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Does participatory governance help address long-term environmental problems? Conceptualization and evidence from 23 democracies

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ABSTRACT

Democratic myopia, lacking salience, and high uncertainty seem to make it difficult to govern long-term problems like nuclear waste disposal, biodiversity loss or the environmental consequences of infrastructure projects. Participatory approaches may benefit environmental decisions, but the literature largely neglects the implications of the long-termness of many environmental issues. Conversely, the literature on long-term governance disregards the potential of participation to solve long-term problems. To address this gap, this study develops a new conceptual framework and statistically analyzes 303 public environmental decision-making processes to assess the role of participatory governance in addressing long-term environmental problems. The results show that participatory governance indeed helps to solve and prevent long-term environmental problems – but in different ways than it addresses short-term environmental problems. Intensive deliberation proves key for effectively adressing long-term issues, while the representation of environmental and economic interests in the process makes no difference for the environmental standard of the governance output. The opposite is true for short-term environmental problems. Surprisingly, issue uncertainty, while higher in long-term issue settings, does not affect the solution of long-term but only of short-term environmental problems. In general, deliberation seems to be more decisive than mere participation for effectively addressing long-term environmental problems.

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Introduction

Decision-making in democracies is often described as more myopic than far-sighted (i.e. it is biased towards the present), as election cycles are said to incentivize politicians to demonstrate short-term success and avoid short-term costs to ensure their (re-)election (MacKenzie 2016; Boston 2017; Smith 2021). Politicians therefore orient their policies

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toward the perceived interests of their strongest voter base, which might conflict with the unvoiced interests of citizens' and politicians' future selves, young and future generations, as well as non-human nature, when there are trade-offs in the intertemporal distribution of costs and benefits (Healy and Malhotra 2009; Lawrence 2022; Rose 2024; Sheffer, Loewen, and Lucas 2024). These trade-offs occur when policy options would come with immediate costs, while beneficial effects are only expected in the long-term future, posing unfavourable decision-situations often exacerbated by uncertainty (Jacobs 2016). Therefore, democratic myopia can decrease the effectiveness of public decision-making processes to solve long-term environmental problems that are subject to such trade-offs, which may partially explain policy failure on climate change and biodiversity loss (Nair and Howlett 2017; Koskimaa and Rapeli 2025).

Against this background, how can long-term environmental problems be addressed successfully? Turning to the scientific literature and the international political discourse, the hopes for "good" (i.e. legitimate and effective) environmental and sustainability policy and governance – long-term or not – seem to lay with the so-called "new modes of governance", in particular participation and collaboration, in contrast to hierarchical top-down decision-making by state actors only (Bäckstrand et al. 2010). Participatory environmental governance is said to potentially lead to better decisions and better implementation through the integration of environmental knowledge, higher acceptance, and conflict resolution (Lemos and Agrawal 2006; Newig et al. 2018; Newig, Challies, and Jager 2019; Peters and Lohse 2023). Critics, however, maintain that citizen and stakeholder participation in environmental governance is mere performative and serves primarily symbolic purposes, allowing consumer societies to manage their lack of will and ability to truly solve environmental problems (Blühdorn and Deflorian 2019). While evidence is mixed, studies show that in many cases, participation of citizens and stakeholders in environmental decision-making indeed leads to more environmentally stringent decisions (Scott 2015; Sterling et al. 2017; Newig et al. 2023).

At the same time, Jacobs (2016, 437) finds that "[m]ost studies have been surprisingly silent on the political implications of the fact that the costs of environmental policy action must often be imposed long before its benefits will arrive." Hence, the literature of (participatory) environmental governance largely ignores the implications of the long-termness of many environmental problems. When we turn to the literature on the governance of sustainable development, we find that it often calls for both participation and long-term orientation, but fails to clearly analyze how they relate to each other (Steurer 2010; OECD 2018; Niestroy et al. 2019; Sachs et al. 2019; Mathis et al. 2023; Rose 2025).

Conversely, literature in the small research area on democratic myopia and long-term policy and governance mostly disregards the potential of participatory governance to address long-term (environmental) problems (Sprinz 2009; Jacobs 2016; MacKenzie 2016; Boston 2017, 2021; Sprinz 2023; Koskimaa and Rapeli 2025; Scheer et al. 2025). Likewise, public administration research on governing long-term (environmental) problems ignores the role of collaborative and participatory governance (Pot, Dewulf, and Termeer 2022; Pot, Scherpenisse, and t'Hart 2023).

Seeking to advance knowledge on how to effectively govern long-term environmental problems, we conceptualize and empirically analyze how the participation of citizens and stakeholders in public decision-making processes helps to effectively address long-term environmental problems. Doing so, we show how different actor, process and issue

characteristics can facilitate or hamper decisions that will likely solve or prevent long-term environmental problems.

To this end, we develop a conceptual framework to inform an empirical analysis of 303 cases of specific public environmental decision-making processes in 23 advanced democracies, covered by the SCAPE dataset (Newig et al. 2021). We code the degree of long-termness of the environmental problem addressed in each case and employ linear regression to examine how different dimensions of participation affect the environmental standard of the decision-making output (i.e. how well environmental problems are solved or prevented). In order to distinguish general participation effects from effects unique to decision-making processes on long-term environmental problems, we compare regressions of subsets of decision-making processes on long-term and short-term environmental problems. Doing so, this study provides the first comprehensive conceptual framework and empirical evidence on the questions of whether and how participation helps to address long-term environmental problems in public decision-making processes, especially compared to the role of participation in cases of short-term problems. With its focus on long-term environmental problems, this study adds nuance to the evidence on the performance of participatory environmental governance, and contributes evidence on the role of participation in the governance of long-term issues.

Conceptual framework

While the literatures on participatory environmental governance and the governance of long-term issues seem largely disconnected, there are some notable exceptions. In an early critical perspective, Cupps (1977, 480) claims that public participation would compromise the ability of public administration to address long-term issues successfully, particularly in cases of "trade-offs between 'short-term pains and long-term gains'". Few, Brown, and Tompkins (2007) show that in cases of high uncertainty and low issue salience, public participation can be detrimental to solving the long-term problem of climate adaptation. In contrast, subsequent works stress the positive role of participation in addressing long-term issues, however, without linking this to either broader theory or empirical evidence. For example, Boston, Bagnall, and Barry (2019, 48) recommend that "Governments should use a wide range of participatory processes for policy-making on long-term issues … [, as these] can be useful in enhancing public understanding, building trust, securing agreement on shared goals and negotiating solutions to complex intertemporal issues." Comparing political systems of 36 countries, Caluwaerts and Vermassen (2023, 189) find a positive association between a democracy's level of participation and its level of intergenerational justice.

Moreover, the growing literature on deliberative mini publics more specifically addresses long-term (environmental) issues. Deliberative mini publics such as climate assemblies consist of randomly selected citizens who meet for longer periods of time to prepare substantial policy recommendations on how to address – in this case – the long-term problem of climate change. This literature shows conceptually and, to a limited extent, empirically that deliberation can facilitate the long-term orientation of participants, and by extension, the mitigation of long-term environmental problems as recommended in the mini publics' decision-making outputs. However, the potential to address long-term environmental problems successfully is mostly attributed to the deliberative and not so much the participatory characteristics of mini publics (Niemeyer and

Jennstål 2016; Smith 2020; Smith 2021; MacKenzie 2021a; Setälä 2022; Willis, Curato, and Smith 2022; Smith 2023; Koskimaa and Rapeli 2025; Setälä 2025).

Overall, the literature offers little conceptual or empirical insights into the participatory governance of long-term environmental problems. Below, we seek to integrate different literatures to develop what we may call a conceptual framework for the participatory governance of long-term environmental problems. On a very general level, we assume that the long-termness of an environmental problem makes a difference in whether and how participation helps to solve an environmental problem. Hence, participation may play out differently with long-term as opposed to more short-term environmental problems (see Figure 1).

As a first element of this framework, we conceptualize the notion of long-term environmental problems. Secondly, we conceptualize how participation in public environmental decision-making processes can contribute to solving or preventing (or worsening) long-term environmental problems addressed in these processes. Drawing on the literature of democratic myopia and the governance of long-term issues, we conceptualize the factors we expect to be sensitive to the long-termness of an environmental problem addressed in a public decision-making process.

Long-term environmental problems and related concepts

So far, the literature has shown neither coherent terminology nor agreed definitions of long-term (environmental) problems, policy issues or challenges (Pot, Dewulf, and Termeer 2022). Sprinz (2009, 2), in his introductory article on "long-term environmental policy", defines "Long-term policy challenges … as public policy issues that last at least one human generation, exhibit deep uncertainty exacerbated by the depth of time, and engender public goods aspects both at the stage of problem generation as well as at the response stage." He continues, "A long-term problem exists only if the mechanism creating it leads to substantial adverse effects for at least a human generation of 25 years or if the remedy would take an equally substantial amount of time." According to Warren (2023, 19), "Long-term problems encompass collective decisions and collective omissions that affect the long-term futures of people who exist today, those who will come into existence, as well as societies, institutions and our environments, both built and natural." Siebenhüner

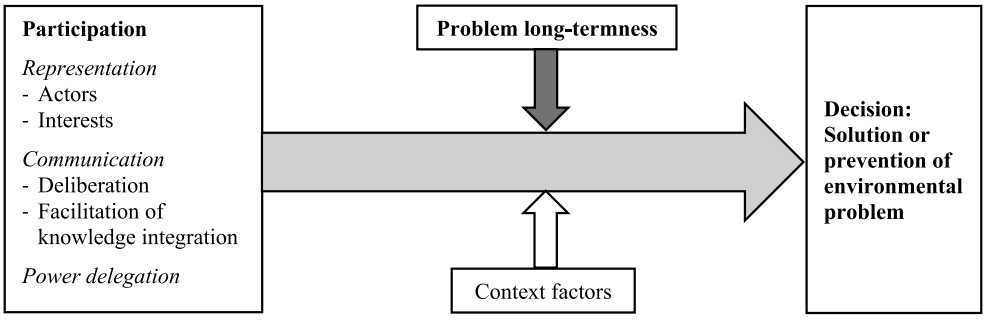

Figure 1. The long-termness of an environmental problem influences whether and how public participation in a decision-making process helps or hinders the solution or prevention of an environmental problem. (Own illustration).

et al. (2013, 4) suggest that long-term problems include "(1) problems which need a long time to unfold … (creeping problems); (2) problems that involve issues of intergenerational equity and trade-offs, or where solutions involve issues of intergenerational equity and trade-offs … ; (3) problems that cannot be resolved quickly." Suggested time horizons vary considerably as well. Next to Sprinz's generational length, which is seconded by Scheer et al. (2025), MacKenzie (2016) thinks in terms of decades, denoting time-spans between ten and sixty years, or even more in cases of very long-term issues. For Meuleman and Veld (2009), long-term means more than 10 years, with environmental and sustainability policies often spanning 20 years or more. Against this background, MacKenzie (2021b) warns to use the term "long-term issue" to clearly differentiate those from short-term issues, and calls such a clear distinction an "unproductive fiction", since the timing of costs and benefits as well as causes and effects is contingent on the actions or inactions taken to address the policy issue in question – "there is no such thing as a short-term issue", he claims.

As we analyze concrete public decision-making processes on (long-term) environmental problems, we must lay out our own understanding of long-term environmental problems as a subset of long-term issues. From the above discussion, we take that (a) long-term environmental problems may be caused by collective decisions or omissions, (b) they usually persist for decades, and (c) their solution may involve trade-offs between present and future costs and benefits. While we agree with Sprinz (2009, 2023) that long-term environmental problems are often characterized by (deep) uncertainty, we disagree in that this should be a defining attribute. Moreover, for the purpose of this article, we are only interested in long-term environmental problems that (d) the actors who designed the decision-making process or who participated in it were likely aware of before the respective decision was taken; (e) are directly associated with the subject of the decision-making process; and (f) are somewhat significant in their (potential) environmental damage.

We distinguish two types of long-term environmental problems: (1) existing long-term environmental problems, and (2) anticipated potential long-term environmental problems. In type 1 – existing long-term environmental problems – the status quo, and hence "inaction" or "business as usual", is considered to be an existing environmental problem. The decision-making process then is about a potential intervention that could mitigate the significant environmental problem at hand. We consider such problems as "long-term", if they are both persistent and substantial, and hence could only be resolved reasonably in the long-term, even if immediate (and potentially costly) actions were taken. Addressing such type 1 long-term environmental problems successfully is not impossible. For example, once it was discovered that CFCs cause the stratospheric ozone hole, it was decided to phase out these substances at considerable short-term costs, while benefits – halting and reversing ozone depletion (i.e. solving the environmental problem) – would only incur decades later.

Type 2 problems – anticipated potential long-term environmental problems – may result from a future action decided on in the decision-making process at hand. We consider such an anticipated environmental problem as "long-term" if it is expected to be both persistent and substantial. In such cases, the significant environmental damage caused by a future action – the subject of the decision-making process at hand – can only be rectified over a long period, or may even be deemed irreversible. This implies that the environmentally harmful action to be decided would prevent a potential

subsequent decision-making process from being able to promptly restore the original environmental conditions or finding a reasonable and cost-effective substitute for these conditions. Many approval or licensing decisions follow this pattern. The most environmentally friendly decision option that would prevent a future long-term environmental problem from happening might be the costliest variant, either through imposing costs for environmental protection measures in the case of approval, or due to opportunity costs in the case of non-approval. An example would be a decision about a logging or land cleaning permission for a forest area that hosts a rare species that may go extinct if it loses its habitat. Another example would be the siting of a final nuclear waste disposal site. Once it is built, filled and sealed, it may be de-facto irreversible even if leakage occurs.

It is also possible to combine both types. This would be the case if a decision-making process is about a future action that is supposed to mitigate an existing long-term environmental problem, but potentially creates a new one at the same time. As regards public decision-making processes on type 1 or type 2 long-term environmental problems, we consider those problems to be addressed successfully when the decisions taken will likely benefit the environment the most, compared to other available decision options. Short-term environmental problems, on the other hand, are environmental problems that are not persistent as described above, and therefore could be solved in the foreseeable future.

The influence of public and stakeholder participation in environmental governance processes on solving long-term environmental problems

The thesis of democratic myopia suggests that the need for re-election incentivizes politicians to aim for short-term gains and to avoid long-term policy investments that impose short-term costs (Healy and Malhotra 2009; MacKenzie 2016). Sheffer, Loewen, and Lucas (2024) show that the willingness of politicians to opt for a policy that mitigates a long-term problem depends on the politicians' view of voters (i.e. in how far they perceive voters as myopic). According to this study, many politicians are in fact able to decide in non-myopic ways, while those who perceive the electorate as myopic are particularly sensitive to the intertemporal cost structure of the problem at hand (i.e. they are less willing to solve a long-term problem if this would impose short-term costs, see Jacobs 2016 for similar arguments). Moreover, Koskimaa, Rapeli, and Hiedanpää (2021) suggest that non-elected professional public servants or experts, who are often part of hierarchical decision-making processes, commonly facilitate policies that address long-term problems, as they are not subject to the political costs that may come with these policies. This has been empirically confirmed for Finland, where administrative policy-making elites are on average more future-regarding and less myopic than citizens and municipal councillors (Koskimaa and Rapeli 2025). Against this background, it is not to be taken for granted that opening-up decision-making processes on long-term environmental problems to individual citizens and organized stakeholders will always lead to more effective problem solving.

Following Fung (2006) and Newig et al. (2018), we distinguish three dimension of participation – representation, communication, and power delegation – which may have varying effects on the decision-making outputs of participatory environmental governance processes. In this section, we focus on those characteristics of participation that may contribute to solving, creating or worsening long-term environmental problems in particular.

Scope of representation

The first dimension – scope of representation – considers the types and breadths of participants engaged. In the relevant conceptual and empirical literature, citizens in general, and voters in particular, are considered to be rather myopic, usually preferring immediate benefits to temporally distant ones (Few, Brown, and Tompkins 2007; Healy and Malhotra 2009; Meuleman and Veld 2009; Christensen and Rapeli 2021). For Finland, Rapeli (2023) shows that even if Finnish citizens are not strongly myopic, they are more myopic than political and administrative elites. For efforts to deliver on long-term environmental problems without generating immediate benefits, a myopic predisposition of citizens is challenging when they get a say in political decision-making. *All else being equal, we therefore expect the involvement of individual citizens or the broader public in decision-making processes to be rather detrimental to solving and preventing long-term environmental problems.*

Having said that, research suggests that citizen myopia is moderated by trust in political institutions, as well as by the salience and the uncertainty of the issue at hand (Few, Brown, and Tompkins 2007; Meuleman and Veld 2009; Jacobs and Matthews 2012, 2017; Smith 2021; Rapeli 2023; Busemeyer 2024). Many citizens might therefore be non-myopic when they trust the process and the long-term implementation of its decisions, and the environmental long-term issue at stake is tangible, salient and not obscured by high uncertainty regarding problem characteristics and possible solutions. In these cases, we would not expect a detrimental effect of citizen participation on solving and preventing long-term environmental problems.

Organized interest groups may take part in participatory environmental governance processes as well. Compared to industry lobbyists, civil society actors seem less influential, but environmental NGOs in particular usually succeed in keeping the environment on the agenda, and may argue in favor of (costly) decisions they expect to address long-term environmental issues (Koskimaa, Rapeli, and Hiedanpää 2021). *We therefore expect the participation of civil society actors, in particular environmental NGOs, to facilitate the solution and prevention of long-term environmental problems.*

The rationales of businesses and business associations, however, seem to be more ambiguous. On the one hand, big business might facilitate solving and preventing long-term environmental problems due to their interest in de-risking their long-term investments (Koskimaa, Rapeli, and Hiedanpää 2021). Local family enterprises that last for generations may favor decisions that solve or prevent long-term environmental problems, too (Meuleman and Veld 2009). On the other hand, businesses can be myopic due to bonuses and short-term shareholder values that incentivize them to obviate any short-term costs that do not result in short-term benefits (Meuleman and Veld 2009). In addition, Jacobs (2016) claims that business associations and labor unions affected by the costs of environmental protection will oppose them out of self-interest alone. *While the influence of participating businesses and business associations on decision-making outputs might be significant, it is likely to vary on a case-by-case basis to what degree this influence is beneficial or detrimental to the solution and prevention of long-term environmental problems.*

Intensity of communication

The second dimension – intensity of communication – considers how the participatory process is designed and carried out. According to the relevant literature, a high

deliberative quality of the process is key for addressing long-term issues successfully, as it "enable[s] experts and lay participants to address complex, long-term problems" (Boston 2017, 190). Participants and competent authority representatives are supposed to engage in meaningful, open-minded conversations on an equal level, characterized by well-informed common-good arguments instead of power- and interest-based negotiations. Experimental evidence suggests that in negotiation settings that deal with resource conflicts, the interests of future generations are ignored even if their consideration would not impose short-term costs (van Treek et al. 2023). In ideal deliberative settings, however, short-sighted, self-interested claims are weaker than social, long-term oriented claims (Smith 2020; MacKenzie 2021a). As deliberation is expected to lead to rationalization, it "establish[es] the relationships between individual actions and long-term consequences" (Warren 2023, 37), and "creates political conditions … to enable collective political judgement for the long term" (Smith 2023, 169). Deliberation has been shown to slightly increase the willingness of participants to make sacrifices for the long-term future (Kulha et al. 2021; MacKenzie and Caluwaerts 2021). *Therefore, all else being equal, the higher the deliberative quality of the process, the higher the extent to which long-term environmental problems are solved or prevented.*

Moreover, the deliberate *facilitation of deliberation and integration of different knowledge domains* is said to increase the ability of participants to address complex long-term environmental problems (Campos et al. 2016; Smith 2020). *Therefore, we expect this to benefit the solution and prevention of long-term environmental problems as well.*

Degree of power delegation

The third dimension – degree of power delegation – considers the extent to which participants can exert influence on the decision at stake. While information and consultation essentially do not include power delegation, co-decision or delegated decision-making do. The literature is largely silent on the question of how much power delegation to participants benefits – or impairs – the solution and prevention of long-term environmental problems. We therefore consider this dimension a rather exploratory one. On a general level, Koskimaa, Rapeli, and Hiedanpää (2021) claim that stakeholder consultation and consensus-seeking increase the commitment of the relevant parties and improve decision quality, legitimacy and implementation, and thereby also benefit long-term environmental policy. Moreover, a corporatist decision-making style that presupposes a medium level of power delegation might help to disperse political blame for short-term costs that may come with long-term policy investments (Koskimaa, Rapeli, and Hiedanpää 2021).

Context factors: trust in government, issue uncertainty, and issue salience

As already mentioned, multiple empirical studies show that the general trust of people in politics and administration to deliver on policies addressing long-term problems facilitates their acceptance of costly long-term investments and mitigates their myopic tendencies (Jacobs and Matthews 2012, 2017; Fairbrother et al. 2021; Rapeli 2023; Busemeyer 2024). Only one study on Finnish citizens does not confirm this relationship (Christensen and Rapeli 2021). *All else being equal, high trust in government may eventually benefit the solution and prevention of long-term environmental problems.*

A similar moderating effect can be expected for the uncertainty and the salience of the environmental issue at hand. While the uncertainty of long-term policy issues has been shown to increase the myopia of citizens (Few, Brown, and Tompkins 2007; Jacobs and Matthews 2012; Christensen and Rapeli 2021), the tangible salience of long-term environmental problems, which is often lacking, would make them less receptive to myopic incentives (Few, Brown, and Tompkins 2007; Smith 2021). On the topic of participation in decision-making on long-term climate adaptation, Few, Brown, and Tompkins (2007, 55) claim that

> It may … function effectively if and when climate impacts begin to have tangible effects on environment and society: as a decision process for reactive adaptation. However, participation … is basically incompatible with the formulation of anticipatory adaptation. Even if some stakeholders may be supportive of anticipatory intervention, the outcome of deliberation is unlikely to produce a consensus strategy to address long-term and uncertain consequences with low immediate salience. A "participatory" process that appears to do so is likely to have been subject to managerialism and containment, in part through the selective inclusion, co-option, and/or exclusion of stakeholders.

All else being equal, we expect that the higher the uncertainty of the long-term environmental issue, the less likely it is to be solved or prevented through a participatory decision-making process. Conversely, the higher the salience of the long-term problem, the more likely it is to be solved or prevented.

Data and methods

EDGE-SCAPE database

To put our assumptions to an empirical probe, we draw on the EDGE-SCAPE dataset of 303 coded cases of public environmental decision-making processes in 23 advanced democracies (Newig et al. 2021). We deliberately limited our selection to these countries to keep political and institutional contexts rather similar and in line with those conditions that inform many of the conceptual foundations of participatory (environmental) governance and the governance of long-term issues (notably by authors cited earlier such as Fung, Jacobs, Koskimaa, MacKenzie, Newig, and Smith). The dataset was developed using the case survey methodology that allows to quantitatively synthesize empirical evidence in a research field dominated by individual qualitative case study accounts (Yin and Heald 1975; Jensen and Rodgers 2001).

Every case covers a decision-making process in the public realm that is oriented towards a collectively binding decision (policy, permit, plan, etc.) on an issue relevant to the environment. Most of them embrace issues of land use, biodiversity and freshwater governance, but some are also touching upon questions around energy, agriculture, waste, traffic, and others. Cases are on average 45 months long and span from the local to the international level, the vast majority (95%) is situated on the regional (e.g. federal state) level or lower. Our data includes a wide variety of process forms, including cases with intensive but also such with minimal participation, in order to allow for meaningful assessments of the benefits of participation as compared to less or not participatory decision-making. Descriptive statistics are provided in the supplementary material (SM 3).

For every case, one or more published qualitative case studies were independently read and coded by three researchers, following a detailed codebook (Newig et al. 2013). For

further details on the selection of cases, the coding methodology, descriptive features of the database, and assessments of data quality and reliability, we refer to earlier publications on this dataset (Jager et al. 2022; Newig et al. 2023).

The variables considered in this research were coded on 5-point or 9-point Likert-type scales, ranging from 0 to 4, or from −4 to 4, respectively. Coder ratings were synthesized through arithmetic means. The EDGE-SCAPE dataset comprises the independent variables used for this research (different features of participation), control variables regarding the government agency, context factors (such as trust in government or issue salience), and dependent variables (environmental standard of the governance output). Overall, intercoder reliability (G(q,k)) lies at 0.75 and agreement (r_{WG}) at 0.72, indicating substantial data quality (James, Demaree, and Wolf 1984; Putka et al. 2008). As the original dataset did not contain data on the type and degree of long-termness of environmental problems, we performed the respective coding specifically for this research.

Specification of variables

For a technical description of all variables, please refer to the Supplementary Material (SM) and the codebook of the EDGE-SCAPE dataset (Newig et al. 2013).

Type and degree of long-termness of environmental problems

We introduced the basic concept of (two types of) long-term environmental problems in Section 2 (Conceptual Framework) above. In order to determine the long-term aspects of all cases in the EDGE-SCAPE database, two researchers independently assessed the case summaries and other text fields provided in the database. For every case (environmental decision-making process), the environmental problem at stake was coded as to (i) the type, and (ii) degree of long-termness. As outlined in Section 2, only environmental problems directly linked to the subject of the decision and with significant (potential) environmental damages likely known by the relevant actors were considered.

(i) Following our conceptualization of types of long-term environmental problems in Section 2, we defined

- *Type 1 problems as existing long-term environmental problems* that are substantial and persistent and that can only be resolved reasonably in the long term (i.e. decades);
- *Type 2 problems as potential long-term environmental problems* that may result from upcoming human action and that would then be substantial and persistent for decades.

For every case, coders decided whether the environmental problem at hand was either type 1 or type 2 or both.

(ii) To determine the degree of long-termness of environmental problems, we used a 5-point scale from 0 (short-term) to 4 (long-term). Long-term environmental problems are those that either cannot be remedied at all in the near future or only at prohibitive societal costs (see Section 2). Short-term environmental problems are those that either occur for a very limited time only or that can easily be remedied without lasting negative environmental effects. For greater nuance, environmental problems could also be classified as rather short-, medium- or rather long-term. We used anchor examples to guide coding (see Table 1).

Table 1. Anchor examples of the degree of long-termness of an environmental problem.

Degree	Short-term (0)	Rather short-term (1)	Medium-term (2)	Rather long-term (3)	Long-term (4)
Anchor example	No known case	Air Pollution Permit in Minnesota	Broome County Siting Attempt Incineration Plant	Gordon Below Franklin Dam	Yucca Mountain Nuclear Waste
Environmental problem		Issued permission to build a new industrial facility that would lead to some degree of air pollution in the neighborhood (including NO_2). In theory, the decision could be revoked and the air pollution stopped in a rather short time.	Failed decision to build a waste incinerator meant that the status quo – a landfill not considered to be a long-term solution – remained. In theory, the decision could be reversed and the landfill closed within a couple of years.	Decision to build a dam would have impaired a nature reserve with forests and rivershed ecosystems, the consequences of which would take decades to reverse.	Risk of contamination (for millennia) by building a substandard repository for highly radioactive nuclear waste.

Note: *All case descriptions (including anchor examples) are available at* https://partscout.org/en.

In case of multiple environmental problems addressed in a decision-making process, the most long-term one was coded. Non-environmental long-term problems were not considered. The complete coding guideline is provided in SM 1. With the provided qualitative case information, the type and degree of long-termness of the environmental problem at stake could be coded for 303 out of 305 cases covered in the database in total. Agreement between coders when assessing this variable is meritorious ($r_{WG} = 0.87$).

Dependent variable: environmental standard of the governance output

Our study seeks to explain the extent to which environmental problems (in particular long-term ones) are effectively addressed through publicly binding decisions made in more or less participatory processes. To this end, we coded what we term the "environmental standard of the governance output" by considering the typically written decision. As this study focused on public governance in the context of a given issue, such outputs include e.g. plans, permits, laws, policies, public-private agreements, or the like, with different degrees of legal binding. We excluded one-sided self-regulation or corporate governance initiatives. Of the 305 decision-making processes covered in the EDGE-SCAPE database, 286 produced a decision so that the governance output could be assessed.

In order to compare the environmental standard of governance outputs across a variety of processes and contexts, we draw on the notion of "regime effectiveness" (Underdal 2002). Originating in the study of international cooperative arrangements, the study of regime effectiveness provides the means to evaluate diverse governance outcomes against a common yardstick, so that results remain comparable even across diverse cases.

Accordingly, we define the environmental standard of the governance output as the degree to which the decision required an improvement (or tolerated a deterioration) of environmental conditions.[1] This was assessed moving from the "business as usual" scenario (projected trend) towards a hypothetical "optimal" (or "worst case") condition on a scale from −4 (worst case) to 4 (optimal) (Newig et al. 2013). By drawing on a hypothetical business as usual scenario, this variable allows us to capture not only the

solution but also the prevention of environmental problems (i.e. it addresses both type 1 and type 2 long-term environmental problems).

Take as an example the restoration of the river Brent in northwest London (see Eden and Tunstall 2006). The Brent River was canalized in a 2 m deep concrete-lined channel and fenced off as part of flood protection works. It had poor water quality because of polluted urban runoff, domestic sewer misconnections and minor pollution incidents. A restoration plan was developed through a participatory process. It consisted of the re-naturalization of a short reach of river, with associated improvements to ecosystem health. While this plan meant a clear improvement from the business as usual (continuation of this poor status), the improvement might not reach a hypothetical optimum, as, e.g. only a part of the river has been restored. Hence, the environmental standard of the output for this case was considered a medium improvement (with an aggregated value of 2.6).

Independent variables: dimensions of participation

Drawing on the conceptual considerations from Section 2, we included a range of independent variables that capture different dimensions of participation (Fung 2006; Newig et al. 2018). In each of these, participation can be more or less "intensive":

- The scope of non-state actor representation was measured, using multiple variables, as the *representation of civil society* (e.g. environmental NGOs, unions), *private business*, and *citizens* (i.e. non-organized individuals and ad-hoc, temporary, issue-related citizen initiatives, who represent themselves); and also, as the representation of *environmental conservation interests* and *economic development interests* in a given case (each measured on a scale from 0 to 4).
- Communication intensity was measured as the degree to which *deliberation* in the sense of a "rational" discourse among participants took place, where deliberation refers to "a process of interaction, exchange and mutual learning preceding any group decision" (Newig et al. 2013, 44), also measured on a 0–4 scale. Additionally, we assessed the extent to which processes had provisions for skilled *facilitation and knowledge integration*. This variable is a composite of two individual variables (facilitation; knowledge integration methods), each measured on a scale from 0 to 4, which were aggregated by arithmetic mean (Cronbach's alpha = 0.69).
- *Power delegation to participants* was measured by the degree to which the process design provided the possibility for participants to develop and determine the decision (Newig et al. 2013, 37), also measured on a 0–4 scale.

Context variables and control variable

Moreover, we include three variables for political trust, issue uncertainty and issue salience as context factors that were introduced in Section 2.

- *Trust in government* is measured through the arithmetic mean of two variables from the EDGE-SCAPE database, measuring distinct, but complementary dimensions of trust (Cronbach's alpha = 0.85), each measured on a scale from −4 to 4, pertaining to the situation before the start of the decision-making process. "General trust in government" assesses the degree of general public trust in the capabilities and intentions of the government and governmental actors to act in the public interest; "trust in

governmental actors" assesses the degree of trust in the specific actors involved in the decision-making process at hand (Newig et al. 2013, 21).

- *Issue uncertainty,* measured on a 0–4 scale, is defined as the "degree to which knowledge of the environmental issue and its human or ecological causes and effects is uncertain or incomplete, and therefore hinders reliable prediction of impacts" (Newig et al. 2013, 24).
- *Issue salience* captures the attention the issue at stake receives as well as the degree to which it is perceived as urgent. The variable is a composite of three individual variables (public attention inside and outside the areas affected by the issue; perceived urgency) (Newig et al. 2013, 26, 30), each measured on a scale from 0 to 4 and aggregated by arithmetic mean (Cronbach's alpha = 0.74).

Prior analyses on the EDGE-SCAPE dataset have found that characteristics of the government agency leading a public decision-making process influence both environmental outputs and the "intensity" of participation. In particular, the extent to which the choice of a particular (participatory) process design was motivated by environmental considerations proved an important control variable (Newig et al. 2023). Thus, we also include the variable "*agency's environmental rationale*" (measured on a 0–4 scale) in our analyses, which measures the degree to which the effective achievement of environmental benefits (as opposed to other social or economic benefits) was an overall rationale for the chosen process type.

Model development

We conducted a series of linear regression analyses testing our previously outlined hypotheses with the environmental standard of the output as dependent variable, including several control variables. We ran two different models for each (sub-)set to capture the different kinds of actor representation, by either interest or societal sector. Overall, our models performed well and met the criteria for linearity, multicollinearity, and normality, without undue influence of outliers (see Supplementary Material SM2). However, as the models showed signs of heteroscedasticity, we computed robust standard errors.

Results & discussion

Descriptive findings on the long-termness of environmental problems

Figure 2 depicts the distribution of long-termness across the whole dataset (arithmetic mean: 2.49, median: 2.5). While long-termness is measured on a scale from 0 to 4, half-numbers occur when averaging across differing values coded by the two researchers. As coders more often agreed on the same value, whole numbers predominate.

While the distribution roughly follows a normal distribution, it is striking that we find virtually no issues that are without any medium or long-term implications (values 0 and 0.5). This echoes the conclusion by MacKenzie (2021b, 1) that "There is no such thing as a short-term issue."

To characterize decision-making processes regarding long-term as opposed to short-term environmental issues, we analyzed mean values of all variables of interest in our analysis (Table 2). To this end, we partitioned our case set along the median both into

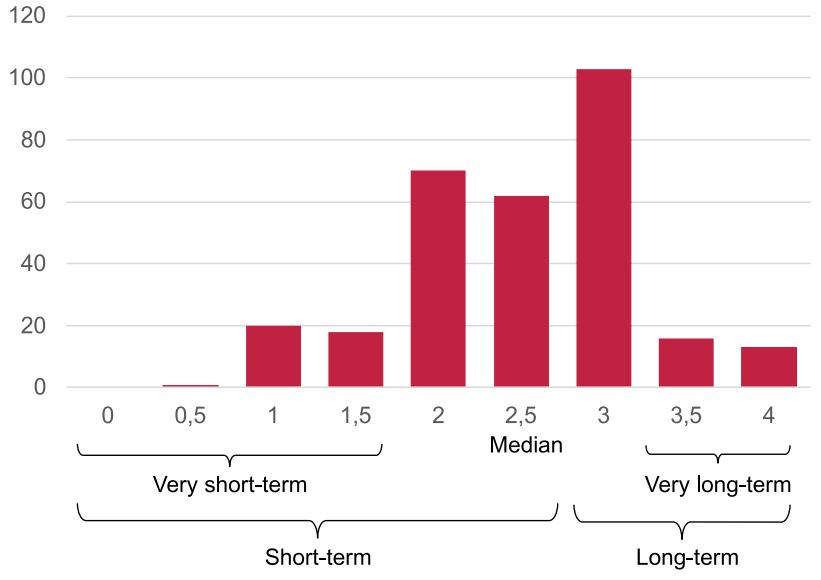

Figure 2. Distribution of long-termness in the dataset of 303 decision-making processes. The horizontal access depicts the degree of long-termness and the vertical access the number of cases.

Table 2. Differences in mean variables values between cases with very short-term, short-term, long-term, and very long-term environmental problems.

Variable	Scale	Very short-term (VS)	Short-term (S)	Long-term (L)	Very long-term (VL)	Difference L – S	Difference VL – VS
Range in long-termness	0 … 4	0.0–1.5	0.0–2.5	3.0–4.0	3.5–4.0		
N		39	172	131	29		
Representation env. conservation	0 … 4	1.15	1.49	1.51	1.47	0.03	0.33
Representation econ. developm.	0 … 4	1.33	1.29	1.42	1.45	0.12	0.12
Representation citizens	0 … 4	0.84	1.03	1.13	1.01	0.09	0.17
Representation civil society	0 … 4	0.88	1.01	1.15	1.30	0.13	0.43
Representation private business	0 … 4	1.03	1.09	0.95	1.08	−0.14	0.06
Deliberation	0 … 4	1.82	1.87	1.57	1.52	−0.31	−0.30
Facilitation & knowledge integrat.	0 … 4	1.39	1.57	1.18	1.16	−0.39	−0.24
Power delegation to participants	0 … 4	1.82	2.01	1.77	1.77	−0.23	−0.04
Trust in government	−4 … 4	−0.13	−0.32	−0.49	−0.81	−0.17	−0.68
Issue uncertainty	0 … 4	1.38	1.55	1.61	2.12	0.05	0.74
Issue salience	0 … 4	1.50	1.53	1.73	2.09	0.20	0.58
Agency's environmental rationale	0 … 4	1.14	1.30	1.26	1.34	−0.04	0.20
Type 1 environmental problem	0;1	0.59	0.64	0.47	0.50	−0.17	−0.09
Process duration in days	…	961.49	1142.45	1707.77	1764.22	564.33	802.73
Environmental governance output	−4 … 4	0.77	0.96	0.70	1.07	−0.26	0.30

"short-term" (≤2.5) and "long-term" cases (>2.5). This yields subsets of 172 and 131 cases, respectively. To also characterize the extreme ends of the spectrum of long-termness, we also considered the 39 cases with "very short-term" problems (long-termness ≤ 1.5) and those 29 cases with "very long-term" problems (≥ 3.5). This partitioning is also illustrated in Figure 2.

When we compare the mean values of relevant variables of decision-making processes that are characterized (very) long-term as opposed to (very) short-term environmental problems, we can identify moderate differences between the two sets of cases:

- *Sector and interest representation:* The representation of interests and societal sectors tends to be somewhat higher for (very) long-term than for (very) short-term problem settings (except for the private business sector), but the differences are not very pronounced.
- *Communication intensity and power delegation:* To our surprise, we find that variables related to communication intensity (i.e. deliberation as well as facilitation and knowledge integration) are more pronounced in cases that deal with short-term as opposed to long-term environmental problems. Our expectation would have been that for long-term issues, being more complex and prone to uncertainties, policy makers would choose processes with stronger deliberation, facilitation and knowledge integration. Power delegation to participants is slightly lower in long-term problem settings, perhaps because they might be less suitable for decision-making by non-experts.
- *Context:* Trust in government is slightly negative across the board, and even lower in cases that deal with long-term environmental issues compared to short-term ones. Participants therefore seem to show some skepticism when they enter the decision-making process, and we would expect this to have rather negative consequences when not mitigated during the process. In line with our expectations, issue uncertainty correlates with the degree of long-termness. Contrary to expectation, issue salience is higher for long-term than for short-term environmental problems. We expected that long-term issues tend to be lower in immediate salience and therefore more challenging to address politically. The higher salience might be explained with the higher number of type-2-cases, in which, e.g. the siting of a large facility or infrastructure implies long-termness while still facing a high immediate salience. Another, perhaps unsurprising, finding is that decision-making processes that deal with long-term environmental issues take roughly two years longer than those that do not.
- The *environmental standard of the output* is – on average – slightly positive across the board, and highest in very long-term settings, with no clear patterns for the lower degrees of long-termness. This seem to imply that in general, public decision-making processes do not perform worse for long-term than for short-term environmental problems as regards the decisions' environmental standards.

How participation fosters the solution or prevention of (long-term) environmental problems

To assess our hypotheses, we conduct linear regression analyses. To this end, the full set is median-partitioned into two subsets ("short term", "long term"), with results depicted in Figure 3; the numerical results for the full set and the two sub-sets are shown in Table 3.

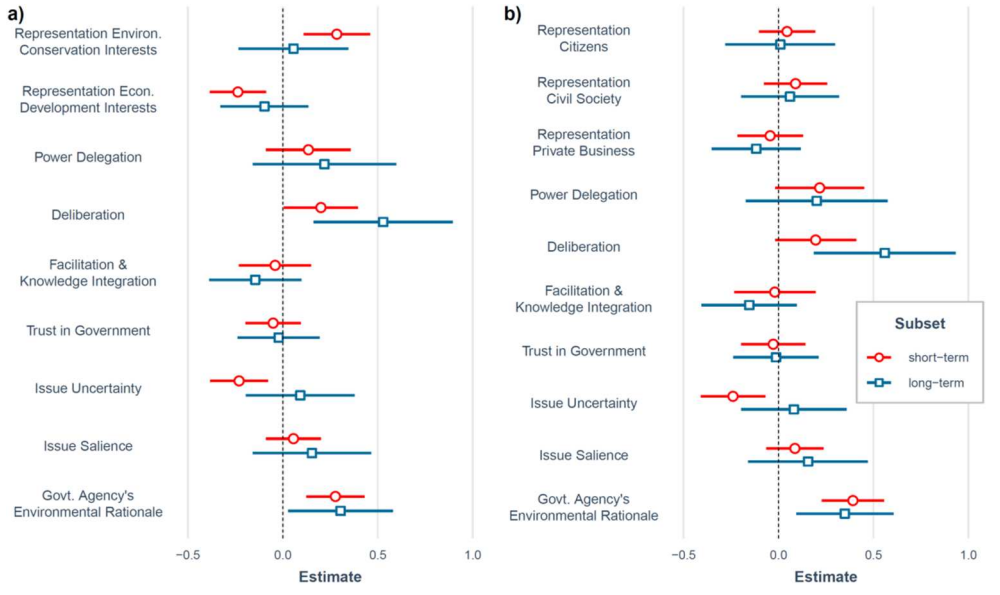

Figure 3. Regression results on the dependent variable "Environmental standard of the governance output". Points show effect sizes (standardized beta values), while the error bars display 95% confidence intervals. Error bars crossing the zero-line signal a non-significant effect. Red: cases with short-term environmental problems; blue: cases with long-term environmental problems. **3a:** Stakeholder representation by *interests* (environmental conservation, economic development). **3b:** Stakeholder representation by *societal sector* (citizens, civil society, private business).

All of the conducted regressions show a considerably high explained variance (adjusted R^2 between .44 and .51), indicating a suitable selection of variables. As a first striking result, in the full dataset, we see that the *degree of long-termness of the environmental problem* does not affect the environmental standard of the governance output (i.e. how well the environmental problem at hand is addressed). Contrary to our expectations, the mere *representation of societal sectors* – citizens, civil society (including environmental NGOs), and private business – shows no statistically significant effects across the board, with only private business representation showing a small negative effect on addressing long-term environmental problems. Confirming earlier analyses (Jager et al. 2020; Newig et al. 2023), we find that *power delegation to participants* is positively associated with anticipated strong environmental outcomes (even though not statistically significant in all models). To our surprise, *facilitation and knowledge integration*, as well as the context factors of *trust in government* and *issue salience*, are not associated with the solution or prevention of long-term environmental problems in a statistically significant way, which is, however, also true for short-term environmental problems and the full dataset. Noticeably, the factors we theorized to be somehow associated with *democratic myopia* (i.e. citizen representation and trust in government), have no significant effect on the environmental standard of the output, neither in long-term nor in short-term problem settings. Finally, the control variable "*governmental agency's environmental rationale*" shows high and significant effects across all models, confirming earlier analyses.

Table 3. Regression results on the dependent variable "Environmental standard of the governance output".

	Full 1	Full 2	Short 1	Short 2	Long 1	Long 2
Representation environm. conservation	0.19 *		0.28 **		0.06	
	(0.07)		(0.09)		(0.15)	
Representation economic development	−0.18 **		−0.24 **		−0.10	
	(0.06)		(0.07)		(0.12)	
Representation citizens		0.03		0.05		0.01
		(0.07)		(0.07)		(0.15)
Representation civil society		0.08		0.09		0.06
		(0.07)		(0.08)		(0.13)
Representation private business		−0.06		−0.04		−0.12
		(0.07)		(0.09)		(0.12)
Power delegation to participants	0.18 *	0.21 *	0.13	0.22 *	0.22	0.20
	(0.10)	(0.10)	(0.11)	(0.12)	(0.19)	(0.19)
Deliberation	0.31 **	0.33 **	0.20 *	0.20	0.53 **	0.56 **
	(0.10)	(0.10)	(0.10)	(0.11)	(0.18)	(0.19)
Facilitation & Knowledge integration	−0.07	−0.05	−0.04	−0.02	−0.15	−0.15
	(0.08)	(0.08)	(0.10)	(0.11)	(0.12)	(0.13)
Trust in government	−0.04	−0.02	−0.05	−0.03	−0.02	−0.01
	(0.06)	(0.07)	(0.07)	(0.09)	(0.11)	(0.11)
Issue uncertainty	−0.08	−0.10	−0.23 **	−0.24 **	0.09	0.08
	(0.07)	(0.08)	(0.08)	(0.09)	(0.14)	(0.14)
Issue salience	0.10	0.11	0.06	0.09	0.15	0.16
	(0.08)	(0.08)	(0.07)	(0.08)	(0.16)	(0.16)
Gov. agency's environmental rationale	0.28 ***	0.36 ***	0.28 ***	0.39 ***	0.30 *	0.35 **
	(0.07)	(0.07)	(0.08)	(0.08)	(0.14)	(0.13)
Type1 environmental problem	0.62 ***	0.67 ***	0.56 **	0.55 **	0.69 **	0.77 **
	(0.13)	(0.14)	(0.17)	(0.18)	(0.26)	(0.24)
Degree of long-termness	0.02	0.02				
	(0.07)	(0.07)				
(Intercept)	0.51 ***	0.47 ***	0.58 ***	0.59 ***	0.42 *	0.38 *
	(0.11)	(0.11)	(0.14)	(0.15)	(0.19)	(0.18)
N	269	269	149	149	120	120
R^2	0.49	0.47	0.54	0.48	0.49	0.50
Adjusted R^2	0.46	0.44	0.51	0.44	0.45	0.44
F-value	22.05***	18.62***	16.3***	11.55***	10.6***	9.61***
AIC	758.24	770.24	377.87	398.33	375.20	376.84

All continuous predictors are mean-centered and scaled by 1 standard deviation. The dependent variable is in its original units. *** $p < 0.001$; ** $p < 0.01$; * $p < 0.05$. Standard errors (in brackets) are heteroskedasticity robust.

We show standardized beta values (with standard errors in brackets). Short: cases with short-term environmental problems; Long: cases with long-term environmental problems. Model 1: Stakeholder representation by environmental interests (environmental conservation, economic development). Model 2: Stakeholder representation by societal sector (citizens, civil society, private business).

Next to these similarities between the sub-sets, the analyses point to remarkable differences between the regressions on cases with long-term versus short-term environmental problems:

- *Representation of interests:* While for long-term issues, the representation of either environmental conservation or pro-economic development interests has virtually no effect on the environmental standard of the governance output, these variables show a pronounced effect in the short-term set: Here, representation of environmental conservation interests is clearly and significantly positive, while the representation of pro-economic development interests is clearly and significantly negative.
- *Communication intensity:* Most strikingly, the intensity of deliberative communication shows a pronounced and significant effect on anticipated environmental

outcomes – in the set of long-term cases. While this effect is still visible in the short-term cases, it is much smaller and not statistically significant.
- *Issue uncertainty:* Only for the short-term cases, issue uncertainty has a clearly and significantly negative effect, while this is negligible for all other regression models.
- *Type of environmental problem:* A strong predictor in all models is the type of environmental problem (i.e. existing (type 1) or anticipated potential (type 2) environmental problem). Type 1 is positively associated with environmental outcomes, and more so in long-term than in short-term cases.

These findings demonstrate that participation is effective across all contexts, significantly contributing to improved environmental outcomes. It helps to address both long-term and short-term environmental problems. However, there is a distinct contrast in how participation functions in addressing long-term versus short-term environmental issues. In cases of long-term problems, the intensity of deliberative communication emerges as the primary determinant of the effectiveness in solving or preventing environmental problems. By contrast, in short-term settings, the presence of pro-environmental interests and the absence of pro-economic development interests predominantly shape the environmental standard of the output. This suggests that for resolving short-term issues, it is "politics" that dominate the game: environment-related interests determine the outcome. To resolve long-term issues, however, a different logic prevails: Here, it is intensive and reasoned dialogue – deliberation – that counts, not interests. While these findings support the assumptions we laid out in our conceptual framework and mirror studies on the effects of negotiation (van Treek et al. 2023) and deliberation (MacKenzie and Caluwaerts 2021), we are surprised to find them so clearly evidenced in our data.

Regarding the role of context, it is interesting to note that the existence of uncertainties has a pronounced negative effect on resolving short-term environmental issues. Processes targeting long-term environmental problems, however, appear to be well prepared to deal with uncertainty: While the level of uncertainty is generally higher than for short-term issues, it does not affect problem solving, contrary to our expectations. Moreover, we find that type 1 (i.e. existing), as opposed to type 2 (i.e. potential) environmental problems most strongly predict better environmental outcomes for long-term environmental issues. While this confirms the importance of a nuanced measurement approach of environmental problems, this may simply be due to the high share of permission procedures in type 2 cases, which tend to result in negative environmental outcomes when permissions are granted.

Reflections on the methodology

As a limitation of our research, coding the long-termness of an environmental problem entails methodological pitfalls. Coders assessed the most long-term major environmental problem of each environmental decision-making process (see SM 1). We did not, however, assess the existence of further short-term issues in a given case. This suggests that we likely underestimate actual differences between long-term and short-term case settings.

Moreover, the environmental standard of the governance output is a proxy for the solution or prevention of the environmental problem. As our cases are decision-making

processes, the environmental standard is estimated based on a thorough assessment of the decision made, including its likely impact on the environment, but not its actual implementation. Whether or not the respective environmental problem was actually prevented or solved in the long-term, we do not know. As in all governance processes – participatory or other – the risk of an implementation gap remains, even though participation may reduce this gap (Newig et al. 2018). In this regard, we might overestimate the effect of participatory governance on the prevention or solution of long-term environmental problems.

Conclusion

Offering the first comprehensive conceptual framework and systematic large-N empirical analysis on the role of participatory governance in addressing long-term environmental problems, our study produces several relevant, and partly unexpected, insights. Drawing on data from a case survey of 303 public decision-making processes on environmental issues, our results show that participatory governance indeed helps to solve and prevent long-term environmental problems – but in different ways than it addresses short-term environmental problems. Consequently, our study substantiates the assertions made by proponents advocating for participatory processes to address long-term problems (Boston, Bagnall, and Barry 2019). However, we emphasize the necessity of tailored process designs that consider the particularities of decision-making for long-term issues.

Contrary to our expectations based on the scholarly literature, the representation of citizens and societal sectors, facilitation and knowledge integration, power delegation to participants, trust in government, and issue salience, do not make a difference in how well (participatory) governance processes can specifically address long-term environmental problems. Though not measured directly, there is no clear indication that democratic myopia is particularly strong in settings of long-term environmental problems. Future qualitative comparative case-study research might help to explain these (non-)results.

Our most striking result is the role of deliberation as opposed to interest representation in processes that address long-term environmental problems: While the environmental stance of represented actors affects the environmental standard of the governance output in short-term problem settings, we do not observe a similar influence in cases of long-term problems. Here, the intensity of deliberation is the most important predictor of a high environmental standard, an influence that we do not see in short-term issue settings. To put it more bluntly, it is deliberation and not so much representation that appears as decisive for preventing and solving long-term environmental problems.

The decision-making processes covered in our case survey were conducted prior to the most recent wave of democratic innovations research, which brought about a deliberative turn (Willis, Curato, and Smith 2022). Hence, recent initiatives explicitly geared towards fostering a long-term orientation among participants, such as deliberative mini publics on climate change and governance processes employing future design techniques, are yet to be included in our dataset (Kulha et al. 2021). Even more so, we are surprised by the clarity of our results, which encourage this line of research, and call for further test, adaptation and validation of our conceptual framework to encompass emerging

cases in the future. With our study, we contribute a perspective of participation and deliberation to the literature on long-term governance, enriching existing literature predominantly focused on institutionalized approaches to the political consideration of the long-term future (Boston 2017; Smith 2020; Rose 2024).

Note

1. The EDGE-SCAPE database contains separately coded variables capturing both an ecocentric perspective on conservation and a more anthropocentric perspective of natural resource protection and sustainable resource use. As both dimensions were highly correlated ($r = .76$, $p<.001$), we combined them into a single scale (Cronbach's alpha = .94).

Disclosure statement

No potential conflict of interest was reported by the author(s).

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Data availability statement

The EDGE-SCAPE dataset is available at https://doi.org/10.7802/2134 (Newig et al. 2021). The codes for type and degree of long-termness of environmental problems are available from the authors upon request.

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References

Bäckstrand, Karin, Jamil Khan, Annica Kronsell, and Eva Lovbrand. 2010. "The Promise of New Modes of Environmental Governance." In *Environmental Politics and Deliberative Democracy: Examining the Promise of New Modes of Governance*, edited by Karin Bäckstrand, Jamil Kahn, Annica Kronsell, Eva Lövbrand, and Karin Backstrand, 3–27. Cheltenham: Edward Elgar.

Blühdorn, Ingolfur, and Michael Deflorian. 2019. "The Collaborative Management of Sustained Unsustainability: On the Performance of Participatory Forms of Environmental Governance." *Sustainability* 11 (4): 1189. https://doi.org/10.3390/su11041189.

Boston, Jonathan. 2017. *Governing for the Future: Designing Democratic Institutions for a Better Tomorrow*. Bingley, UK: Emerald.

Boston, Jonathan. 2021. "Assessing the Options for Combatting Democratic Myopia and Safeguarding Long-Term Interests." *Futures* 125:102668. https://doi.org/10.1016/j.futures.2020.102668.

Boston, Jonathan, David Bagnall, and Anna Barry. 2019. *Foresight, Insight and Oversight: Enhancing Long-Term Governance through Better Parliamentary Scrutiny*. Wellington: Victoria University of Wellington.

Busemeyer, Marius R. 2024. "Who Cares for the Future? Exploring Public Attitudes towards the Needs of Future Generations in Germany." *Journal of European Public Policy* 31 (3): 680–705. https://doi.org/10.1080/13501763.2023.2165697.

Caluwaerts, Didier, and Daan Vermassen. 2023. "Democratic Institutions and Future Generations." In *Democracy and the Future: Future-Regarding Governance in Democratic Systems*, edited by Michael K. MacKenzie, Majia Setälä, and Simo Kyllönnen, 173–192. Edinburgh: Edingburgh University Press.

Campos, Inês, André Vizinho, Carlos Coelho, Fátima Alves, Mónica Truninger, Carla Pereira, Filipe Duarte Santos, and Gil Penha Lopes. 2016. "Participation, Scenarios and Pathways in Long-Term Planning for Climate Change Adaptation." *Planning Theory & Practice* 17 (4): 537–556. https://doi.org/10.1080/14649357.2016.1215511.

Christensen, Henrik Serup, and Lauri Rapeli. 2021. "Immediate Rewards or Delayed Gratification? A Conjoint Survey Experiment of the Public's Policy Preferences." *Policy Sciences* 54 (1): 63–94. https://doi.org/10.1007/s11077-020-09408-w.

Cupps, Stephen D. 1977. "Emerging Problems of Citizen Participation." *Public Administration Review* 37 (5): 478–487. https://doi.org/10.2307/974695

Eden, Sally, and Sylvia Tunstall. 2006. "Ecological versus Social Restoration? How Urban River Restoration Challenges but Also Fails to Challenge the Science – Policy Nexus in the United Kingdom." *Environment and Planning. C, Government & Policy* 24 (5): 661–680. https://doi.org/10.1068/c0608j.

Fairbrother, Malcolm, Gustaf Arrhenius, Krister Bykvist, and Tim Campbell. 2021. "Governing for Future Generations: How Political Trust Shapes Attitudes towards Climate and Debt Policies." *Frontiers in Political Science* 3: 656053. https://doi.org/10.3389/fpos.2021.656053.

Few, Roger, Katrina Brown, and Emma L. Tompkins. 2007. "Public Participation and Climate Change Adaptation: Avoiding the Illusion of Inclusion." *Climate Policy* 7 (1): 46–59. https://doi.org/10.1080/14693062.2007.9685637.

Fung, Archon. 2006. "Varieties of Participation in Complex Governance." *Public Administration Review* 66 (s1): 66–75. https://doi.org/10.1111/j.1540-6210.2006.00667.x.

Healy, Andrew, and Neil Malhotra. 2009. "Myopic Voters and Natural Disaster Policy." *The American Political Science Review* 103 (3): 387–406. https://doi.org/10.1017/S0003055409990104.

Jacobs, Alan M. 2016. "Policy Making for the Long Term in Advanced Democracies." *Annual Review of Political Science* 19 (1): 433–454. https://doi.org/10.1146/annurev-polisci-110813-034103.

Jacobs, Alan M., and J. Scott Matthews. 2012. "Why Do Citizens Discount the Future? Public Opinion and the Timing of Policy Consequences." *British Journal of Political Science* 42 (4): 903–935. https://doi.org/10.1017/S0007123412000117.

Jacobs, Alan M., and J. Scott Matthews. 2017. "Policy Attitudes in Institutional Context: Rules, Uncertainty, and the Mass Politics of Public Investment." *American Journal of Political Science* 61 (1): 194–207. https://doi.org/10.1111/ajps.12209.

Jager, Nicolas W., Jens Newig, Edward Challies, and Elisa Kochskämper. 2020. "Pathways to Implementation: Evidence on How Participation in Environmental Governance Impacts on Environmental Outcomes." *Journal of Public Administration Research and Theory* 30 (3): 383–399. https://doi.org/10.1093/jopart/muz034.

Jager, Nicolas W., Jens Newig, Edward Challies, Elisa Kochskämper, and Henrik von Wehrden. 2022. "Case Study Meta-analysis in the Social Sciences. Insights on Data Quality and Reliability from a Large-N Case Survey." *Research Synthesis Methods* 13 (1): 12–27. https://doi.org/10.1002/jrsm.1514.

James, Lawrence R., Robert G. Demaree, and Gerrit Wolf. 1984. "Estimating Within-Group Interrater Reliability with and without Response Bias." *The Journal of Applied Psychology* 69 (1): 85–98. https://doi.org/10.1037/0021-9010.69.1.85.

Jensen, Jason L., and Robert Rodgers. 2001. "Cumulating the Intellectual Gold of Case Study Research." *Public Administration Review* 61 (2): 235–246. https://doi.org/10.1111/0033-3352.00025.

Koskimaa, Vesa, and Lauri Rapeli. 2025. *Advancing Future-Orientation in Policymaking: Institutions, Individuals and Risks: Routledge Research on Social and Political Elites Series*. 1st ed. Oxford: Taylor & Francis Group. https://permalink.obvsg.at/.

Koskimaa, Vesa, Lauri Rapeli, and Juha Hiedanpää. 2021. "Governing through Strategies: How Does Finland Sustain a Future-Oriented Environmental Policy for the Long Term?" *Futures* 125:102667. https://doi.org/10.1016/j.futures.2020.102667.

Kulha, Katariina, Mikko Leino, Maija Setälä, Maija Jäske, and Staffan Himmelroos. 2021. "For the Sake of the Future: Can Democratic Deliberation Help Thinking and Caring about Future Generations?" *Sustainability* 13 (10): 5487. https://doi.org/10.3390/su13105487.

Lawrence, Peter. 2022. "Justifying Representation of Future Generations and Nature: Contradictory or Mutually Supporting Values?" *Transnational Environmental Law* 11 (3): 553–579. https://doi.org/10.1017/S2047102522000176.

Lemos, Maria Carmen, and Arun Agrawal. 2006. "Environmental Governance." *Annual Review of Environment and Resources* 31 (1): 297–325. https://doi.org/10.1146/annurev.energy.31.042605.135621.

MacKenzie, Michael K. 2016. "Institutional Design and Sources of Short-Termism." In *Institutions for Future Generations*, edited by Inigo Gonzalez-Ricoy and Axel Gosseries, 24–45. Oxford: Oxford University Press.

MacKenzie, Michael K. 2021a. *Future Publics: Democracy, Deliberation, and Future-Regarding Collective Action*. New York, NY: Oxford University Press.

MacKenzie, Michael K. 2021b. "There Is No Such Thing as a Short-Term Issue." *Futures* 125:102652. https://doi.org/10.1016/j.futures.2020.102652.

MacKenzie, Michael K., and Didier Caluwaerts. 2021. "Paying for the Future: Deliberation and Support for Climate Action Policies." *Journal of Environmental Policy & Planning* 23 (3): 317–331. https://doi.org/10.1080/1523908X.2021.1883424.

Mathis, Okka Lou, Michael Rose, Jens Newig, and Steffen Bauer. 2023. "Toward the Sustainability State? Conceptualizing National Sustainability Institutions and Their Impact on Policy-Making." *Environmental Policy and Governance* 33 (3): 313–324. https://doi.org/10.1002/eet.2032.

Meuleman, Louis, and Jan in 't Veld. 2009. *Sustainable Development and the Governance of Long-Term Decisions*. Den Haag: RMNO.

Nair, Sreeja, and Michael Howlett. 2017. "Policy Myopia as a Source of Policy Failure: Adaptation and Policy Learning under Deep Uncertainty." *Policy & Politics* 45 (1): 103–118. https://doi.org/10.1332/030557316X14788776017743.

Newig, Jens, Ana Adzersen, Edward Challies, Oliver Fritsch, and Nicolas W. Jager. 2013. "Comparative Analysis of Public Environmental Decision-Making Processes: A Variable-Based Analytical Scheme." INFU Discussion Paper 37. https://nbn-resolving.org/urn:nbn:de:0168-ssoar-333641.

Newig, Jens, Edward Challies, and Nicolas W. Jager. 2019. "Democratic Innovation and Environmental Governance." In *Handbook of Democratic Innovation and Governance*, edited by Stephen Elstub and Oliver Escobar, 324–338. Northampton, MA: Edward Elgar Publishing.

Newig, Jens, Edward Challies, Nicolas W. Jager, Elisa Kochskaemper, and Ana Adzersen. 2018. "The Environmental Performance of Participatory and Collaborative Governance: A Framework of Causal Mechanisms." *Policy Studies Journal* 46 (2): 269–297. https://doi.org/10.1111/psj.12209.

Newig, Jens, Nicolas W. Jager, Edward Challies, and Elisa Kochskämper. 2021. "SCAPE Database on Participatory and Non-participatory Environmental Decision-Making: 305 Coded Cases of Public Environmental Decision-Making from North America, Europe and Australasia". https://doi.org/10.7802/2134.

Newig, Jens, Nicolas W. Jager, Edward Challies, and Elisa Kochskämper. 2023. "Does Stakeholder Participation Improve Environmental Governance? Evidence from a Meta-analysis of 305 Case Studies." *Global Environmental Change* 82:102705. https://doi.org/10.1016/j.gloenvcha.2023.102705.

Niemeyer, Simon, and Julia Jennstål. 2016. "The Deliberative Democratic Inclusion of Future Generations." In *Institutions for Future Generations*, edited by Iñigo González-Ricoy and Axel Gosseries, 247–265. 1st ed. Oxford, New York: Oxford University Press.

Niestroy, Ingeborg, Elisabeth Hege, Elizabeth Dirth, and Ruben Zondervan. 2019. *Europe's Approach to Implementing the Sustainable Development Goals: Good Practices and the Way Forward*. Brussels: European Parliament.

OECD. 2018. *Policy Coherence for Sustainable Development 2018*. OECD.

Peters, Birgit, and Eva Julia Lohse. 2023. *Sustainability through Participation? Perspectives from National, European and International Law*. Leiden, Boston: Brill/Nijhoff.

Pot, Wieke D., Art Dewulf, and Catrien J.A.M. Termeer. 2022. "Governing Long-Term Policy Problems: Dilemmas and Strategies at a Dutch Water Authority." *Public Management Review* 24 (2): 255–278. https://doi.org/10.1080/14719037.2020.1817531.

Pot, Wieke, Jorren Scherpenisse, and Paul t'Hart. 2023. "Robust Governance for the Long Term and the Heat of the Moment: Temporal Strategies for Coping with Dual Crises." *Public Administration* 101 (1): 221–235. https://doi.org/10.1111/padm.12872.

Putka, Dan J., Huy Le, Rodney A. McCloy, and Tirso Diaz. 2008. "Ill-Structured Measurement Designs in Organizational Research: Implications for Estimating Interrater Reliability." *The Journal of Applied Psychology* 93 (5): 959–981. https://doi.org/10.1037/0021-9010.93.5.959.

Rapeli, Lauri. 2023. "Voter Myopia Reassessed." In *Democracy and the Future: Future-Regarding Governance in Democratic Systems*, edited by Michael K. MacKenzie, Maija Setälä, and Simo Kyllönnen, 215–231. Edingburgh: Edingburgh University Press.

Rose, Michael. 2024. "Can We Represent Future Generations in Myopic Democracies? – Analyzing the Design, Feasibility and Viability of Institutional Guardians of Future Generations." *Policy Studies*, 1–21. https://doi.org/10.1080/01442872.2024.2444632.

Rose, Michael. 2025. "From the Environmental State to the Sustainability State? Conceptualization, Indicators, and Examples." *Sustainability: Science, Practice and Policy* 21 (1): 2463188. https://doi.org/10.1080/15487733.2025.2463188.

Sachs, Jeffrey D., Guido Schmidt-Traub, Mariana Mazzucato, Dirk Messner, Nebojsa Nakicenovic, and Johan Rockström. 2019. "Six Transformations to Achieve the Sustainable Development Goals." *Nature Sustainability* 2 (9): 805–814. https://doi.org/10.1038/s41893-019-0352-9.

Scheer, Dirk, Sandra Venghaus, Stefania Sardo, Sascha Stark, Sophie Kuppler, Michael W. Schmidt, and Carsten Hoyer-Klick. 2025. "No Easy Way Out: Towards a Framework Concept of Long-Term Governance." *Energy, Sustainability and Society* 15 (1): 9. https://doi.org/10.1186/s13705-025-00513-3.

Scott, Tyler. 2015. "Does Collaboration Make Any Difference? Linking Collaborative Governance to Environmental Outcomes." *Journal of Policy Analysis and Management* 34 (3): 537–566. https://doi.org/10.1002/pam.21836.

Setälä, Maija. 2022. "Inclusion, Participation and Future Generations." In *The Routledge Handbook of Democracy and Sustainability*, edited by Basil Bornemann, Henrike Knappe, and Patrizia Nanz, 69–82. London: Routledge.

Setälä, Maija. 2025. "Inclusive Deliberation for Future-Regarding Governance: Potentials and Pitfalls." *Policy Studies*, 1–19. https://doi.org/10.1080/01442872.2025.2454488.

Sheffer, Lior, Peter John Loewen, and Jack Lucas. 2024. "Long-Term Policymaking and Politicians' Beliefs about Voters: Evidence from a 3-Year Panel Study of Politicians." *Governance* 37 (2): 395–410. https://doi.org/10.1111/gove.12768.

Siebenhüner, Bernd, Marlen Arnold, Klaus Eisenack, and Klaus Jacob. 2013. "Long-Term Governance for Social-Ecological Change: Setting the Scene." In *Long-Term Governance for Social-Ecological Change*, edited by Bernd Siebenhüner, Marlen Arnold, Klaus Eisenack, and Klaus Jacob, 1–25. Environmental politics / Routledge research in environmental politics v. 21. London, New York: Routledge.

Smith, Graham. 2020. "Enhancing the Legitimacy of Offices for Future Generations: The Case for Public Participation." *Political Studies* 68 (4): 996–1013. https://doi.org/10.1177/0032321719885100.

Smith, Graham. 2021. *Can Democracy Safeguard the Future? Democratic Futures Series*. Cambridge: Polity.

Smith, Graham. 2023. "Democratic Design for Future-Regarding Institutions." In *Democracy and the Future: Future-Regarding Governance in Democratic Systems*, edited by Michael K. MacKenzie, Maija Setälä, and Simo Kyllönnen, 157–172. Edingburgh: Edingburg University Press.

Sprinz, Detlef F. 2009. "Long-Term Environmental Policy: Definition, Knowledge, Future Research." *Global Environmental Politics* 9 (3): 1–8. https://doi.org/10.1162/glep.2009.9.3.1.

Sprinz, Detlef F. 2023. "The Challenge of Long-Term Environmental Policy." In *Routledge Handbook of Environmental Policy*, edited by Helge Jörgens, Christoph Knill, and Yves Steinebach, 305–314. London: Routledge.

Sterling, Eleanor J., Erin Betley, Amanda Sigouin, Andres Gomez, Anne Toomey, Georgina Cullman, Cynthia Malone, et al. 2017. "Assessing the Evidence for Stakeholder Engagement in Biodiversity Conservation." *Biological Conservation* 209:159–171. https://doi.org/10.1016/j.biocon.2017.02.008.

Steurer, Reinhard. 2010. "Sustainable Development as a Governance Reform Agenda: Principles and Challenges." In *Nachhaltigkeit Regieren: Eine Bilanz zu Governance-Prinzipien und*

-*Praktiken*, edited by Reinhard Steurer and Rita Trattnigg, 22–52. Politische Ökologie. München: Oekom-Verl.

Underdal, Arild. 2002. "One Question, Two Answers." In *Environmental Regime Effectiveness: Confronting Theory with Evidence*, edited by Edward L. Miles, Steinar Andresen, Elaine M. Carlin, Jon B. Skjærseth, Arild Underdal, and Jørgen Wettestad, 3–46. Cambridge, Mass: MIT Press.

van Treek, Marie, Johann M. Majer, Hong Zhang, Kai Zhang, and Roman Trötschel. 2023. "Present Generation's Negotiators Realize Their Interests at the Cost of Future Generations." *Journal of Environmental Psychology* 91:102126. https://doi.org/10.1016/j.jenvp.2023.102126.

Warren, Mark E. 2023. "Three Challenges for Long-Term Decision-Making in Democracies: Boundaries, Knowledge and Incentives." In *Democracy and the Future: Future-Regarding Governance in Democratic Systems*, edited by Michael K. MacKenzie, Maija Setälä, and Simo Kyllönnen, 19–37. Edingburgh: Edingburgh University Press.

Willis, Rebecca, Nicole Curato, and Graham Smith. 2022. "Deliberative Democracy and the Climate Crisis." *WIREs Climate Change* 13 (2): e759. https://doi.org/10.1002/wcc.759.

Yin, Robert K., and Karen A. Heald. 1975. "Using the Case Survey Method to Analyze Policy Studies." *Administrative Science Quarterly* 20 (3): 371. https://doi.org/10.2307/2391997.