

ORIGINAL ARTICLE

Exploring the last man argument: Evidence on society's disposition toward Nature's legal rights

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Abstract

Legal scholars are discussing the idea of giving nature its own rights. However, this is more likely to occur if the population accepts such rights in principle. To explore this question, we turn the thought experiment known as “The Last Man Argument” into an actual survey experiment. We ask a representative sample of the German population to imagine they are the last human alive and might enjoy destroying the only remaining oak tree. Using a between-subjects design, we vary the motives for doing so (and, in one treatment, the object of destruction). This thought experiment is unique in removing all possible extrinsic motives for preserving nature, thereby providing clear evidence for humans’ belief in nature’s intrinsic value and making a case for nature’s rights. Most men, and considerably more women, refrain from destroying the oak. This gender difference only disappears when the scenario concerns the destruction of the Brandenburg Gate, a German landmark.

KEYWORDS

nature’s intrinsic value, rights of nature, survey experiment

INTRODUCTION

You cut down the apple tree in your neighbor’s garden because its shadow bothered you. The neighbor is suing you and will probably win because you have violated her rights. But what about the tree’s rights? Does it have rights of its own? Should it have? These are difficult questions because it is hard to imagine a tree that does not benefit any human (even though the benefits might be more indirect or potential than those of an apple tree). However, this is one of the cases where a thought experiment helps to think the issue through. A thought experiment is a hypothetical (often counterfactual) scenario designed to sharpen thinking about more realistic and general questions,

including moral problems (Brun, 2018, p. 196; Irvine, 1991, p. 150; Swirski, 2007, p. 97).

There is one such experiment concerning the rights of trees, a variant of Routley’s (1973) “Last Man” thought experiment by Willott and Schmidtz (2002, p. xiii): “You are the last human being. You shall soon die. When you are gone, the only life remaining will be plants, microbes, and invertebrates. For some reason, the following thought runs through your head: Before I die, it sure would be nice to destroy the last remaining redwood. Just for fun.”

The point of this scenario is that there is simply no other human being left to suffer from this act. Therefore, if you refrain from destroying the last remaining redwood, you are implicitly acknowledging its intrinsic value, which is not derived from human utility.

Björn Frank and Blanca Tena-Estrada contributed equally to this work.

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According to this criterion, are people inclined to attribute rights to nature? And which traits would predict the answer? The purpose of this exploratory study is to find out just that.

Anthropocentrism versus rights of nature

While the biblical story of Noah's Ark renders humankind as God's creatures' custodian (Callicott, 1986), a large part of Genesis can be read as anthropocentric, seeing the natural world as man's subject. This dogma, spread by Christianity in the Western world, has hardly been challenged by any other set of values shaping how we behave toward nature. Nonetheless, religious texts by Benedict of Nursia, Francis of Assisi, and John Calvin, along with the language and practices of the Sami People, indicate traces of respect for nature and acknowledgement of its intrinsic value according to Gilbert et al. (2024).

Whether a human-induced change is legitimate for pleasure or survival depends on a person's convictions. A tree, a river, or any natural object were, until recently, without legal rights of their own. Their conservation was justified in terms of human consumption and enjoyment, not intrinsically. Stone (1972, p. 456) argued that "it is hard to see it and value it for itself until we can bring ourselves to give it 'rights'." Stone (1972) proposed granting rights to ecosystems. Independently, the Chilean lawyer Stutzin (1984) in 1973 defended the concept of nature's personality as only conceivable as a legal entity (see Tanasescu, 2022; Nash, 1989 on the roots and intellectual origins of the RoN-movement). A guardian would represent ecosystems in court to defend them when they were in danger. 36 years later, Ecuador became the first country to enshrine the Rights of Nature in its constitution (Tanasescu, 2013). Meanwhile, the Whanganui River in New Zealand and the Mar Menor in Spain are just two of at least 409 known RoN initiatives worldwide (Putzer et al., 2022).

Philosophically, things can have an instrumental and noninstrumental (or intrinsic) value, the former when the object serves as an instrument, a means to serve human wellbeing, and the latter when it is valued irrespective of benefits for humans (Willot & Schmitz, 2002). From a non-anthropocentric view, the members of the ecocommunity can be said to have value for their own sake. In contrast, in mainstream economic theory, particularly cost-benefit analysis (e.g., Johansson, 1993; Zerba & Bellas, 2006), only humans can grant value; that is, value exists only with respect to humans (however, see Ng, 1995, for an extension of utilitarianism to animals). This also holds for the case of existence value—the preference human beings

might have for something to exist even if they do not use it. Extensive research from environmental economics aims to elicit existence value, or the value of nonuse resources (Carson et al., 2003; Chambers & Whitehead, 2003). Nevertheless, it might be the value of nature to other humans, or humanity, that drives these results—be it aesthetic values, ecosystem stabilization, scientific research values, teaching values, habitat reconstruction values, conservative values, and others (see Ehrenfeld, 1976, for a more comprehensive list).

In the empirical and experimental literature, the most original attempt to clearly isolate intrinsic valuation is by Boyce et al. (1992). In an experimental market, they let subjects submit their willingness to accept (WTA) or their willingness to pay (WTP) for trees (Norfolk Island pines, an evergreen pot plant). Buyers' bids and sellers' reservation prices were considerably higher when leftover trees were destroyed rather than left with the experimenter. Boyce et al. (1992) interpret this as evidence of the plants' intrinsic value: people want to save the plants they do not own from destruction. However, as they are saving the trees for a world inhabited by humans, a possible alternative explanation could be simple altruism.

Legal recognition of the rights of nature has mostly arisen from popular participation. In the case of the Ecuadorian Constitution (Tanasescu, 2013), in addition to the official assembly, many associations came together to share their opinions and proposals in plenary discussions. Similarly, the Mar Menor rights were recognized thanks to a popular legislative initiative (Gilbert et al., 2024). The inclusion in the constitution or law in these cases follows the diffusion of a new understanding of the role of nature in society, making room for ecocentric or biocentric principles. Cooter (1998) has argued that, when resolving disputes or interpreting the law, the courts represent the moral framework of society, and hence, their most important function is to express social values. Moral rights of nature are not a sufficient condition for implementing legal rights of nature (Corrigan & Oksanen, 2021, p. 8). However, society's acceptance of the moral rights of nature might be a necessary condition not only for the law's introduction, at least in democracies, but also for compliance. The mere introduction of the rights does not entail a direct change in mindset (attitude). The law could face backlash if it fails to meet citizens' standards of justice. Compliance depends on people's perception of the law (Bilz & Nadler, 2014). The perception that a law is legitimate leads people to comply with it.¹ The purpose of our experiment is to explore the

¹For the view that law can express values, which in turn can influence behavior, see, e.g., Alvarez (2021); Cooter (1998); Gutmann and Morales Naranjo (2021).

sociodemographic characteristics associated with predispositions toward granting rights.

Granting rights to nature sounds like, but is fundamentally different from, granting rights to humans. Environmental liability is an established remedy for environmental problems (e.g., Basse, 2001), yet it aims to reach a socially optimal (typically nonzero) level of externalities. Furthermore, it relies on the possibility of compensating victims à la Coase (1960). Nature, however, cannot negotiate in this sense, and it has no use for monetary compensation. Giving local communities the right to sue polluters reduces externalities to zero. However, this might be a “second-best” option, roughly comparable to smoking prohibition in public places, which might be more efficient—as it is better targeted—than a cigarette tax (Frank, 1995; Hofmann & Nell, 2012).

Our research does not contribute to such an anthropocentric possible justification of RoN. In fact, it is not normative at all, but as a survey experiment, it is positive. Hence, it differs from the legal analysis of RoN, which asks questions such as: Can rights of nature already be derived from current law? If a new law is to be introduced to establish rights of nature, under which principles? And does it raise any concern? A specific example for research guided by the first question is this: In the 1980s, industrial waste severely affected the North Sea, killing seals, but not harming humans directly. So, organizations sued in the name of the seals. The court dismissed the case, citing the lawsuit's incongruity (Gutmann & Morales Naranjo, 2021). In 1994, the new Art. 20a Grundgesetz (GG), the German constitution, introduced the state's responsibility to protect nature. It does not guarantee citizens' right to a healthy environment, nor does it recognize nature as a legal subject (Alvarez, 2021). However, the latter point is debated; Fischer-Lescano (2018) argues that Art. 20a GG implies nature's rights although this “requires modifications to legal doctrine's understanding of personhood and to the architecture of legal representation” (Fischer-Lescano, 2020, p. 249).

When studying the design principles for new laws, Ecuador is the prime example. The Ecuadorian constitution facilitates the work of nature's representatives; claims can be made either before deterioration occurs to prevent it or, once the damage is done, to repair and sanction it to avoid similar cases in the future. Representing nature is free of charge, and the onus is on the polluter/defendant to prove that there is no damage to nature. The court can be located either in the affected area or where the company is based (neither of which is necessary for the system to work, but it would likely facilitate the process logistically). To legitimize RoN, society's ruling bodies have embraced biocentrism and

ecocentrism as ethical theories. There has been a shift in how public policymakers, legislators, and judges view nature, from the environment for human use to nature's own moral status (Gutmann & Morales Naranjo, 2021).

However, enacting and enforcing such laws is more likely when there is societal will to do so. While our study of precisely this question is largely exploratory, in the next section, we discuss an *ex ante* hypothesis that previous research clearly suggests.

Gender

Specific demographic variables might determine how people set value. The existence of a “Patriarchy's Weltanschauung” suggests a potential impact of gender. Ecofeminism (Shiva, 1992) denounces that it is not only women who are degraded to a lower level, but that nature is degraded as well. Since for nature to have value, it is dependent on the gain it produces to male holders of power and influence. According to Bloodhart and Swim (2020), the experience of marginalization also sensitized the female gender to reject hierarchical values.

Milfont and Sibley (2016, p. 86) found that empathy and adherence to social dominance orientation are determinants of the gender difference in adopting pro-environmental attitudes. Empirical evidence suggests a discrepancy in environmental behavior between genders. Hunter et al. (2004), using international cross-sectional data, found that women are more likely than men to be engaged in environmentally oriented behavior in most of the countries studied; the effect was smaller in Germany than in the other Western countries, though. Among entrepreneurs, women are more likely to establish organizations oriented toward environmentalism (Hechavarria, 2016). Also, in an international cross-sectional study, Norgaard and York (2005) found that the share of women in parliament correlates with the number of environmental treaties it ratifies. Women display greater concern and pro-environmental behavior (Hunter et al., 2004; Zelezny et al., 2000). Stern et al. (1993) found that women ascribe more severe negative consequences to environmental damage than men do, which, in turn, leads to more pro-environmental behavior. Gender also influences MBA students' opinions about imposing environmental accountability on enterprises and governments (Fukukawa et al., 2007).

Social roles and identity theory explain the difference. The socialization process of females focuses on nurturing, especially on the moral principle of care, which might extend to objects other than their own offspring (Beutel & Marini, 1995; Eagly, 1987). Males, typically raised to be independent and competitive, even face

ostracism for engaging in pro-environmental activities (Rome, 2006). Dietz et al. (2002) indicate that the level of altruism, which is more prominent in females, correlates with environmentalism. In his *Treatise of Human Nature*, David Hume sees the emotional roots of morality (Callicott, 1986), which makes the socialization process of females ideal for endowing nonhumans with nonutilitarian value. In the next section, we describe the scenario we confront our subjects with. Although the scenario is very different from the literature surveyed above, we still expect gender to matter when answering our core question.

MATERIALS AND METHODS

Experimental design

We preregistered our experiment in December 2022 at AsPredicted (#116666). As part of a survey of a representative sample of the German population, we asked, depending on the treatment, one of these four questions:

Imagine the following: You are the last human being. You shall soon die. When you are gone, the only life remaining will be animals and plants. Assume that in this situation you have the following possibility: to press a button

...and destroy the *last oak*. You have the feeling that this would bring you a lot of joy. Would you do it? (*baseline oak treatment*).

...and destroy the *Brandenburg Gate*. You have the feeling that this would bring you a lot of joy. Would you do it? (*Brandenburg Gate treatment*).

...and destroy the *last oak*. This will get you to a powder buried under the oak tree. If you take the powder, you will have a *very strong feeling of happiness for a week*. Would you push the button? (*happiness powder treatment*).

...and destroy the *last oak*. This will get you to a powder buried under the oak tree. If you take the powder, *your life will be extended by about a year* (there are no harmful side effects). Would you push the button? (*life prolongation treatment*).

We wanted the baseline treatment to be close to the thought experiment by Willot and Schmidt (2002) cited in the introduction, with the main difference that we

could not expect the German subjects to be familiar with redwood trees. Instead, we used oaks, which are of comparable prominence in Germany. The first site that was awarded the title “Nationales Naturmonument” (national nature monument) is a 164-hectare forest featuring roughly 240 large trees, mainly oaks, called “Ivenacker Eichen” (Ivenack Oaks). Oaks (together with lindens) were traditionally considered the German national tree (Wilson, 2016). From 1950 to 2001, the back of a common German coin (50 pfennig) showed a woman planting an oak tree, while German 1-, 2-, and 5-euro-cent coins today show oak leaves.

We follow Willot and Schmidt (2002) in the choice to focus on one tree genus (thus “a precious custodian of unique genetic material” as Callicott, 1986, p. 155 puts it), deviating from the inventor of the “Last Man” argument, Richard Routley, who asked readers to imagine a much larger extent of destruction: “eliminating (...) every living thing, animal or plant (but painlessly if you like, as at the best abattoirs)” (Routley, 1973, p. 207). We opted against this scenario, as it is much harder to imagine taking pleasure in the destruction of every living thing, compared to the enjoyment of eradicating a single tree. An alternative method that is less demanding on subjects’ imagination was introduced by Bastian et al. (2023), who asked participants to rate how wrong it would be of someone else to destroy a number of different objects in the last man situation.

However, the thought experiment variant by Willot and Schmidt (2002), which we follow in our baseline treatment, also demands a lot of our subjects’ imagination: It tells them to envision themselves enjoying the destruction of a tree without giving a particular reason. Had we not done that, people would have answered “yes” only if two conditions are fulfilled at the same time: First, they actually—and not only in their imagination—enjoy, or would enjoy, destroying the tree (whether the joy comes from the generation of a feeling of power, retaliation for the end of humanity, aesthetic pleasure, seeing destruction as a poetic act, or a more dark reason, such as sadism). Second, there is nothing that outweighs the joy—in particular, no moral costs due to an intrinsic value of the tree. We wanted to isolate this second motive. Admittedly, respecting the intrinsic value of the last tree might not be the only imaginable reason to refrain from destroying it. There might be the wish to preserve the tree’s beauty for your last moments, or shame for the action (even though one of Routley’s reasons for asking the reader to imagine being the last human being surely was to exclude shame), or a valuation of the tree’s uniqueness per se. It might thus be argued that using the last man experiment overestimates the prevalence of intrinsic values’ acceptance. Yet we

expect this problem to be much larger had we used Routley's original scenario, which implies destroying nature completely.

Our *happiness powder* and *life prolongation* treatments serve the purpose of helping the subjects to imagine that they might benefit from the act of destruction. The reason for introducing the Brandenburg Gate treatment is to measure the contrast between the willingness to destroy a part of nature, such as the last tree of a genus, in comparison to a man-made object, the Brandenburg Gate. In both cases, to save them would be to refrain from a joyful act.

If participants refrain from destroying the last oak, we can conclude that they perceive it as having a moral value. In our scenarios, destroying the last oak (or possibly an ecosystem that depends on the oak) is bad not because of its consequences for human beings, but because of the oak's own value.

Hypotheses

The main research question is exploratory: Are people willing (or: how many are willing) to let the last oak tree live, even if there are no human beings left to enjoy the tree? The answer aims to elicit whether there is a case for granting rights to nature based on people's beliefs. The actual act of destruction is depicted as joyful, so if one's joy were valued more highly than the existence of the last remaining oak or the Brandenburg Gate, participants would destroy them. It is therefore plausible to assume that a greater salience of the benefits of destruction should have an impact on subjects' choices, leading to our first two hypotheses:

H1. *Compared to the baseline treatment, in which destruction of the tree is imagined to be joyful, fewer people refrain from destroying it if its destruction prolongs survival.*

H2. *Compared to the baseline treatment in which the destruction of the tree is imagined to be joyful, fewer people refrain from destroying the tree when they are given reasonable reasons for the joy (access to a pleasurable drug).*

One treatment accounts for the possibility that people refrain from destroying the oak because of a general aversion to destroying things. However, if this does not hold for the entire sample, we can hypothesize thus:

H3. *Compared to the baseline treatment, more people would destroy the Brandenburg Gate.*

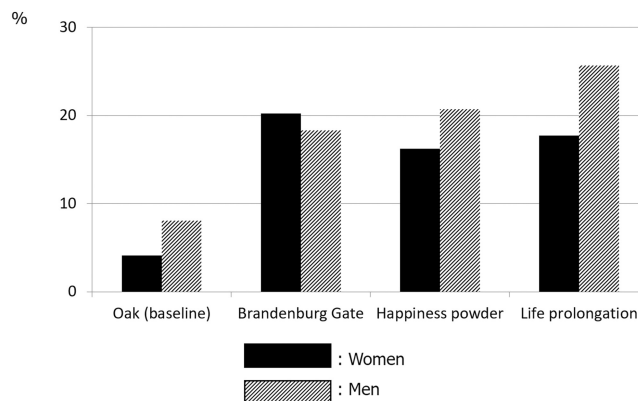


FIGURE 1 Percentage of subjects opting for destruction, by treatment and gender.

In addition to this hypothesis regarding the treatment effect, as mentioned in the introduction, previous research on attitudes toward the environment suggests a gender difference. Thus, we would expect that:

H4. *Compared to men, more women refrain from destroying the oak.*

RESULTS

In total 3198 participants² completed the survey: 825 in the baseline treatment, 833 in the *Brandenburg Gate treatment*, 778 in the *happiness powder treatment*, and 762 in the *life prolongation treatment*. Only 6.3% of the respondents in the baseline treatment would destroy the oak. In line with our first and second hypotheses, which state that more people are willing to destroy the oak if the benefits are more salient, the share of destroyers of the oak is markedly higher, 18.5% and 21.7% in the happiness powder and in the life prolongation treatment, respectively. Using a two-sided Fisher exact test, the difference between baseline and any other treatment is highly significant, $p < 0.00001$. Figure 1 illustrates the percentage of subjects opting for destruction, by treatment and gender.

Regarding the gender hypothesis, taking the participants of the three treatments involving oaks together, the difference between females and males is significant with $p = 0.034$ (Fisher exact, two-sided), supporting H4. However, more women than men would be willing to destroy the Brandenburg Gate, and while the difference is not significant, it clearly demonstrates that women do

²The professional panel provider Psyma recruited the participants to be representative of the German population with regard to age, gender and federal state according to the distribution of the official statistics.

TABLE 1 Marginal effects of the probit regression (at sample means) and the linear probability model.

	Linear probability model	Probit models	
	All treatments	All treatments	Excluding Brandenburg Gate treatment
Brandenburg Gate treatment ^a	0.1278 (<0.001)	0.1577 (<0.001)	
Happiness powder treatment ^a	0.1260 (<0.001)	0.1559 (<0.001)	0.1504 (<0.001)
Life prolongation treatment ^a	0.1566 (<0.001)	0.1796 (<0.001)	0.1706 (<0.001)
Female	−0.0332 (0.014)	−0.0350 (0.008)	−0.0373 (0.011)
Age	−0.0028 (<0.001)	−0.0027 (<0.001)	−0.0015 (<0.003)
Education	−0.0075 (0.317)	−0.0065 (0.374)	−0.0008 (0.913)
Income level	0.0008 (0.656)	0.0005 (0.737)	0.0016 (0.382)
Veg diet	−0.0033 (0.889)	−0.0001 (0.996)	0.0213 (0.934)
With children	0.0004 (0.975)	−0.0015 (0.912)	0.0134 (0.379)
Life satisfaction	−0.0010 (0.749)	−0.0006 (0.828)	0.0023 (0.509)
Risk tolerance	0.0148 (0.031)	0.0155 (0.021)	0.0148 (0.047)
Time discounting	0.0067 (0.427)	0.0052 (0.527)	−0.0060 (0.503)
Altruism	−0.0136 (0.060)	−0.0152 (0.028)	−0.0138 (<0.001)
New environmental paradigm	−0.0091 (<0.001)	−0.0083 (0.001)	−0.0117 (<0.001)
Constant	0.4381 (<0.001)		
Obs.	3191	3191	2360
R ² /pseudo R ²	0.0640	0.0795	0.1050879

Note: Dependent variable: Decision to destroy.

^aBaseline: oak; *p*-values in parentheses; bold type indicates that *p* < 0.01.

not per se refrain from acts of destruction more than men. Concerning our third hypothesis, the difference between the Brandenburg Gate and the baseline treatment is significant (*p* < 0.00001). We do not get this result when comparing the other two oak treatments with the Brandenburg Gate treatment. However, since the benefits of destroying the Brandenburg Gate were not made salient at all, its destruction cannot be meaningfully compared to the life prolongation and happiness treatments.

We estimated a probit model to control for other variables that could play a role in the destruction (Table 1). The main results reported so far remain intact: the higher the salience of the benefit of destruction, the more likely it is, and women are less likely to destroy than men. The likelihood of destroying the last oak significantly decreases with higher age³ and with higher risk aversion, self-reported on a scale from 1, “Not at all willing to take risks,” to 5 “Very willing to take risks.” An environmental mindset, measured using a short version of the New Environmental Paradigm (NEP) scale by Dunlap et al. (2000),⁴ had the same effect. Also, those who, on a five-point scale, claim that they are more willing to give

something away without getting anything in return (this survey’s proxy for altruism) are significantly less likely to destroy.

One might expect that those who are more sensitive to animal welfare would refrain from altering their ecosystem. However, following a more animal-friendly diet, as measured by a dummy variable that takes the value 1 for vegan or vegetarian subjects and 0 otherwise, was not significant.

Other variables without a significant impact are education (on a four-point scale), income category (ranging from 1 for a monthly household income below €500 to 21 for incomes above €10,000), having children in the

³Age squared was not significant, indicating that this relationship is neither U-shaped nor ∩-shaped.

⁴Subjects assess if they “strongly disagree,” “somewhat disagree,” are “undecided,” “somewhat agree,” and “strongly agree” with six statements from Dunlap et al. (2000)’s New Ecological Paradigm: “Humans are severely abusing the planet,” “Plants and animals have as much right as humans to exist,” “The balance of nature is very delicate and easy to upset,” “Humans have the right to modify the natural environment to suit their needs,” “The balance of nature is strong enough to cope with the impacts of modern industrial nations,” and “Humans were meant to rule over the rest of nature,” the answers to the first three are coded as 1 for “strongly disagree” to 5 for “strongly agree,” and vice versa for the last three. The sum of the values is the NEP variable.

household, and life satisfaction, self-assessed by subjects on a scale of 0 to 10.

Overall, it is personal characteristics and attitudes (with the notable exception of vegetarianism and veganism) rather than socioeconomic variables that have an impact.

DISCUSSION

The contribution of this paper is twofold. It provides evidence of the moral intuitions about the intrinsic value of nature by collecting the responses to a thought experiment from a representative sample of the German population. The results are also in line with the introduction of the Rights of Nature. As participants had to consider the situation of being the last human on the planet and destroying the last oak (or, in one treatment, the Brandenburg Gate), the definition of the object's value is independent of humans (Willot & Schmidt, 2002)—once human beings are gone, no one will be able to value trees or landmarks. We find that the oak is most destroyed in the treatment in which participants receive an extra year from it, the *life prolongation treatment*. However, even in this treatment, more than three quarters of the population refrain from destruction. Furthermore, we find a difference between the genders, with males tending to destroy it more than females.

Like many thought experiments, Routley's is trying to convince readers by describing a specific scenario in which one choice of action is intuitively right (to the reader), in order to then conclude concerning an underlying more general principle (in this case, the intrinsic rights of nature). This comes with two limitations: First, the presumption about the readers' intuition might be wrong. Even if a single reader agrees that a particular action is obviously right, it is unclear (to him or her or to the author of the thought experiment) how many others do. Statistically speaking, it is an "experiment" with $n = 1$ subjects, which is not representative. Second, it might not be justified to base the conclusion concerning nature's intrinsic value on the observed choice (not destroying the tree) if the action can be explained otherwise. We contribute to solving the first issue by turning the thought experiment into a real one, while not fully resolving the second problem. But at least the two treatments with salient benefits for subjects who destroy the tree attempt to override any benefits of letting it live apart from intrinsic value.

The method we used requires subjects to imagine a highly unfamiliar hypothetical situation. Replications of our study might achieve the same goal, that is, disentangling rights of nature from its usefulness, through other means. Another caveat is that gender

differences in environmentalism are not universal (Davidson & Freudenburg, 1996); hence, a replication in other countries might obtain different gender effects. The thought experiment turned into an empirical study can serve not only to inform the discussion on introducing legal rights to nature but also to enhance researchers' methodological framework.

It is a recent development that natural objects have been given rights of their own to protect them from improper exploitation. Giving them a legal status reflects their new social role: they are no longer passive objects but can defend themselves in court through a guardian. This new paradigm conveys an understanding of nature which could affect people's perceptions of it. However, the likelihood that these rights of nature will be established and enforced depends on a basic human disposition to grant and accept these rights. We find evidence that this disposition exists.

AUTHOR CONTRIBUTIONS

Blanca Tena-Estrada: Conceptualization; data curation; formal analysis; funding acquisition; investigation; methodology; project administration; resources; software; supervision; validation; visualization; writing – original draft; writing – review and editing. **Björn Frank:** Conceptualization; data curation; formal analysis; funding acquisition; investigation; methodology; project administration; resources; software; supervision; validation; visualization; writing – original draft; writing – review and editing.

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CONFLICT OF INTEREST STATEMENT

The authors declare no conflicts of interest.

DATA AVAILABILITY STATEMENT

The data that support the findings of this study are openly available in figshare at <https://doi.org/10.6084/m9.figshare.25481827.v1>.

ETHICS STATEMENT

We obtained written consent from participants. Participants were comprehensively informed about the purpose and

procedure of the survey, measures for data protection and ensuring their anonymity, the voluntary nature of their participation, and the conditions for processing their data. This information was provided to them in advance, and their consent for participation and data processing was obtained through actively checking a box (opt-in).

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