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The impact of participatory interventions on pro-social behaviour in environmental and natural resource management Evidence from the lab and the field¹

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Abstract: Unresolved social dilemmas that inhibit pro-social behaviour are at the root of most pressing global environmental issues such as climate change, ecological degradation and water scarcity. Meeting these challenges through purely externally imposed ('top-down') solutions can be ineffective or even counterproductive. It has been suggested, therefore, that participation of the relevant concerned, affected and interested actors (i.e. the stakeholders) in the environmental policy process is critical to attaining socially desirable outcomes. Yet, the experimental evidence regarding the impacts of participatory interventions on pro-social behaviour is still insufficient and scattered. In this chapter, we contribute to bridging this gap. We review lab and field experimental and quasi-experimental evidence on the potential of participatory interventions to trigger pro-social behaviour in the context of natural resources and environmental management. In sum, the results of the reviewed studies suggest that participatory interventions have the potential to influence actors' institutional context, understandings, beliefs, emotions and preferences, thereby fostering pro-social behaviour. Ultimately, outcomes would depend on the design of the participatory process and the methods applied to facilitate stakeholders' interactions. Particularly adequate to foster pro-social behaviour in collective action challenges seem to be interventions aimed at inducing stakeholders to deliberate on their (individual and collective) actions and facilitating the collective development and implementation of concrete solutions for stakeholders' social dilemmas (i.e. collective-action challenges). Solely inducing problem awareness or consulting stakeholders about their preferred (policy) options seems not enough to trigger and sustain pro-social behaviour.

Keywords: Pro-social behaviour; Social dilemmas; Participatory processes; Environmental policy; Behavioural and institutional economics

JEL classification codes: C90, D79, D91, Q56, Q57

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Introduction

Undesired outcomes such as water and air pollution, biodiversity loss, and global warming are the result of unresolved social dilemmas or collective action challenges; in other words, they are the result of unresolved tensions between narrowly defined individual interests and desirable group and societal outcomes (Muradian and Cardenas 2015; Dasgupta 2021). Pro-social behaviour, which encompasses the broad range of actions intended to benefit one or more people other than oneself (Batson and Powell 2003; Lindenberg 2006), can contribute to attaining socially desirable outcomes in social dilemma situations. It can be induced by, e.g., changing economic incentives, thus harnessing self-regarding preferences, by influencing mental models and beliefs, or by activating or strengthening other-regarding preferences (Ostrom 2000, 2005, 2010; Bénabou and Tirole 2006; Bosworth et al. 2016; Bowles 2016; Heinz and Koessler 2021; Velez and Moros 2021).

In any case, externally devised and imposed ('top-down') solutions to social dilemmas may not always be effective and may even be counterproductive. Although they may be devised upon the best knowledge made available by state officials and researchers, external solutions may neglect relevant local sources of knowledge, face resistance and other implementation challenges, or crowd out intrinsic motivations for pro-social behaviour (Baland and Platteau 1996; Ostrom 2000; Cardenas et al. 2000; Frey et al. 2004; Rode et al. 2015). At the other end of the policy spectrum, autonomously crafted ('bottom-up') solutions, albeit a possibility through self-governance, do not always emerge. Relevant actors may face challenges to communicate, build shared understandings and coordinate collective action (Ostrom 1990; Pahl-Wostl 2002; Adams et al. 2003; Meinzen-Dick et al. 2018). Both the limitations and the advantages of bottom-up and top-down solutions call for participatory approaches which involve the relevant state and non-state actors in the crafting and enforcing of legitimate and pertinent solutions (Baland and Platteau 1996; Ostrom 1990 and 2010; Engel 2004; Pahl-Wostl 2002, 2015; Muradian and Cardenas 2015).

The knowledge on whether and how participatory policy interventions might foster pro-social behaviour in social dilemmas is nevertheless still limited and scattered across different strands of literature. Research on participatory governance has consistently indicated that the outcomes of participatory processes depend upon process design and context. Participatory methods and design features need careful tailoring to attain the intended outcomes in the relevant context (Beierle and Cayford 2002; Rowe and Frewer 2005; von Korff et al. 2012; Reed 2008; NRC 2008; Newig et al. 2018). It is however challenging to sort out their specific impacts and underlying mechanisms with observational data (NRC 2008).

The experimental approach offers a promising way out of this conundrum. Notwithstanding, large-scale experimental evaluations of participatory interventions using randomized control trials are logistically challenging and this type of experimental evidence is hence rather lacking (NRC 2008). We find, however, a number of lab and field experiments as well as quasi-experiments which can already provide insights on whether and how participatory interventions might foster pro-social behaviour in

environmental and natural resource management. Some of these studies are part of our long-term research program on participatory approaches for pro-social behaviour in social dilemmas. In this chapter, we review the insights these studies provide. We draw upon the concepts, theories and previous findings of institutional and behavioural environmental economics (North 1994; Ostrom 2005 and 2010; Dhami 2016; Cárdenas 2018), as well as of the literature on participatory governance (Fung 2006; NRC 2008; Newig et al. 2018; Reed et al. 2018), to integrate them within a coherent framework.

Participatory interventions and pro-social action: features and potential impacts

Whether an actor decides to behave pro-socially in a social dilemma situation depends on the structure of the specific decision situation and the broader context that shapes it (Ostrom 2005, 2010 and 2011; Batson and Powell 2003; Lindenberg 2006; Levitt and List 2007; Bosworth et al. 2016). Specifically, pro-social behaviour depends on the attributes and number of other actors involved, the information available, their possible actions and outcomes, the involved costs, and the control that the actors have over the (final) outcomes. Each of these components are, in turn, moulded by the broader biophysical, socio-cultural and institutional context (Ostrom 2005 and 2011; Schill et al. 2019).

Environmental policy interventions can thus foster pro-social action by changing the institutional context or by addressing or influencing actors' attributes (Ostrom 2010; Lindenberg 2014; Bowles 2016; Bosworth et al. 2016; Ortiz-Riomalo et al. 2022; Heinz and Koessler 2021). An intervention is considered to be participatory when it involves the affected, concerned or interested actors (i.e. the stakeholders) in the design, implementation, monitoring and/or reform of a given policy through information, consultation or active engagement (Fung 2006; Reed 2008; Newig et al. 2018; Ortiz-Riomalo et al. 2022). Different tools or methods such as polls, open consultations and citizens' assemblies can be employed to involve stakeholders in one or several activities at different stages of the policy and management process (van Asselt Marjolein and Rijkens-Klomp 2002; Rowe and Frewer 2005; Fung 2006; Lynam et al. 2007; Voinov and Bousquet 2010).

In sum, a wide variety of participatory interventions exist, which can be classified by (a) the aimed outcomes and (b) the facilitated patterns of interactions and information exchanges (Arnstein 1969; Ostrom 1996; Beierle and Cayford 2002; Fung 2006; NRC 2008; Reed 2008; Newig et al. 2018; Reed et al. 2018). Aimed outcomes include (a.1) specific behaviours, (a.2) actors' attributes such as mental models, beliefs, preferences, emotions and social capital (i.e. trust and social networks), and/or (a.3) institutional arrangements (i.e. rules, norms, shared strategies; Ostrom 2005) and processes. Facilitated patterns of interactions and information exchange, on the other hand, can be unilateral and/or multilateral. More specifically, organizers of participatory interventions can (b.1) inform stakeholders (e.g. about a policy or desired behaviour), (b.2) consult them (e.g. about their preferences), (b.3) help them attain desirable outcomes (e.g. in terms of knowledge and institutions), or (b.4) engage with them in the co-creation, co-production and attainment of such outcomes. The attained outcomes and facilitated patterns of interactions ultimately depend on the aims, activities, methods and design

principles of the deployed participatory intervention (Beierle and Cayford 2002; NRC 2008). Thus, given a context, how can participatory interventions be arranged to effectively foster and sustain pro-social behaviour? Experiments can help address this question.

Through experiments, researchers can identify the behavioural effect of a particular treatment and examine possible underlying mechanisms. Experimenters first delimit the baseline decision situation of their interest (e.g. the provision of a public good, the maintenance of a common-pool resource) and then design the treatment manipulation whose impact they want to assess (e.g. a new rule or piece of information; a modified version of the baseline situation). They decouple the treatment effect from participants' observable or unobservable characteristics by randomizing participants into treatment and control conditions (Banerjee and Duflo 2009; Kremer 2020). By associating each possible action and outcome with salient monetary rewards, economic experiments provide rather accurate measures of participants' revealed preferences (Smith 1976, 1982). Furthermore, experiments allow researchers to control for participants' behavioural attributes such as beliefs, preferences or emotions (e.g. by measuring them in incentivised elicitation procedures) and/or participants' deep-seated socioeconomic attributes such as their ethnic or socio-economic background (e.g. by eliciting them through surveys before and/or after the experiment) (Anderies et al. 2011; Schotter and Trevino 2014). In laboratory and lab-in-the-field experiments, researchers can even design the entire incentive structure of the decision situation (Smith 1982; Kagel and Roth 1995, 2016; Poteete et al. 2010; List and Price 2013).

The studies we review employ different types of research methods. They encompass lab experiments (Koessler et al. 2021; Ortiz-Riomalo et al. 2020) and lab-in-the-field experiments (Handberg 2018; Ortiz-Riomalo et al. 2021; Meinzen-Dick et al. 2018; Cardenas et al. 2020) in which students or resource users participated in recreations of social dilemma situations. We also have field experiments in which researchers randomly assigned participants to a specific participatory intervention (Cavalcanti et al. 2010; Meinzen-Dick et al. 2018; Alpízar et al. 2019; Cardenas et al. 2020). Finally, there is a couple of natural experiments, i.e., quasi-experimental studies (Cavalcanti et al. 2013; Palmer et al. 2020), in which causal relationships were examined by using criteria other than randomization. These studies statistically mimicked, *ex-post*, the conditions of random assignment to the participatory intervention.

Experimental treatments can take the form of a particular participatory method such as an open consultation, a voting mechanism, or a deliberative or informative multi-actor workshop. Treatments could also take the form of a common feature or mechanism of participatory processes such as role-reversal, role-playing or structured information exchange. The reviewed studies analyse different forms and features of participatory interventions. They thus help us gain nuanced insights into the factors that might influence the potential of participatory interventions for pro-social action in social—and environmental—dilemmas.

The reviewed studies

We reviewed eight experimental studies and two quasi-experimental studies which examine the impact of a participatory intervention. To guide our review, we characterised each study based on the conceptual elements introduced in Section 2: we coded the studies according to (a) their main outcome variables and (b) the types of interactions and information exchanges facilitated by the assessed participatory intervention. Table 8.1 presents the categories we used to code each study along these two dimensions.

Table 8.1. Characterising participatory interventions

Outcome variable [OV] (Aimed outcomes)	Participation form [PF] (Types of facilitated stakeholder interactions and information exchange)
<p>1. Behaviour (OV1) 2. Actor's attributes (e.g. social and ecological knowledge, beliefs, trust, preferences, emotions, social networks). (OV2) 3. Institutional arrangements (rules, norms, shared strategies.) (OV3)</p>	<p>Relatively weak forms of participation:</p> <ol style="list-style-type: none"> 1. Informing stakeholders: The experimenter, facilitator or policy-maker (i.e. organiser of the process) only provides information to participants, e.g., awareness of the problem and desired course of action. (PF1) 2. Consulting stakeholders: The organiser only elicits information from participants, e.g., on their preferences through voting, polling, and/or public hearings. (PF2) <p>Relatively strong forms of participation:</p> <ol style="list-style-type: none"> 3. Facilitating interactions among stakeholders: The organiser facilitates a space for participants to generate, e.g., new knowledge, shared understandings of a situation or problem, and institutional arrangements. * (PF3) 4. Co-creation: The organiser directly engages with participants to actively generate, e.g., new knowledge, shared understandings of a situation or problem, and institutional arrangements. * (PF4)

***Note:** Inducing perspective-taking (e.g. through economic games or role-playing games) and techniques for group moderation, communication and deliberation are often used to structure stakeholders' interactions.

The categories we used for coding the outcome variable (OV) account for the fact that participatory interventions can impact pro-social behaviour directly and indirectly. They can directly target the desired behaviour (e.g. resource conservation, cleaner technologies adoption) or indirectly influence the factors that underpin it (i.e. institutional arrangements and actors' attributes). We consider the change in a rule or shared management strategy as a change in the governing institutional arrangements (i.e. an impact on OV3) while we see the act of crafting, adopting and/or enforcing sustainability-enhancing rules and management strategies as an instance of pro-social behaviour (i.e. an impact on OV1). The categories for the different participation forms (PF) move from the less to the more intensive and interactive PF—i.e. from provision of information and consultation to facilitating interactions and co-creation (e.g. Beierle and Cayford 2002; Fung 2006; NRC 2008; Reed et al. 2018).

Our review is not intended to be a systematic review of the relevant literature but a narrative review of purposively selected experimental and quasi-experimental studies to shed light on the potential of participatory interventions for pro-social behaviour. We, furthermore, intend to illustrate the potential

of different types of experimental and quasi-experimental research designs to unearth possible behavioural impacts and mechanisms in participatory processes. Hence, the selected studies vary on the assessed form of participation, the main outcome variable(s) and the research method(s). We do not delve into the literature on the effects of voting on institutions in social dilemmas because this literature has been amply and thoroughly reviewed elsewhere (see, for instance, Dal Bó 2014, Dannenberg and Gallier 2020, and Dannenberg's chapter in this same volume).

Table 8.2, at the end of this section, presents an overview of the reviewed studies in terms of the assessed form of participation, outcome variable(s), research method, participant sample and context of each study. The categorisation of outcomes and participation forms follows Table 8.1. We will first provide an overview of the findings regarding the impacts on pro-social behaviour before examining whether the observed effect, or lack thereof, can be associated with the features of the assessed intervention.

Our review suggests that participatory interventions do have the potential to foster pro-social behaviour. Several of the reviewed studies report positive effects of the assessed participatory interventions on the observed pro-social behaviours. The lab study with German students by Koessler et al. (2021) reports positive effects on group contributions in a public good game. In a lab-in-the-field experiment carried out in a Peruvian watershed, Ortiz-Riomalo et al. (2021) found positive impacts on donations by downstream farmers to a sustainable development initiative in the upper watershed. The field experiments by Meinzen-Dick et al. (2018) and Cardenas et al. (2020), conducted in settings of groundwater and river basin management settings in India and Colombia, respectively, indicate positive impacts on the adoption of water meters and water management rules and strategies in local communities (Meinzen-Dick et al. 2018), or on water savings in local aqueducts (Cardenas et al. 2020). The quasi-experiment by Palmer et al. (2020) suggests crowding-in of pro-social behaviour for the conservation of forest by Brazilian forest resource users. Finally, the series of studies by Cavalcanti et al. (2010, 2013), drawing on data from a field experiment and a quasi-experiment, suggest positive effects on the willingness to adopt and the actual adoption rate of sustainable management practices by communities of Brazilian fishers.

Notwithstanding, three studies found no impacts. Ortiz-Riomalo et al. (2020) found no change in unilateral giving in a standard give-and-take dictator game (List 2007; Bardsley 2008) implemented in the lab with German students. Handberg (2018) did not find a significant impact on forest conservation in a forestry-framed CPR lab-in-the-field experiment with resource users from Tanzania. And in a field experiment conducted in a drought-prone area in Costa Rica, Alpízar et al. (2019) did not find a significant impact on the adoption of water pricing and water management strategies at the municipality level two years after the intervention. We focus on the forms of participation (i.e. the features of the treatment conditions) as likely explanatory factors for these diverse results.

Firstly, *we can associate relatively weak forms of participatory interventions with no effects on pro-social behaviour (i.e. PF1 and PF2 in Table 8.1).* These were interventions in form of information

and advice provision through experts (i.e. PF1; Alpízar et al. 2019) and stakeholder consultation (PF2; Handberg 2018). The capacity-building workshops studied by Alpízar et al. (ibid) induced water managers in Costa Rica to problem and strategy awareness, providing them with opportunities to individually deliberate on their individual potential goals and actions.¹ During these workshops, they received technical information on climate change adaptation, reflected upon their current courses of action and outlined potential water management and adaptation strategies to promote sustainable water use in their communities. The studies by Koessler et al. (2021) and Ortiz-Riomalo et al. (2020, 2021), although they were not designed to systematically assess this effect, also suggest that the sole provision of qualified expert information may not suffice to impact pro-social behaviour. Complementary measures thus appear to be warranted.

In the study by Handberg (2018), participants got to choose their desired payment for conservation scheme by majority vote after talking to each other. Communication was allowed in all control and treatment conditions, thus isolating the impact of the binding voting mechanism. The results indicate that voting, in itself, does not add to the well-documented impact of communication on cooperation in social dilemmas (Ledyard 1995; Ostrom 1998; Balliet 2010). However, the available evidence indicates that, in general, endogenous rules can yield higher levels of pro-social behaviour in social dilemmas than rules which are imposed without any form of consultation (see Frey et al. 2004; Dal Bó 2014; Dannenberg and Gallier 2020, and Dannenberg's contribution in this volume). Giving participants the opportunity to vote for their institutions does nevertheless not guarantee that they will pick efficiency-enhancing rules. To make choices that approximate socially optimal outcomes participants may require accurate and reliable information, opportunities to learn from different possible rules and access to enforcement mechanisms (Kroll et al. 2007; Dal Bó 2014; DeCaro et al. 2015; Danneberg and Gallier 2020). To be effective at buoying up cooperation, participation in the choice of the relevant institutions may thus need to be supplied with other—likewise participatory—enforcement mechanisms (Ostrom 2006; DeCaro et al. 2015; Handberg 2018).

An exception to the above described tendency—i.e. studies which assess the impact of relatively weak forms of participation find no effect—is the study by Ortiz-Riomalo et al. (2020). In a give-and-take dictator game, the authors assessed the impact of having dictators experience the position of the receiver (i.e. a unilateral role reversal) during a payoff-irrelevant simulation round. Since the intervention targeted individual deliberation of the participants, we coded this form of perspective-taking as a relatively stronger form of participatory intervention (i.e. PF3, based on Table 8.1). The study found that inducing perspective-taking through this unilateral role reversal had no significant impact on pro-social behaviour, but on the experienced emotions of the participants, namely empathic, distressing and negative emotions. While empathic emotions may foster pro-social behaviour, distressing and negative emotions could have counteracted this effect, thus hindering pro-social behaviour (Batson 2009, 2011; Batson et al. 1997; Singer and Klimecki 2014). In any case, this is a conjecture which warrants further investigation.

In sum, the sole provision of expert and technical advice, the pure consultation of participants' preferences and the inducement of perspective-taking by unilateral role reversal seem not to be enough to foster pro-social behaviour. Complementary measures (e.g. two-way communication processes and strategic follow-up activities) and/or relatively more intensive forms of participation may be needed to trigger a significant change in behaviour (Carlson-Sabelli and Sabelli 1984; Beierle and Cayford 2002; NRC 2008; Epley 2014).

In our study sample, *we can indeed associate more intensive forms of participation with positive impacts on pro-social behaviour (i.e. PF3 and PF4 in Table 8.1)*. Ortiz-Riomalo et al. (2021) studied the effects of induced perspective-taking (PF3) and Koessler et al. (2021) assessed the impacts of a mechanism aimed at facilitating coordination and consensus-building through non-binding voting and pledging (PF1 + PF3 + PF4). Meinzen-Dick et al. (2018) and Cardenas et al. (2020) studied the effects of using economic games coupled with community debriefing sessions as learning tools for water management (PF3 + PF4). And finally, Cavalcanti et al. (2010, 2013) and Palmer et al. (2020) assessed the effects of stakeholder workshops created for participants to receive information on their collective management challenges and to collectively propose management strategies to overcome them (PF1 + PF3 + PF4). As part of this workshop series, some resource users also got the chance to learn skills of their choice (PF1 + PF2 + PF3 + PF4; Palmer et al. 2020) and implement some of the developed proposals (PF4; Cavalcanti et al. 2013; Palmer et al. 2020).

The lab-in-the-field experiment by Ortiz-Riomalo et al. (2021) assessed the impacts of inducing perspective-taking. Before deciding on a donation for a sustainable development initiative in the upper section of a Peruvian watershed, downstream farmers were induced to imagine the thoughts, feelings and expectations of the upstream farmers' perspectives. Upstream farmers in the upper watershed are relatively less well-off and bear most of the burden of protecting nature upstream and secure water provision downstream. The study finds that inducing perspective-taking can be associated with increased donations, most likely via a strengthening of other-regarding preferences.

Previous research suggests that the effects of inducing perspective-taking on pro-social behaviour depend on the features of the perspective-taking procedures, situation and context (e.g. Carlson-Sabelli and Sabelli 1984; Davis 1996; Epley et al. 2006; Batson 2009). Whereas the perspective-taking procedures used in Ortiz-Riomalo et al. (2020)—i.e. *imagine-self*-like procedures—may trigger or hinder pro-social behaviour, the procedures used in Ortiz-Riomalo et al. (2021)—i.e. *imagine-other*-like procedures—are more likely to induce empathic concern for others and pro-social behaviour thereby (Davis 1996; Batson et al. 1997; Batson 2009).² Furthermore, Ortiz-Riomalo et al. (2020) induced perspective-taking in a laboratory dictator game in which participant students could transfer part of their endowment or take from the receiver's endowment. In contrast, the Peruvian farmers could only donate to an initiative in favour of relatively less well-off upstream farmers (Ortiz-Riomalo et al. 2021). Giving in dictator games has been shown to be relatively higher when non-standard subjects (i.e. non-students) are involved, the take option is not allowed and the recipients are located in a deserving

position (Engel 2011; Zhang and Ortmann 2014). Hence, differences in procedures, situations and contexts are the factors that may help explain the somewhat contradicting results of the studies by Ortiz-Riomalo et al. (2020, 2021) on the effects of inducing perspective-taking. The latter is an insight worth considering for the design of participatory interventions which nevertheless warrants further investigation.

The importance of perspective-taking, and the interest in studying its impacts and mechanisms, lies in the central role that communication and deliberation play in tackling social dilemmas and facilitating collaborative governance processes (e.g. Ostrom 1998; Sally 2001; Pahl-Wostl and Hare 2004; Wald et al. 2017). Communication allows stakeholders to learn about each other's intentions, understand each other's perspectives, build shared understandings and trust, reach collective agreements and coordinate action (e.g. Cardenas et al. 2004; Delli Carpini et al. 2004; Ansell and Gash 2008; Poteete et al. 2010).

Based on their review of the previous literature, Koessler et al. (2021) identified the basic elements that usually comprise effective communication processes in social dilemma situations, namely problem and strategy awareness, as well as agreement on, and ratification of, a joint strategy. They examined the sole and combined effects of these elements. Their results indicate that a coordination mechanism that allows participants to exchange their preferences on potential contribution strategies and pushes them towards a consensus around the social optimum significantly increases contributions. Hence, allowing participants to build agreements on desirable strategies seems to be key to fostering cooperation in this type of social dilemma (see also Ostrom 1998). As already mentioned above, their results also suggest that solely inducing problem and strategy awareness may not suffice.

In turn, Meinzen-Dick et al. (2018) and Cardenas et al. (2020) studied the effects of using framed economic games together with subsequent debriefing sessions as participatory tools to facilitate discussion on collective action problems and their potential solutions.³ Indian communities that participated in the games are more likely to recognize the social dilemma they are part of and the need for each actor to restrain and act pro-socially in order to attain socially desirable outcomes in water management (Meinzen-Dick et al. 2018). They also seem more likely to adopt water registers and management rules than the communities that did not participate (ibid). Likewise, Cardenas et al. (2020) have also results which indicate that participation in economic games and debriefing sessions can be associated with increased savings on water use by Colombian resource users in their local aqueducts.⁴

The comparison between the participatory interventions studied by Meinzen-Dick et al. (2018), Alpízar et al. (2019) and Cardenas et al. (2020) is informative. The capacity-building workshops described by Alpízar et al. (2019) chiefly induced problem and strategy awareness. In turn, the economic games described by Meinzen-Dick et al. (2018) and Cardenas et al. (2020) recreated the water management situations in which participants make their day-to-day decisions. Therein, participants interacted and experienced the likely consequences of different possible courses of action on individual and aggregate outcomes.⁵ The results were further discussed by the community and facilitators in

subsequent debriefing sessions. One may then hypothesise that these pedagogical tools, coupled with deliberation exercises, were relatively more effective at triggering collective action than solely providing information to facilitate individual reflection.

Alpizar et al. (2019) and Meinzen-Dick et al. (2018) coincide, however, in stressing the importance of articulating participatory interventions and other ongoing activities, programs and projects led by other governmental and non-governmental organisations pursuing similar aims in the same resource system. To trigger and sustain a change in behaviour, they suggest, it is necessary to follow up on initial interventions, address emerging concerns (e.g. socioeconomic effects of conservation initiatives) and embed specific interventions within broader decision-making processes. The studies by Palmer et al. (2020) and Cavalcanti et al. (2010, 2013) complement this insight.

Palmer et al. (2020) assessed the effects of participatory processes comprised of training workshops and knowledge exchange activities. These were to help Brazilian forest users gain new understandings on less resource-intensive and environmentally-friendly alternative livelihoods, favourable to forest conservation. Participants selected their preferred training, received relevant information on the income and conservation benefits of alternative livelihoods, and developed business plans for these livelihoods. The workshops created spaces for discussion and knowledge exchange. The analysis by Palmer et al. (*ibid*) suggests that participation in these may have crowded-in pro-social behaviour. On average, cooperation in a forestry-framed CPR is higher in participants that attended three or more workshops.

In turn, Cavalcanti et al. (2010, 2013) assessed the effect of a participatory process aimed at developing and implementing environmental management strategies in fishing communities in Brazil. Resource users who participated in the development of the management strategies reported intentions to cooperate in their implementation (Cavalcanti et al. 2010). Moreover, participant communities were more likely to engage in the manufacturing and adoption of sustainable fishing technologies than communities that did not participate in the process of developing this management strategy (Cavalcanti et al. 2013). The use of sustainable technology waned two years after, nonetheless. Structural barriers for its production and use seem to be the main reasons behind (*ibid*).

Table 8.2. Summary of study designs and findings

No	Author	Year	Study design	Subjects	Ecological context	Country	The assessed participation form (PF)	Outcome variable [OV]	Summary of results
1	Alpizar	2019	Field experiment	Resource users	Water management (in drought-prone areas)	Costa Rica	<i>Capacity-building workshops providing information on water scarcity and alternative water management and climate change adaptation strategies, and inducing participants to reflect upon potential goals and strategies to adopt in their communities (PF1)</i>	Adoption of recommended price schemes and suggested management strategies (OV1, OV3)	Participation in the workshops did not change the current institutional arrangements at the municipality level two years after the intervention.
2	Handberg	2018	Lab-in-the-field experiment	Resource users	Forestry	Tanzania	<i>Voting on the desired payment for ecosystem services (PES) scheme in a forestry-framed CPR experiment (PF2)</i>	Behaviour in a CPR game (OV1) & Beliefs and preferences: actual and normative evaluations of PES schemes (OV2)	Voting had no effect, neither on pro-social behaviour nor on the evaluations of the proposed PES schemes.
3	Ortiz-Riomalo	2020	Laboratory experiment	Students	Laboratory - Abstract game	Germany	<i>Inducing perspective-taking through unilateral role-reversal (PF3)</i>	Behaviour in a give-and-take dictator game (OV1) & Emotions (OV2)	Unilateral role-reversal can be associated with significant changes in emotions such as anger, disappointment, surprise and compassion, but it seems not to have a significant impact on the pro-social behaviour.
4	Ortiz-Riomalo	2021	Lab-in-the-field experiment	Resource users	Water management (Watershed)	Peru	<i>Induced perspective-taking through imagine-other instructions and task (PF3)</i>	Behaviour in a framed dictator game (i.e. donation to a sustainable development initiative in an upper watershed) (OV1) & Other-regarding preferences (OV2)	Induced perspective-taking had a significant effect on donations, likely by strengthening other-regarding preferences.
5	Koessler	2021	Laboratory experiment	Students	Laboratory - Abstract game	Germany	<i>Coordination mechanism through non-binding voting and pledging (PF1 + PF3 + PF4)</i>	Behaviour in a public goods game (OV1)	The coordination mechanism produced a significant positive effect on contributions.
6	Meinzen-Dick	2018	Field experiment	Resource users	Groundwater management	India	<i>Economic experiments coupled with community debriefings to discuss collective action challenges and potential solutions (PF3 + PF4)</i>	Knowledge and mental models (OV2); adoption of water management rules and strategies (OV1, OV3)	Participation in experiments and debriefings impacted mental models and institutional arrangements.

Table 8.2. (Continued)

No	Author	Year	Study design	Subjects	Ecological context	Country	The assessed participation form (PF)	Outcome variable [OV]	Summary of results
7	Cardenas	2020	Field experiment	Resource users	Water management (Local aqueducts)	Colombia	<i>Economic experiments</i> coupled with <i>community debriefings</i> to discuss collective action challenges and potential solutions (PF3 + PF4)	Water use in local aqueducts (OV1)	Preliminary analyses suggest that participation in economic experiments and community debriefings can be associated with an effect on water savings.
8	Palmer	2020	Lab-in-the-field experiment & Quasi-experiment	Resource users	Forestry	Brazil	<i>Stakeholder workshops</i> which provided information on current and alternative sustainable livelihoods (PF1) coupled with self-selected capacity-building <i>trainings</i> as well as <i>stakeholder workshops</i> to inform about, discuss and co-produce alternative livelihoods (PF1 + PF2 + PF3 + PF4)	Behaviour in a CPR game (OV1)	Participation in the workshop series had a statistically significant impact on the pro-social behaviour.
9	Cavalcanti	2010	Field experiment	Resource users	Fishery	Brazil	<i>Stakeholder workshops and meetings</i> that (i) provided information on the current fishing situation (PF1) and (ii) allowed discussing and developing potential solutions (i.e. shared management strategies) (PF3 + PF4)	Management strategies (OV3) & Intentions to cooperate in the implementation of agreed-upon fisheries management strategies (OV2)	New fisheries management strategies resulted from the series of workshops and meetings. Participation in these arguably strengthened participants' intended pro-social behaviour.
10	Cavalcanti	2013	Quasi-experiment	Resource users	Fishery	Brazil	<i>Stakeholder workshops and meetings</i> that (i) allowed participants to develop management strategies and (ii) helped them implement one prioritised strategy (i.e. sustainable fishing technologies) (PF1 + PF3 + PF4)	Manufacturing of sustainable fishing technologies (OV1)	Participation in the workshop series had a statistically significant effect on pro-social behaviour. Notwithstanding, use of the sustainable technology waned over time.

Note: Based on Table 8.1, we have the following categories: OV1: Change in observed pro-social behaviour; OV2: Change in actor's attributes; OV3: Change in institutional arrangements; PF1: Provision of information and knowledge; PF2: Consultation on stakeholder's preferences; PF3: Facilitating decentralised stakeholder interactions; PF4: Working with stakeholders, i.e. co-creation and co-production

Conclusions

The experimental evidence on the impacts of participatory interventions on pro-social behaviour in social dilemma situations is rather scant and available evidence remains very much scattered across different strands of literature. In the above paragraphs, we presented a selection of experimental and quasi-experimental studies that shed first light on the behavioural effects and underlying mechanisms of participatory processes. The reviewed evidence suggests that participatory interventions do have the potential to directly impact pro-social behaviour, and to indirectly influence it by impacting actors' attributes (e.g. mental models, beliefs, preferences and emotions) and institutional arrangements (e.g. resource management rules and shared strategies). Hence, these types of policy interventions can enrich the environmental policy toolbox to foster pro-social action for sustainable, environmental and natural resource management.

By qualitatively comparing the forms of participation each study analysed, one can infer that interactive and intensive forms of participation are particularly effective at fostering pro-social behaviour for collective action in social dilemmas. One may conjecture that relatively less interactive and less intensive participatory interventions might be helpful to foster unilateral pro-social action, e.g., in situations where pro-social action does not depend on strategic considerations (e.g. Ortiz-Riomalo et al. 2021). In any case, the possibilities for these types of processes to generate and sustain pro-social behaviour would largely depend on the way they are followed up by subsequent processes and how they are embedded in the broader ecological, social, economic and governance context. This has been suggested in previous synthesis efforts and comparative analyses within the participatory governance scholarship (e.g. Beierle and Cayford 2002; Edelenbos et al. 2009; Fritsch and Newig 2012; Bodin 2017) and also touched upon in several of the reviewed studies (e.g. Cavalcanti et al 2013; Meinzen-Dick et al. 2018; Alpízar et al. 2019; Ortiz-Riomalo et al. 2021). In general, complementary arrangements of methods and processes may have a greater potential than a single participatory method or policy intervention (Santos et al. 2006; Cetas and Yasué 2016; Engel 2016).

However, these statements and other tentative propositions emerging throughout the chapter should be taken as hypotheses worth assessing through further systematic research. As our review illustrates, results from laboratory and lab-in-the-field experiments (e.g. Koessler et al. 2021; Handberg 2018; Ortiz-Riomalo et al. 2020, 2021), small- and large-N comparative studies or surveys of cases (e.g. Beierle and Cayford 2002; Newig et al. 2019; Tribaldos et al. 2020), as well as quasi-experimental studies (e.g. Cavalcanti et al. 2013; Palmer et al. 2020) and randomized controlled trials (e.g. Alpízar et al. 2019) can complement one another to gain nuanced insights into the working gears of participatory processes and their impacts on pro-social action. Working in tandem, and backed up by the appropriate overarching research frameworks, researchers and practitioners should generally aim for identifying the forms and design principles of participatory interventions and processes most likely to beget pro-social behaviour in certain types of social dilemma situations and contexts (see, e.g., NRC 2008; Reed 2008; von Korff et al. 2012).

Endnotes

- ¹ These workshops thus also have traces of PF3 (see Table 8.2). They facilitate stakeholders' individual deliberation. However, based on the paper's description, we sustain the main feature of the workshops was to provide qualified information. Thus, we coded these capacity-building workshops as PF1 participation forms (see Table 8.1 and Table 8.2).
- ² Commonly, perspective-taking tasks consist in providing participants with an accurate description of a given situation in which they are confronting another actor who happens to be in a different position than theirs. Upon that, participants are instructed to take the perspective of that other actor. Commonly, there are two ways to carry out these procedures (Davis 1996; Batson et al. 1997; Batson 2009). On the one hand, *Imagine-self* procedures instruct the perspective-takers to imagine themselves in the position of the other actor; they are instructed to step in the others' shoes. Role reversal techniques follow these types of procedures (Johnson 1971; Carlson-Sabelli and Sabelli 1984; Kellermann 1994). *Imagine-other* procedures, on the other hand, instruct perspective-takers to imagine and think about the perspective of the other actors without inducing them to step in their shoes.
- ³ Cardenas et al. (2013) and Meinzen-Dick et al. (2016) expound on the specific economic games they use.
- ⁴ Medema et al. (2016) and Falk et al. (2021) provide further insights into the potential of games for natural resource management.
- ⁵ This approach is in line with approaches that use participatory modelling (Voinov and Bousquet 2010) and serious games (e.g. Medema et al. 2016).

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