lack of organization of the deliberations by the institutions or events' organizers. This was perceived by participants as a clear obstacle to citizens' efficient participation. This result confirms the known importance of efficient and adaptive facilitation to guide participation exercises and help elicit relevant information [34,35].

5. Conclusions

How may the analysis of our two case studies be used to inform future public participation in biodiversity governance? First, let us note that as they are based on singular examples, our results are heavily context dependent. Consequently, what can be generalized from them is limited. However, out of the discussion of the theoretical insights presented in the previous section, we do think that some general practical recommendations can be proposed on this basis. From the different results we obtained, we will then retain two take-home messages. The first one is quite classical: organizing public participation exercises without upstream clarification of their objectives, their means and their expected outputs feeds into the existing skepticism regarding citizens' real political power. The second (maybe more original) one concerns the diversity of expectations, among concerned or interested citizens, regarding the forms that should take their engagement (and then, regarding the objectives of the participative exercise they engage in). Contrary to the idea that citizens would like to participate more (in the sense of Arnstein's ladders of participation), we found that many participants tend to pose themselves some limits to their participation: in other words, and to say it briefly, they express the desire to walk down, and not up, the Arnstein scale. This diversity of expectations regarding citizens' participation is partly related to the high technicity of biodiversity issues: not all citizens, even if interested in engaging themselves, are ready to enter an ideal deliberative process leading to political decisions (administrative side of biodiversity governance), or to guide research by formulating scientific questions (scientific side of biodiversity governance). Our conclusion is as follows: to be really representative (or, roughly speaking, inclusive), participative governance of biodiversity should include a diverse range of opportunities to engage, from deliberative arenas to concrete communication actions led by participants under the guidance of institutions.

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