Can monetary valuation undermine nature conservation? Evidence from a decision experiment

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Abstract: Nature conservation scientists and practitioners have voiced the concern that a conservation discourse based on economic arguments and monetary valuation may undermine conservation efforts by eroding ("crowding out") the influence of other arguments for nature conservation. This paper presents the results of a decision experiment in which nature conservation is framed using an economic, a non-economic, or a combined discourse before participants take hypothetical decisions on the construction of hydropower dams in the Bolivian Amazon. We find that an economic discourse with monetary valuation framing leads to significantly fewer pro-conservation decisions, that is, decisions against dam construction. This is the case when a cost-benefit analysis inclusive of environmental costs reveals that the dam is economically viable (i.e., there remains a *trade-off* between economics and conservation), but also when such a costs-benefit analysis indicates that the dam is not viable (i.e., *no trade-off*). The results suggest that an economic discourse with monetary valuation framing can indeed undermine nature conservation efforts. They also suggest that the effect can be avoided, however, by presenting non-economic arguments side by side with an economic rationale.

Keywords: nature conservation, policy discourse, framing, monetary valuation, crowding out

JEL codes: D61, D63, D81, H41, O13, Q01, Q34, Q51, Q56, Q57

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1. Introduction

Biodiversity and natural ecosystems are in decline all over the planet due to human activities, such as land conversion for residential or agricultural use, or infrastructure development (e.g., roads, pipelines, or hydropower plants). When there is a conflict between economic development and nature conservation, the latter almost always has a difficult stance. Arguments for protecting the natural environment can be based on many lines of reasoning and looked at from different perspectives (O'Neill et al 2008). The nature conservation discourse had for a long time been dominated by moral arguments based on a duty to preserve species and natural ecosystems, respect for nature and wildlife, or the recognition of a connection between (indigenous) people and the natural landscape (O'Neill and Spash 2000, Jax et al 2013, Antal and Drews 2014). More recently the debate has shifted towards a focus on ecosystem services (i.e., the benefits nature provides for people see, e.g., de Groot et al 2002) and towards monetary valuation of these benefits (Doak et al 2014, Mace 2014). Ecosystem service benefits include, for instance, a wetland's capacity to store and purify water for human use, a forest's potential to mitigate catastrophic events (such as floods or land-slides) or to sequester carbon, or the habitat function for useful species, such as fish or insect pollinators. The main intention behind emphasizing these benefits is to reach out to actors beyond the environmental community, in particular in business, finance and economics (TEEB 2010, Fisher and Brown 2015). Economic valuation of ecosystem services is used, for instance, to "make the case" for investment in protected areas, or to evaluate the environmental impacts of large scale development projects (Laurans and Mermet 2014).

The economic approach also has its opponents, however, who argue that (over-) emphasizing the economic domain may eventually do a dis-service to conservation (O'Neill 1997 2001, Spash 2008, Monbiot 2014, Doak et al 2014). One particular concern voiced by conservation scientists is that a discourse based on economic arguments and monetary valuation may erode ("crowd out") non-economic arguments for conservation (McCauley 2006, Redford and Adams 2009). For instance, Redford and Adams (2009) write that "there is a real risk that economic arguments about services valued by humans will overwrite and outweigh noneconomic justifications for conservation". Neuteleers and Engelen (2015) derive the hypothesis that "monetary valuation's framing and crowding effects can decrease (demand and support for) environmental protection". Fisher and Brown (2015) show that this concern is also prominent within conservation practitioners.

Conservation scholars debating on this topic also agree, however, that there is so far no direct empirical evidence and that this topic requires empirical research (Skroch and Lopez-Hoffman 2010, Adams and Redford 2010). Suggestive evidence comes from a range of disciplines that have dealt with framing effects. For instance, the effect of framing for (environmental) decision making is widely acknowledged in psychology (Tversky and Kahneman 1981, Satterfield et al 2000, Hsee and Rottenstreich 2004, Bolderdijk et al 2013) and linguistics (Lakoff 2010). For the conservation context, there is some empirical evidence that economic incentives (e.g., within PES) can crowd out non-economic motivations for conservation action (Bowles 2008, Rode et al 2015). Framing effects are one among several possible psychological mechanisms to explain such an effect.

In this paper, we present the results of a decision experiment designed to test whether a nature conservation discourse based on monetary valuation framing can indeed diminish people's motivation to decide in favour of conservation. Section 2 provides an overview of related interdisciplinary literature and derives the hypothesis for the experimental study. Section 3 explains the design of the decision experiment. Section 4 presents the results, which are interpreted and discussed in section 5.

2. Framing and environmental decisions: Literature and hypotheses

2.1. Literature

It is well established that the framing of choices influences decision making, including in the environmental domain. The following paragraph reviews some of the arguments and empirical evidence from an interdisciplinary literature. In some cases the authors explicitly refer to the nature conservation context.

In psychology, the seminal references by Tversky and Kahneman (1974, 1981) provide a conceptual basis and empirical evidence for framing effects. They were followed by a large literature on the effects of framing of (risky) decisions with uncertainty. Hsee and Rottenstreich (2004) show in a series of studies that when people are presented with emotional stimuli ("affective valuation") their decisions are largely insensitive to the scope or magnitude of the stimuli, but that their decisions are highly sensitive to scope when confronted with numerical stimuli ("valuation by calculation"). For instance, the willingness to donate for saving one or four pandas is almost identical when people see panda pictures, but is significantly higher for four pandas when no pictures are presented. Satterfield et al (2000) study judgments on a policy choice (a dam project) with environmental impacts, where

they present the same information either in a narrative or a technical manner. They find that narratives help people to better comprehend and assimilate information for their judgments, but do not find any evidence that a narrative presentation changes which values are more influential. Liberman et al. (2004) demonstrate that people make significantly fewer contributions when a public goods dilemma game is labelled as a "Wall Street game" compared to labelling it a "community game". It seems that an frame context shifts individual's attention towards a focus on self-interested reasoning. Evans et al (2012) show in a lab experiment that priming participants on self-transcending reasons for one environmental behaviour (car sharing) causes a positive spill-over effect to another pro-environmental behaviour (recycling), while priming on self-interested reasons reveals no effect compared to the control condition. Bolderdijk et al (2013) use a field experiment to show that appealing to self-interest (personal cost savings) can be less effective in persuading people to act environmentally friendly than a biospheric appeal. They argue that "biospheric appeals – more than economic appeals enable people to perceive compliance as morally good conduct, and thus feel good about their decision to act" and that "there may be something in economic appeals that puts people off" (p.3). Lakoff (2010) argues from a linguist point of view that the framing of an environmental discourse is of utmost importance for its success in influencing public opinion and policy. With respect to nature conservation, he advises to frame the issue as a "moral imperative to preserve and reconstitute as much of it as possible as soon as possible" (p.80). García-Amado et al. (2013) show with a survey study among rural communities in a Mexican biosphere reserve that payments for ecosystem services (PES) involving monetary incentives shift people's perceived reasons for conservation from those reflecting intrinsic motivations to those reflecting utilitarian and monetary motivations. They conclude that their "data supports the idea that PES are contributing to shifting from a 'culture of conservation' to a "culture of monetary criteria" (p.98).

2.2. Hypotheses

The concerns mentioned at the outset are captured in the hypothesis formulated by Neuteleers and Engelen (2015) that "monetary valuation's framing and crowding effects can decrease (demand and support for) environmental protection". For the purpose of the experimental study, we derive two more specific testable hypotheses for choices with or without a trade-off between economic benefits and nature conservation. Conservationists who are in favour of economic valuation of nature typically expect that a cost-benefit analysis that includes economic valuation of ecosystem service benefits (henceforth labelled *inclusive CBA*) will

reveal that conserving nature is also the best option from an economic perspective (Fisher and Brown 2015). In that case, there is no trade-off between an economic rationale and conservation, so that economically motivated decision-makers should opt for conservation.

H1: When an inclusive CBA reveals **no trade-off** between economics and conservation, an economic discourse with monetary valuation framing leads to equal or higher inclination to decide in favour of nature conservation.

The situation changes when even the inclusive CBA reveals a trade-off between conservation and economic interest. In that case, non-economic arguments for nature conservation could lead decision-makers to nevertheless accept the economic (opportunity) costs and opt for conservation. Decision makers with an economic mindset, on the other hand, are expected to decide against conservation.

H2: When an inclusive CBA reveals a **trade-off** between economics and conservation, an economic discourse with monetary valuation framing leads to lower inclination to decide in favour of nature conservation.

In addition to the hypotheses on decision making, we want to explore cognitive access to reasons for conservation as one aspect that could be behind people's demand and support for environmental protection (Tversky and Kahnemann 1974). Motivations to decide in favour of nature conservation may be rooted in a variety of psychological sources, such as an environmental self-identity (Van der Werff et al 2013), universalist values (Thøgersen & Ölander, 2002), emotional stimuli (Zajonk 1980, Hsee and Rottenstreich 2004), or behavioral spillover (Thøgersen & Ölander, 2003), some of which are not necessarily fully conscious. We test here only whether the discourse framings affect how frequently people think of different types of reasons for nature conservation.

H3: An economic discourse with monetary valuation framing leads people to state more economic reasons for nature conservation and to neglect non-economic reasons.

We design the decision experiment to test these hypotheses using the decision context of two proposals for hydropower dam construction in the Bolivian Amazon.

3. Methodology

Participants: 71 undergraduate students (3rd and 4th year business and economics studies) participated in the online survey as obligatory preparation for a class on International

Business Policy, taught by one of the co-authors. The survey took around one hour to complete. Participants were 30 % male and 70 % female and were between 19 and 41 years old (mean 22.3 years). They had 16 different nationalities, the most frequent being Spanish (55%), US American (10%), Dutch (7%), German (4%) and French (4%). There were no significant differences between treatments with respect to these personal characteristics. One participant was excluded because he or she only took 18 minutes to complete the survey and responses were nonsensical.

Procedure: We used Qualtrix (www.qualtrics.com) to conduct the online survey. An introductory page explained to participants that the study deals with decisions that have implications for the natural environment. On the next page, all participants received background information on the Bala hydropower dam proposal in Bolivia, including the economic rationale to export energy to Brazil, the location of the dam and its reservoir, and the fact that the reservoir would flood parts of two protected areas. Participants were then randomly allocated to three experimental treatments, within which more specific information on the environmental impacts were framed in correspondence with distinct discourses on nature conservation (more details below). Subsequently, all participants responded to a series of questions corresponding to the three dependent variables (more details below). For the questions that involved hypothetical choices for or against nature conservation, participants were also asked how well informed they felt for building their opinion. Finally, all participants filled in questionnaires corresponding to the Environmental Worldview Scale (Nooney et al. 2003), the Environmental Value Orientations Scale (Schwartz 1992, de Groot and Steg 2008), and an aspirations index (Kasser and Ryan 1996), and they were asked to provide some personal data (gender, age, studies, nationality, previous participation in participate processes, engagement in environmental organization). On a last slide, participants were told that in some cases the numbers and other pieces of information were not based on objective sources, but served as simulations in order to test how people respond to different scenarios ("debrief").

Discourse framings: In the three experimental treatments we aimed to mimic people's exposure to an economic discourse on nature conservation, relying on monetary valuation of nature's benefits for human well-being ("ECON"), a non-economic discourse on nature conservation that focusses on ecological value, deontological principles and duties to protect "Mother Earth", and the rights and relationship of affected indigenous people to their land ("NON-ECON"), and a combination of both economic and non-economic discourses

("COMB"). We constructed a stylized form of the two distinct discourses as we observe them in current debates, trying to provide participants with characteristic information and value judgments. Table 1 lists the material we employed to reflect the ECON and NON-ECON discourses; COMB simply presented the material from both. In order to reinforce the framing of the discourses and to ensure that participants paid attention to the presented material, we asked them to write down four reasons that were mentioned for protecting the natural environment in the project area, to name the source (e.g., video, text by…), and to rate how important they personally find each of the presented reasons.

Table 1. Material presented to participants for the ECON and NON-ECON discourse framings

ECON	**NON-ECON**
A paragraph with quotes on the necessity to include the benefits of conserving nature in economic analysis.	A paragraph on the political view on nature in Bolivia (granting rights to Nature, Mother Earth concept) and quotes from Evo Morales.
A youtube video (3.26 min) by Pavan Sukhdev (2010) on the problems of a global economy that ignores the economic value of nature and its services.	A youtube video (4.10 min) prepared by RightsOfNature (2012) for the 2012 Rio+20 Earth Summit in Rio de Janeiro, arguing that the Earth has rights and needs to be protected.
The detailed description of methods and results of an economic cost-benefit analysis for the Bala dam proposal, which explicitly calculates social and environmental costs using state-of-the-art valuation methods (adapted from Reid 1999).	A description of the protected areas around Bala as natural heritage with high ecological value, including a list of endemic IUCN red-listed plant and animal species (adapted from UNESCO 2015).
	A letter from the affected indigenous communities presenting their historical rights to and connection with the natural environment of the Bala basin (adapted from InternationalRivers 2010).

Dependent variables: We tested the influence of the discourse framings on three dependent variables:

(I) "No trade-off dam decision": Participants responded on a 5-point Likert scale to which extent they would personally ("if YOU were the president and had to decide") be (strongly/rather) in favour, neutral, or (rather/strongly) against construction of the Bala dam. According to the cost-benefit analysis, the Bala dam is not economically viable once environmental costs are considered; hence there is no trade-off between an inclusive view of economics and nature conservation. Therefore, we expect that participants in all three treatments would equally opt against construction (H1).

(II) "Trade-off dam decision": Participants received information about the proposal for the Cachuela Esperanza dam: location (also in Bolivia, but close to the Brazilian border), economic rationale, opposition of indigenous people and conservationists; and they were presented with a synthetic form of a cost-benefit analysis. Contrary to the Bala dam, the cost-benefit analysis for the Cachuela Esperanza dam concludes that the dam is economically viable even when environmental costs are considered; hence there appears now a trade-off between an inclusive view of economics and nature conservation. Participants responded on a 5-point Likert scale to which extent they would personally be in favour or against construction of the Cachuela Esperanza dam. We expect that ECON participants would be more inclined to decide in favour of the dam compared to participants in NON-ECON and COMB (H2).

(III) "Reasons for nature conservation": Participants were asked to state at least five general reasons for protecting the natural environment (i.e., no longer focussing on the Bolivian cases) and to rate how important they find these reasons personally. In accordance with hypothesis H3, we expected that participants in ECON would state more frequently reasons that reflect an economic welfare rationale (i.e., in line with an instrumental value of nature for the benefit of human well-being) and less frequently non-economic reasons (based for instance on intrinsic ecological value or deontological principles, rights, and duties to act as stewards of the Earth).

4. Results

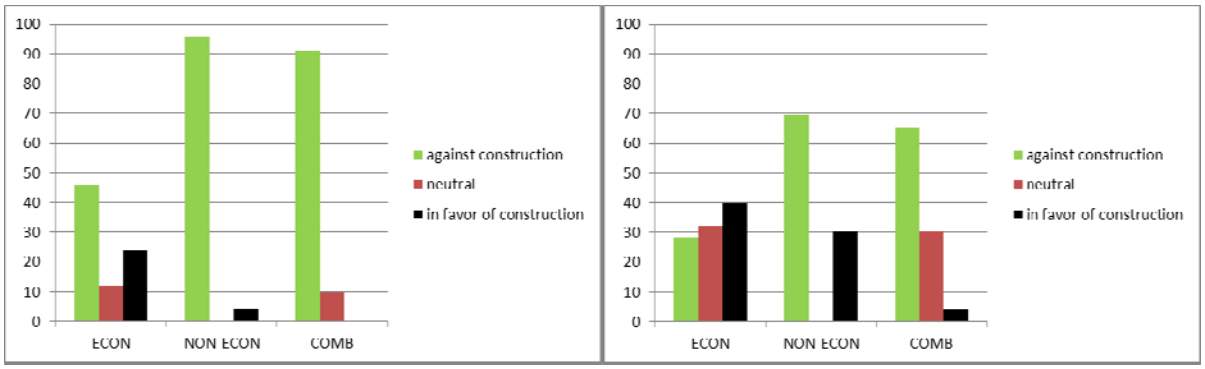
Dam decisions: For a statistical analysis of the decisions regarding dam construction, we present the Likert scale responses numerically such that positive values imply pro-conservation decisions and negative values imply decisions against conservation. Opting strongly (rather) against dam construction obtains a numerical value of 2 (1), a neutral response is 0, and strongly (rather) in favour of dam construction is calculated as -2 (-1). Table 2 shows the frequencies of responses in the different treatments for dependent variables (I) and (II) and compares the means. The Mann-Whitney U-test (MWU) is used to test for statistically significant differences in the distributions between treatments. For illustration purposes, the graphs in Figure 1 show the distributions with bundled responses for decisions against construction (2 and 1) and in favour of construction (-1 and -2).

Table 2. Frequencies and means in dam decision without (I) and with (II) trade-off

	(I) No trade-off dam decision			(II) Trade-off dam decision		
Treatment	**ECON**	**NON-ECON**	**COMB**	**ECON**	**NON-ECON**	**COMB**
Strongly against (2)	5	9	16	2	5	11
Rather against (1)	11	13	5	5	11	4
Neutral (0)	3	-	2	8	-	7
Rather in favor (-1)	5	1	-	7	6	1
Strongly in favor (-2)	1	-	-	3	1	-
# participants	25	23	23	25	23	23
Mean	**.56**	**1.30**	**1.61**	**-.16**	**.57**	**1.09**

"No trade-off dam decision": Responses in ECON are significantly lower than in both NON-ECON (MWU = -2.4, p = .02) and COMB (MWU = -3.53, p < .01), the difference between NON-ECON and COMB is not significant at 5% level (MWU = -1.77, p = .08). Contrary to our predictions, some participants were neutral or decided in favour of dam construction, in particular nine participants (36%) in ECON. The results do not support hypothesis H1 according to which an economic discourse framing leads to equal or higher inclination to opt for nature conservation as long as an inclusive CBA reveals that there is no trade-off between economics and conservation.

Figure 1. Frequencies in the "No trade-off dam decision" (left) and in the "Trade-off dam decision" (right)



"Trade-off dam decision": Responses in ECON are again significantly lower than in both NON-ECON (MWU = -2.1, p = .04) and COMB (MWU = -3.47, p < .01), the difference between NON-ECON and COMB is not significant (MWU = -1.47, p = .14). The right graph

of Figure 1 illustrates the differences between the distributions. This result is supporting hypothesis H2 according to which economic framing of nature conservation leads to fewer decision in favour of nature conservation when an inclusive cost-benefit reveals a trade-off between economics and conservation.

"Reasons for nature conservation" (III): We classified all given arguments as *economic* when they reflect an instrumental value of nature for the benefit of human well-being or *non-economic* when they are based on intrinsic ecological value or on deontological principles, rights, and duties to act as stewards of the Earth. Participants in ECON stated economic reasons for nature conservation more frequently (62% of all stated reasons compared to 53% in NON-ECON and 58% in COMB). While the differences are in the expected directions, they are not statistically significant (using Chi-Square tests) and there are no significant differences in the ratings for economic and non-economic arguments. The difference in frequency does not provide strong support for hypothesis H3. We cannot rule out that the difference in decisions is mediated by cognitive access to different types of reasons, but we do not want to overemphasize the non-significant result.

5. Discussion and conclusions

The results of the experiment provide empirical evidence for the concern mentioned at the outset. When nature conservation was framed by an economic discourse based on monetary valuation of nature's benefits for human well-being, participants in our experiment were more likely to decide in favor of the presented dam projects with large environmental impacts. We had expected that this could be the case when an inclusive CBA (i.e., one that calculates and internalizes environmental externalities) rates a development project as economically viable (H3). This finding already has implications for the effectiveness of an economic nature conservation discourse. As Monbiot (2014) has argued, it can happen that "the accounting exercise would be used as a weapon by the developers. The woods are worth £x, but by pure chance the road turns out to be worth £x +1. Beauty, tranquility, history, place, particularity? Sorry, they've already been costed and incorporated into x – end of discussion. The strongest arguments opponents can deploy – arguments based on values – cannot be heard." This is particularly relevant since in many jurisdictions the (corporate) project proponent for large scale infrastructure projects has the mandate to prepare a cost-benefit analysis (within the environmental impact analysis), although there is an economic incentive to understate or even neglect environmental impacts (Lim 1985, Rode et al 2010).

More surprisingly, and against our hypothesis H2, results from the experiment show that even when the inclusive CBA rates the project as unviable, the economic discourse reduces people's propensity to decide against the dam project. A possible explanation may be that an economic framing strengthens the narrow economic rationale that a project should be undertaken whenever it leads to more monetary benefits than costs, i.e. irrespective of externalities. After all, profit maximization remains a dominant paradigm of economic rationality and can be expected to influence decision-making, in particular among economics and business students as in the participant population (Le Menestrel 2002, Rubinstein 2006). This possible explanation and others should be addressed in a follow-up study.

From a policy perspective, the good news from our results is that the reductionist tendency induced by a purely economic discourse can be avoided by presenting a non-economic discourse (based for instance on ecological value or deontological principles, rights, and duties to protect our Earth) side by side with an economic rationale. This raises the question whether "crowding out" is an appropriate term for the effect that is at play. When both economic and non-economic arguments are presented, the economic ones do not seem to erode the non-economic ones. It is rather that when non-economic perspectives are not mentioned at all (as here in the ECON treatment) that people tend to reduce conservation considerations to those presented in economic terms.

Results from this decision experiment with hypothetical choices by a student population will raise evident questions concerning generalizability (Levitt and List 2007, Falk and Heckman 2009). For instance, the role of students as participants (vs. "real" decision makers) is frequently criticized, although one can argue that basic psychological mechanisms should work for all people. Moreover, for evaluating the overall policy relevance of framing effects, it is crucial to understand which part of the population is sensitive to economic framing, and how persistent the effects are over time. Of course, a decision experiment cannot represent the functioning of a lengthy socialisation process or even a policy campaign or gradual change in the public discourse. Nor can it test whether framing effects are persistent over a longer period of time. It is also not clear to which extent framing in a specific decision context (example here: a development project with environmental impacts) will affect judgment and decision making on nature conservation in other decision contexts. The decision context can vary for instance regarding type of decision task (e.g., public project or consumer choice), region or type or scope of the effects on nature, or type and scope of economic costs and

benefits. Such questions should be addressed in future research and using the full spectrum of empirical research methods.

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