

**Beliefs about Human-Nature Relationships and Implications for Investment and Stewardship
Surrounding Land-Water System Conservation**

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1. Full Study Vignettes

Below are full content of the five study vignettes, with attention checks. Target manipulated content is bolded and italicized for these materials, but was presented to participants without this formatting. Similarly, the correct answers to attention check questions are also bolded and italicized for these materials.

1a. Image of River Accompanying all Vignettes

Figure S1: Photograph of Urban River. This same photograph of the Muddy River in Boston (taken by author N.B.) accompanied all vignettes.



1b. Natural / Local Consequences

Today, there is a *natural* river flowing through a city. *The river was there long before people established the city.* In the 1880s, *the city was rapidly developing and began to connect its drainage systems to the river.*

So, the river is fed by run-off from the roads, parking lots, buildings, and private properties of the city. All this run-off brings chemical pollution and physical debris that hurt the water quality of the river. But, the river remains a **local** resource because the *river serves as a drainage system that takes run-off away from the city into the nearby lake.*

The river, along with its surrounding wetlands of diverse plants, helps to filter this runoff and *reduce much of the pollution that the city feeds into the river.* In this way, the river benefits the *local life of the city.*

In the past decade, increased pollution flowing from the city into the river has *damaged the plants and ecosystem along the river and the water is less filtered than it used to be.* As a result, *the quality of the water remaining in the city* is worse than it used to be, diminishing these *local* benefits.

The local, state, and federal government will all need to make significant investments in the river to restore the ecosystem and therefore fix this issue.

Attention Check/ Manipulation Check Questions (Correct answers marked in bold italics):

Where does the river flow into?

- A large river
- **A lake**
- The Ocean

What happened in the 1880s in this story?

- **the city was rapidly developing and connected its drainage to the river.**
- the river was turned into a tourist attraction
- the river was turned into a pond

1c. Artificial / Local Consequences

Today, there is a *manmade* river flowing through a city. The river was *built by people who established the city*. In the 1880s, *the city was rapidly developing and all the water from around the city was funneled to create this new river*.

So, the river is fed by run-off from the roads, parking lots, buildings, and private properties of the city. All this run-off brings chemical pollution and physical debris that hurt the water quality of the river. But, the river remains a local resource because the river serves as a drainage system that takes run-off away from the city into the nearby lake.

The river, along with its surrounding wetlands of diverse plants, helps to filter this runoff and *reduce much of the pollution that the city feeds into the river*. In this way, the river benefits the *local life of the city*.

In the past decade, increased pollution flowing from the city into the river has damaged the plants and ecosystem along the river and the water is less filtered than it used to be. As a result, *the quality of the water remaining in the city* is worse quality than it used to be, diminishing these *local* benefits.

The local, state, and federal government will all need to make significant investments in the river to restore the ecosystem and therefore fix this issue.

Where does the river flow into?

- A large river
- *A lake*
- The Ocean

What happened in the 1880s in this story?

- *the developing city funneled its waste water to create the river.*
- the river was turned into a tourist attraction
- the river was turned into a pond

1d. Natural / Global Consequences

Today, there is a *natural* river flowing through a city. The river was there long before people established the city. In the 1880s, the city was rapidly developing and began to connect its drainage systems to the river.

So, the river is fed by run-off from the roads, parking lots, buildings, and private properties of the city. All this run-off brings chemical pollution and physical debris that hurt the water quality of the river. But, the river remains a global resource because the river filters water run-off from the city before the water enters into the nearby ocean.

The river, along with its surrounding wetlands of diverse plants, *helps to filter this runoff and reduce much of the pollution that the city feeds into the river.* In this way, *the river benefits all areas connected to the ocean.*

In the past decade, increased pollution flowing from the city into the river *has damaged the plants and ecosystem along the river and the water is less filtered than it used to be.* As a result, the *quality of the water entering the ocean* is worse quality than it used to be, diminishing these *global* benefits.

The local, state, and federal government will all need to make significant investments in the river to restore the ecosystem and therefore fix this issue.

Where does the river flow into?

- a larger river
- a lake
- *the ocean*

What happened in the 1880s in this story?

- *the developing city connected its drainage system to the river*
- the river was turned into a tourist attraction
- the river was turned into a pond

1e. Artificial / Global Consequences

Today, there is a *manmade* river flowing through a city. *The river was built by people who established the city. In the 1880s, the city was rapidly developing and all the water from around the city was funneled to create this new river.*

So, the river is fed by run-off from the roads, parking lots, buildings, and private properties of the city. All this run-off brings chemical pollution and physical debris that hurt the water quality of the river. But, the river remains a global resource because the river filters water run-off from the city before the water enters into the nearby ocean.

The river, along with its surrounding wetlands of diverse plants, helps to filter this runoff and reduce much of *the pollution that the city feeds into the river*. In this way, *the river benefits all areas connected to the ocean*.

In the past decade, increased pollution flowing from the city into the river *has damaged the plants and ecosystem along the river and the water is less filtered than it used to be*. As a result, *the quality of the water entering the ocean is worse quality than it used to be*, diminishing these *global* benefits.

The local, state, and federal government will all need to make significant investments in the river to restore the ecosystem and therefore fix this issue.

Q18 Where does the river flow into?

- a larger river
- a lake
- *the ocean*

Q19 What happened in the 1880s in this story?

- *the developing city funneled its waste water to create a river*
- the river was turned into a tourist attraction
- the river was turned into a pond

1f. Control

Today, there is a river flowing through a city. This city was built in the 1880s. The river weaves through most of the city. It meanders past parking lots, buildings and private properties along the way.

Many people see the river while commuting to work. In the past decade, there has been damage to the plants and ecosystem along the river and the water is less filtered than it used to be.

As a result, the quality of the water in the river is worse than it used to be. The local, state, and federal government will all need to make significant investments in the river to restore the ecosystem and therefore fix this issue.

Where does the river flow through?

- a lake
- *a city*
- a forest

Q23 What happened in the 1880s in this story?

- *the city was built*
- the river was turned into a tourist attraction
- the river was turned into a pond

2. Extended Participant Demographics

2a. Descriptive Statistics

Age and Gender Breakdown, by Condition. As reported in Table S1, there were no differences in participant age across conditions: $F(4,374)=1.37, p=.24$. Similarly, the gender breakdown did not differ across groups: $X^2(4, 378)= 3.877, p=.21$. Thus, the condition-based differences reported in the main text can not be explained by group-level age or gender differences.

Political Affiliation, by Condition. Participants wrote in their political affiliation. The majority self-identified as democrat/liberal ($N=189$), followed by republican/conservative ($N=83$), independent ($N=64$), and no affiliation ($N=22$). In addition, small numbers of participants identified as moderate ($N=6$), libertarian ($N=3$), socialist ($N=3$), or wrote in content other than a political identity (e.g., voting, Christian, ($N=6$)).

Participants also rated their political leanings in terms of both fiscal and social issues on a scale of 0 (very liberal) to 100 (very conservative). Overall, participants leaned liberal for both fiscal issues: ($M=46.18, SD=31.14, Range 0-100$) and social issues: ($M=41.56, SD=32.58, Range 0-100$). Political ratings did not differ across conditions: fiscal issues $F(4, 374)=.42, p=.80$; social issues $F(4, 374)=.089, p=.99$. Thus, the condition-based differences reported in the main text do not stem from political leanings.

Table S1. Extended summary of participant demographics, by vignette condition.

	Natural/Local (N=80)	Artificial/Local (N=85)	Natural/Global (N=65)	Artificial/Glob al (N=67)	Control (N=84)
Age M(SD)	39.32 (13.48)	39.38 (11.80)	36.82 (10.95)	35.15 (10.34)	36.64 (12.57)
Gender Counts	34 Female, 46 Male	38 Female, 45 Male	19 Female, 46 Male	32 Female, 35 Male	33 Female, 50 Male, 1 Undisclosed
Fiscal M(SD)	43.50 (30.63)	47.35 (30.67)	46.62 (34.65)	49.48 (30.17)	44.62 (30.40)
Social M(SD)	41.38 (30.81)	43.10 (33.00)	40.49 (35.39)	42.15 (31.15)	40.55 (33.40)

2b. Exploratory Correlations

To explore the relationships between political leanings and key variables, we ran a set of Spearman's correlations between the following: fiscal conservativeness, social conservativeness, ecological connectedness, human exceptionalism, proximity to water, investment, and stewardship. Rho

We found four significant negative relationships between conservativeness and key variables. As depicted in Table S2, both fiscal and social conservativeness inversely predicted both ecological connectedness and stewardship. This suggests that conservative and liberal individuals may differ both in their understanding of the connectedness of humans and the natural world, and their belief that humans may have a specific responsibility to protect surrounding ecosystems.

Interestingly, social but not fiscal conservativeness positively predicted investment in river clean-up initiatives, including both financial investment and investment of time spent volunteering to clean up. This suggests that social conservativeness may be a useful way to communicate with conservatives about environmental conservation initiatives. Future research should directly probe this, and whether this relationship differs between financial and time investments.

Table S2. Exploratory Correlations between Political Conservativeness and Key Variables.

Key Variable	Fiscal Conservativeness	Social Conservativeness
Ecological Connectedness	-.156**	-.213***
Human Exceptionalism	-.016	-.033
Investment	.068	.168***
Stewardship	-.229***	-.303***
Proximity to Water	.059	.047

Note: This table reports Spearman's Rho Correlation Coefficients. ** $p < .01$; *** $p < .001$

3. Confirmatory Factor Analysis for Investment and Stewardship Measures

To confirm the reliability of the composite measures of stewardship and investment, we conducted a principal components analysis on the z-transformed component variables. *Ranked priority of river cleanup project* was reverse coded so that higher scores represent higher ranked priority. Results are presented in Table S3.

Table S3. Varimax-rotated loadings of stewardship and investment measures.

Variable	Loading on Factor 1 ("Stewardship")	Loading on Factor 2 ("Investment")
City Government	.028	.555
State Government	-.022	.793
Federal Government	-.127	.714
Volunteer Hours	-.041	.747
Ranked Priority of River Cleanup Project	.538	.200
Support for Protective Laws	.854	-.211
Support for Protective Community Initiatives	.815	-.300
Perceived Human Responsibility	.741	.032
Eigenvalue (Variance Explained)	2.63 (32.9%)	1.80 (22.5%)