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## Shifting Perspectives: An Updated Survey of Environmental and Natural Resource Economists

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# Shifting Perspectives: An Updated Survey of Environmental and Natural Resource Economists

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## Abstract

In 2023, a survey was given to environmental and natural resource economists to gauge levels of consensus in the field. Respondents were queried on core topics in the discipline, including air quality, groundwater, climate change, natural resource management, land conservation, environmental justice, and more. Many of the survey questions mirrored questions from the first such survey of environmental and natural resource economists in 2012, but additional questions on newer topics were also added. From these survey results, we can determine contemporary levels of consensus in the field, as well as how these levels have changed over the last decade. We find, for the most part, significant levels of consensus today, and over time, on many key topics including the prevalence of market failures and support for policy interventions including Pigouvian taxes and cap-and-trade schemes. At the same time, some areas with lower levels of consensus today, and over time, include the effects of population growth on the environment, and what to do with revenues from policy interventions such as taxes or cap-and-trade schemes.

JEL Codes: A1, A2
Keywords: environmental policy, natural resources, professional consensus, survey, academic opinion, AERE

## Introduction

Surveys of professional economists frequently explore levels of consensus within the field on topics such as fiscal policy, public policy, and the role of government. Geide-Stevenson and La Parra Perez (2021) found that consensus in the economics profession has grown in recent decades, particularly regarding fiscal and macroeconomic issues. However, Andre and Falk (2021) highlight significant heterogeneity in economists' opinions on subjects of more academic concern. Additional studies have examined consensus within the discipline, including Fuller and Geide-Stevenson (2014), Gordon and Dahl (2013), Klein and Stearn (2007), and Alston and Kearl (1992).

Consensus within specific subfields of economics has also been explored. For instance, Whaples and Heckelman (2005) surveyed public choice economists on voting, elections, and the purpose of government, while Fuchs et al. (1998) investigated labor and public economists' views on topics such as affirmative action, minimum wage policies, and job training programs.

In 2012, the first comprehensive survey of environmental and natural resource economists was conducted among members of the Association of Environmental and Resource Economists (AERE), with results published by Haab and Whitehead (2017). The survey provided valuable insights into areas of agreement within the field. Respondents expressed strong consensus on the prevalence of market failures in environmental contexts, and broadly supported policy interventions like Pigouvian taxes and cap-and-trade systems to address these issues. Climate change emerged as a critical concern in that initial survey, with widespread advocacy for immediate policy measures including carbon taxes and emissions trading schemes. The 2012 survey also revealed strong support for sustainable resource management practices to safeguard fisheries, forests, and water resources. At the same time, the 2012 survey indicated a lack of consensus with regard to the effects of population growth on the environment, and for what to do with revenues generated from taxes or permit auctions. These early findings highlighted both areas of broad consensus and areas of complexity and diversity in opinion in the field, providing a benchmark for comparison to the current survey.

Revisiting the 2012 survey with updated data from a similarly conducted 2023 survey allows for two sorts of examinations: first, an updated survey allows for a determination of current levels of consensus in the field, on topics similar to those queried before as well as on more contemporary topics such as environmental justice and electric vehicle subsidies. Second, by retaining many of the same questions from the 2012 survey, observations can be made about how professional consensus on key environmental issues and related public policy interventions may have shifted over time.

Determining the level of professional consensus in a field serves multiple purposes. A clear consensus can advance policy by demonstrating broad support within the profession for specific, applied solutions on challenging topics such as climate change, pollution, and resource depletion. Similarly, empirical evidence on consensus amongst professional environmental and natural resource economists can aid in communication with the media and the wider public, helping to address misperceptions or misunderstandings about particular issues and related policy interventions. Another important purpose for determining consensus in the field is that it can aid

in identifying areas in need of further research and analysis, particularly those where there may not yet be high levels of consensus. Finally, the results of surveys on professional consensus can be invaluable in academic settings, providing material for classroom discussions and fostering a deeper understanding of critical issues in environmental and natural resource economics. By leveraging these results, instructors can create innovative pedagogical strategies that engage students, foster critical thinking, and bridge the gap between academic theory and real-world application.

**Survey, Sample Design, & Respondents**

In October, 2023 a link to an online survey was distributed to the membership of the Association of Environmental and Resource Economists (AERE) through an email blast.[1] Of the 1,208 members who received the survey request, 267 responded, resulting in a response rate of 22%.[2] Seventy-five of these responses were dropped: 24 due to respondents who answered that they were not AERE members, and 51 from respondents who did not provide an answer to the membership question at all. The useable sample size, therefore, was 192, implying a 16% usable response rate. This represents a decline from the 36% response rate achieved in the 2012 survey of AERE members, which had the advantage of allowing multiple reminders to survey non-respondents. A change in official AERE policy after 2012 limited the direct distribution of the membership list (and so the survey link), and this change in policy precluded the use of reminders to survey non-respondents.[3] The decrease may also reflect growing survey fatigue over the past decade, with respondents potentially inundated by a rising number of requests (Eggleston, 2024).

The 2023 survey consisted of 68 questions, most of the first 28 mimicking questions from the original 2012 survey, and grouped into eight thematic categories: 1. markets and property rights, 2. forestry resources, 3. carbon emissions and regulation, 4. fishery resources, 5. economic growth and natural resource management, 6. pollution and pollution control, 7. energy resources, and 8. international agreements and dynamic resource allocation. Respondents used a Likert scale ranging from "disagree completely" to "agree completely" to indicate their level of agreement with each statement, just as in the 2012 survey.[4, 5]

Additional questions following this first set gauged respondents' levels of concern on topics such as fuel efficiency standards, electric vehicles, environmental justice, groundwater, land conservation, biodiversity, and mining impacts. These questions employed one of two scales,

[1] IRB Approval # HS-23-351 given for the survey work by Appalachian State University Institutional Review Board.
[2] Note that this is better than the 18% response rate AERE received to its own January, 2025 membership survey, despite that survey offering the chance of winning a prize.
[3] In addition, the first announcement of the 2023 survey sent out directly by AERE included a broken link. Needless to say, this did not help the overall response rate.
[4] Specifically, the options were: “disagree completely,” “disagree mostly,” “neither agree nor disagree,” “agree mostly,” and “agree completely.”
[5] A complete set of survey responses is available upon request.

either “favor,” “oppose,” or “neutral/unsure” for policy specific proposals, or another Likert scale ranging from "not at all concerned" to "extremely concerned."[6]

A final set of 16 questions collected demographic and political data, as summarized in Table 1. Respondents answered questions about their professional roles, demographic characteristics, and political leanings. A significant majority (82%) were employed in academic institutions. Most respondents (91%) reported engaging in research, 73% taught, 30% participated in policy-related work, 26% worked in administration and 6% worked in extension. In terms of specialization, 85% identified their field of study as environmental economics, with energy economics as the next most common field (35%), based on Journal of Economic Literature (JEL) classification codes.

Respondents had worked as professional economists for an average of 16 years, and 90% held a PhD. The average age was 47 years. Respondents also shared personal details: 44% had children under the age of 17, with an average household size of 2.75 persons. Regarding gender, 70% identified as male, 26% as female, and 3% opted not to self-identify. The racial and ethnic composition reflected broader diversity challenges in the economics profession, with 86% identifying as white or Caucasian, 10% as Asian, 2% as Hispanic or Latinx, and 0% as Black or African-American.[7] Politically, 77% described themselves as very, somewhat, or moderately liberal, while 17% identified as moderate, and less than 4% leaned conservative (with n=5 missing).[8]

There are some notable differences in respondent demographics as compared to the 2012 sample. Respondents in the 2023 sample had more work experience, 16 years relative to 12 years in the 2012 sample, and they were older, 47 years compared to 42. The respondents in the 2023 sample were also more likely to be engaged in teaching, research and administration. In other words, the 2023 sample respondents were less specialized in their day-to-day work activities.[9] The 2023 sample is less likely, relative to the 2012 sample, to identify as a renewable resource economist and more likely to identify as an energy economist and/or an environmental economist. Finally, respondents in the 2023 sample are much more likely to identify as politically liberal, 77% relative to 60% in the 2012 sample. The difference in household size is statistically significant, but not substantively different.

**Measures of Consensus**

[6] Specifically, the options were: “not at all concerned,” “slightly concerned,” “moderately concerned,” “very concerned,” and “extremely concerned.”

[7] For comparison purposes, this 2023 survey was also distributed to the ResEcon listserv. Responses were broadly similar to those reported here, but that sample did include 3% of respondents identifying as Black or African-American.

[8] In January, 2025 AERE conducted its own membership survey which included a couple of demographic questions similar to our own. Both sets of survey respondents had similar age and occupational profiles, however the rest of the demographic questions aren’t directly comparable as AERE allowed respondents to click “all that apply” while this survey limited respondents to single choices.

[9] Whether this represents a change in job focus of same respondents from the 2012 to the 2023 surveys, or a change in the composition of the respondents themselves, is something that can not be determined with available data.

Tables 2-5 provide the survey statements, categorized by level of consensus: supermajority (Table 2), majority (Table 3), no majority (Table 4), and consensus over time (Table 5).[10] The first consensus measure, *Summary*, is a simple percentage-based summary level of agreement/disagreement about the survey statement. These percentages are computed after combining the "agree completely" and "agree mostly" (or "extremely concerned" and "very concerned") responses into a single category variable, and the "disagree completely" and "disagree mostly" (or "not at all concerned" and "slightly concerned") responses into another single category variable. Results for those statements that generated supermajorities (i.e. two-thirds or more) of agreement or disagreement are listed in Table 2, majorities (i.e. greater than fifty percent) are listed in Table 3, and statements without a clear consensus in Table 4. Table 5 compares consensus levels between the 2023 and 2012 surveys for those questions that were common between them.

Tables 2-5 also contain a *Consensus Rank*. This consensus measure is a combination of three key metrics: standard deviation (SD), Shannon Entropy (SE), and Tastle and Wierman (TW) consensus scores. First, the survey responses were converted to numerical values such that 1 = "disagree completely" (or "not at all concerned"), 2 = "disagree mostly" (or "slightly concerned), 3 = "neither agree nor disagree" (or "moderately concerned"), 4 = "agree mostly" (or "very concerned"), and 5 = "agree completely" (or "extremely concerned").

The SD of these numerical values will be sensitive to the specific values chosen, however, as long as the value assignments are consistent across questions the standard deviation will provide a means of comparing response dispersion across questions. SD, therefore, measures the variability in responses; lower values indicate that responses are closely clustered, signifying higher consensus.

Tastle and Wierman (2007) argue against using SD as a measure of ordinal dispersion, however, because the standard deviation necessarily assumes strict cardinality of responses, which can of course be violated in categorical responses. Another widely used measure of consensus for categorical response questions is SE (Shannon 1948), which uses the empirical probabilities of each response to calculate a measure of dispersion that is similar to the standard deviation. SE evaluates the randomness or disorder of the response distribution; lower entropy suggests greater alignment among respondents.

However, it has been shown that the SE measure of consensus is overly sensitive to the arbitrary values chosen to represent the categories (Tastle and Wierman, 2007). An alternative measure of consensus that minimizes the influence of the assigned values for each category is the TW consensus. This measure also uses empirical probabilities to calculate a measure of dispersion, but avoids the failings of the SE measure. TW scores quantify the degree of agreement, with values near 1 representing strong consensus and values near 0 or negative indicating lower or conflicting alignment.

While each of these measures of consensus have their advantages and disadvantages (see Haab and Whitehead (2017) for a fuller description of these measures and the axiomatic rules that they

[10] The appendix contains tables with frequencies (for the common across time survey questions) of responses, tests for differences across year and consensus ranks and changes in consensus ranks across year.

satisfy), there is an extraordinary degree of correlation between them in both sets of survey responses (Table 6). For this reason, consensus results from the survey responses are presented in Tables 2-5, in terms of an average combined level of consensus across the three measures, and labeled the *Consensus Rank*.

**Levels of Consensus Today (2023)**

It is clear that there is a large degree of consensus, across a range of issues, in the environmental and natural resource economics profession. Twenty-three of the questions asked (44%) resulted in a supermajority level of consensus, and thirty-six of the questions asked (69%) resulted in a majority or above level of consensus. That indicates a degree of consensus, across a range of issues, policy options, and concerns. Indeed, for only four of the survey questions (8%) was "neutral/unsure" the choice with the largest number of responses.

A second conclusion gleaned from the survey results is that there does not appear to be much support across the profession for what is deemed "free market environmentalism," or, trusting the free market alone to optimally handle environmental issues and concerns. The statement with the highest level of consensus (97%) involved near universal disagreement with the idea that unregulated markets could optimally provide for public goods. Similarly, a supermajority (73%) of respondents disagreed with a direct question about free market environmentalism and its basic tenets to rely on property rights and Coase bargaining: "the free market, property rights, and tort law provide the best tools to preserve the health and sustainability of the environment." Finally, 88% of respondents also agreed with the statement that "unregulated common-pool resources face the 'tragedy of the commons' problem."

A second notable result from the survey results was a supermajority consensus about, and concern with, environmental justice. The second and third statements with the largest levels of consensus (91% for both) involved an awareness about environmental justice and the siting decisions of hazardous waste sites. Another statement along similar lines also garnered a supermajority response (75%). Finally, a majority of respondents (54%) expressed an overall "concern" about the topic of environmental justice. These results, while interesting in and of themselves, also point to the value of updated, regular (preferably decennial) surveys of the profession, in order to gauge levels of consensus around contemporary issues that may not have been queried in earlier survey efforts. Similarly, concerns that may have garnered greater consensus in the past (for example over mining, solid waste, or food safety), appear to in this latest survey to no longer garner majority levels of concern. Updated surveys of the profession are valuable for keeping up with changing levels of consensus, especially on contemporary topics.

A third conclusion that can be taken from these survey results is that climate change remains a very big concern. 89% of survey respondents report being concerned about climate change, and other questions related to climate change (including emissions taxes and marketable emission permits, energy taxes, methane gas production, and import tariffs based on greenhouse gases) garner supermajority levels of consensus.

A fourth takeaway has to do with the management of natural resources, notably forestry resources. There was strong support among survey respondents, across multiple questions, for the idea that resources should be managed to provide multiple uses. With regards to fishery resources, there was no clear agreement with respect to appropriate management goals, with similar levels of consensus around managing them to achieve "maximum sustainable yield from commercial catch," as well as to achieve "maximum economic yield from commercial and recreational catch." This could be interpreted as support, again, for multiple use goals, or, it could be interpreted as a lack of clear consensus among survey respondents on the primary goal for managing commercial fishery resources.

A number of questions concerned economic growth and sustainability. In response to the sustainable development statement developed by the Bruntlandt Commission, "the management of resource use should aim to meet the needs of the present generation without compromising the ability of future generations to meet their own needs," 86% of survey respondents agree, illustrating strong support for dynamic sustainability across multiple generations. At the same time, 70% of respondents disagreed that "economic growth always harms the environment." Additional questions regarding economic, as well as population, growth all together imply a well-recognized balance within the profession between environmental sustainability and economic growth. The profession's inherent respect for tradeoffs in decision-making is not forgotten among survey respondents when it comes to sustainability and economic growth.

A sixth takeaway from these latest survey results is strong support among respondents for environmental regulation in various forms, including increases in energy taxes, use of individual transferable quotas (ITQs) to manage fishery resources, and regulation of some kind to address negative externalities and environmental justice concerns. Indeed, reducing the power of the Environmental Protection Agency (EPA) was soundly rejected by 81% of respondents.[11] This is the mirror image, theoretically, of our first stated takeaway, that of the rejection of free market environmentalism, and support instead for managing environmental and natural resource concerns with government regulation of varying kinds.

On a more macro-level scale, there was also broad support for international agreements to address environmental issues, as well as for taxing imports "based on the greenhouse gases used to make them." Of the specific issues queried with "How concerned are you about…", climate change and biodiversity were the two issues (out of 17) that garnered supermajority levels of concern among respondents.

Another contemporary topic that was new to the 2023 survey concerned electric vehicles and electric vehicle charging stations. A supermajority of respondents were in favor of high fuel efficiency standards for cars, trucks, and buses, as well as for spending federal money to increase the number of electric vehicle charging stations in the U.S. As well, just over half (52%) were in favor of providing tax credits to individuals who purchased electric vehicles.

Looking to those issues without a majority consensus (Table 4), what stands out is a lack of concern about a number of environmental topics that perhaps garnered greater concern in the

[11] This question about the EPA was also in a survey of AEA members (Fuller and Geide-Stevenson, 2003), where 59% disagreed with it.

public zeitgeist in the past, including food safety, solid waste, invasive species, and hazardous waste. There was concern—though not from a majority—about surface and drinking water quality, land conservation, renewable energy, and the impacts of mining. The policy related questions that did not garner a majority consensus included a few related to forestry resources, ocean fisheries, mechanisms for private firms to reach their carbon reduction goals, and what should be done with any double dividend arising from emission taxes or emissions trading permits. Many of these questions were rather technical in nature, and the lack of consensus may have been somewhat academic.[12] Either way, the policy questions without majority consensus did appear to be more detailed-oriented in nature, and not as broad.

**Levels of Consensus Over Time, 2012-2023**

The first result of note when comparing the common survey questions from 2012 to 2023, is the large levels of consistent consensus over time, across a range of questions and so a range of environmental and policy topics.[13] Of the twenty-two common questions a supermajority (68%) exhibited less than a five percent average difference between the percentage of respondents that agreed with the statement and the percentage of respondents that disagreed.[14] Environmental and natural resource economists appear to be a conservative bunch, hesitant to change basic beliefs and tenets of the field.

One area where there was a greater than five percent average difference in consensus between 2012 and 2023 was with respect to free market environmentalism. An increasing number of respondents (from 60% in 2012 to 73% in 2023) reported disagreement with the statement that the tenets of free market environmentalism were the best tools for preserving the heath and sustainability of the environment. Similarly, though on a smaller scale, the number of respondents agreeing that unregulated common-pool resources face the tragedy of the commons increased in 2023, and the number of respondents disagreeing that unregulated markets provide public goods in optimal quantities increased in 2023.

Other areas of notably decreasing consensus over the last decade included what to do with the revenues from emissions taxes or permit auction schemes (or, more precisely, the lack of consensus on their optimal use), how to optimally manage forestry resources and ocean fisheries, and the effect of population growth on the environment. These questions, for the most part, were specific, more so than many of the other survey questions, and one conclusion that could be drawn is that consensus among AERE members declines (within a survey, and over time) when faced with questions that involve greater detail. An alternative interpretation could be that natural resource management and optimal use of funds from any green double dividend are general areas where environmental and natural resource economists lack consensus. Without greater detail on why survey respondents answered questions as they did, interpretation of the results is difficult. One recommendation for any future survey would be to include free-form text boxes along with

[12] This mimics the Andre and Falk (2021) results of greater heterogeneity of opinion on subjects of more academic concern.
[13] The combined Consensus Rank, for example, stayed the same for nearly half the questions, and for the rest, changed by only one, to at most four, spots.
[14] That is less than 5% before rounding. Or, 15/22 of the questions.

radio-dial survey choices, for text and thematic analysis, which may lead to interpretations based on respondent motivations.

Finally, it is interesting to note not just the areas where consensus has diverged over the last decade, but those areas where it has most clearly not. For example, that "the U.S. should increase energy taxes" received a supermajority of support both in 2012 (84%) and in 2023 (83%). In addition, reducing the regulatory power of the EPA received strong disagreement both in 2012 (79%) and in 2023 (81%). Managing resources sustainably over time and with multiple objectives also continued to garner large levels of support (83% and 87% respectively in 2012, and 86% and 88% respectively in 2023), as did disagreement with the statement that "we worry too much about the future of the environment and not enough about prices and jobs today" (84% in 2012 and 87% in 2023).

While many of the changes in consensus over time are slight, it may be worthwhile noting that most of them are in the direction of a more politically liberal stance, including less reliance on free market environmentalism and a greater faith in regulation and regulatory options for managing environmental and natural resource issues. This may be because the opinions of AERE-members have evolved over time, or, it may reflect the increasingly liberal political affiliations of 2023 survey respondents (77% identifying as politically liberal, as opposed to 60% in 2012).

**Pedagogy**

The survey findings not only provide valuable insights into the perspectives of environmental and natural resource economists but also offer a unique opportunity to enhance teaching and learning in economics courses. By integrating these strategies, instructors can transform survey findings int dynamic and engaging learning tools, enhancing students' understanding of economic principles while equipping them with critical thinking, data analysis, and communication skills essential for addressing complex environmental and resource management challenges.

*Comparative Student Surveys for Engagement*
A powerful pedagogical application of the survey findings is the use of comparative student surveys to foster engagement and deepen understanding. At the beginning of a course, instructors can administer a survey that mirrors the questions posed in Tables 2-5. This exercise encourages students to reflect on their initial perspectives on key topics such as carbon pricing, economic growth, and natural resource management. Comparing student responses to those of professional economists provides a starting point for discussions about areas of alignment and divergence, sparking curiosity and critical thinking early in the course.

*Iterative Learning with Surveys*
Survey questions can then be revisited throughout the course to support iterative learning. As shown in Figure 1, for example, specific questions tied to course topics allow students to critically assess their evolving understanding as they engage with the material. This process encourages analysis and evaluation, aligning with Bloom's Taxonomy of Educational Objectives (Bloom, 1956). At the end of the course, the same survey can be re-administered, and students'

"before and after" responses compared alongside the survey results of AERE members. This reflective practice helps students see how their knowledge has developed and can foster meaningful discussions about the complexity of environmental and economic challenges (Ambrose et al., 2010).

*Interactive and Applied Learning*

Role-playing scenarios offer an engaging way to integrate survey findings into classroom activities. Students can take on roles such as policymakers, environmental advocates, or industry representatives to debate issues like cap-and-trade systems or electric vehicle subsidies. By grounding arguments in professional consensus data, these exercises simulate realistic policy discussions, helping students develop negotiation and persuasive skills (Biggs & Tang, 2011). Similarly, data analysis assignments using anonymized survey data allow students to practice quantitative techniques like trend analysis and subgroup comparisons, fostering both technical expertise and an appreciation for data interpretation.

Real-world application projects further bridge the gap between theory and practice. Using the survey results, students can design regional policy proposals or research projects, applying their academic knowledge to address contemporary challenges. These projects emphasize the relevance of professional insights while building practical problem-solving skills (McKeachie & Svinicki, 2013).

*Collaborative and Reflective Practices*

Collaborative learning opportunities, such as analyzing case studies related to fisheries management or pollution control, allow students to integrate survey insights into group discussions. This approach promotes diverse perspectives and peer-to-peer learning, enhancing understanding of complex issues (Biggs & Tang, 2011). To encourage individual reflection, students can maintain learning journals throughout the course, documenting their evolving thoughts on survey topics. Reviewing these journals at the end of the term helps students identify shifts in their understanding and connect their learning to professional consensus (Ambrose et al., 2010).

*Enriching Engagement Through Guest Lectures and Gamification*

Guest lectures by environmental and resource economists can deepen the classroom experience. These sessions connect theoretical material with real-world insights, offering students valuable networking opportunities and a clearer understanding of career pathways (McKeachie & Svinicki, 2013). Additionally, gamification techniques, such as quizzes where students guess consensus levels among economists, make learning interactive and fun, encouraging further exploration of survey themes (Biggs & Tang, 2011).

*Cross-Disciplinary Insights*

In courses with an interdisciplinary focus, comparing the survey findings to results from other fields, such as environmental science or sociology, can enhance students' appreciation for interdisciplinary collaboration. Highlighting differences in perspectives across disciplines underscores the unique contributions of economics in addressing environmental challenges (Haab & Whitehead, 2017).

## Summary and Conclusions

What is the current consensus of professional environmental and natural resource economists on topics such as carbon pricing, electric vehicle subsidies, economic growth and sustainability, and environmental justice? And how has the professional consensus changed over the last decade, if at all? From a 2023 survey of AERE members, this research documents the level of consensus among professional economists on these topics, and many more. The survey results are also compared to a similar survey first given over a decade ago, in 2012.

A primary conclusion to be drawn is that there are large levels of consensus among professional environmental and natural resource economists now, and over time. Had President Truman been seeking a "one-armed" environmental economist, he may very well have been able to find one.[15]

Important caveats to consider when reviewing these survey results is the low response rate (22% in 2023 compared to 36% in 2012), and the demographics of the survey respondents. While the survey respondents were perhaps representative of the field of environmental and natural resource economics, they are not necessarily representative of other academic fields, and certainly not of the general public. The respondents in the 2023 survey were 70% male, 81% white, 90% PhD educated, and 77% politically liberal.

Future research could try to determine the motivations behind the 2023 survey responses, as well as the causes of the few notable changes in consensus. For example, why has free market environmentalism lost even more of its support over the last decade, and what might that imply for future policy? Do world events change opinions? Or well-cited academic research?

Along similar lines (and as suggested by an early reviewer of this work), is there concern that too much consensus in a discipline is actually *worrisome*. Is there a level of groupthink within the profession on particular policy topics and might this imply a lack of innovation regarding certain environmental and natural resource economics topics? It is hard to address this issue without a greater understanding of the motivations and thought processes behind the survey choices that respondents made. This is another reason why future research investigating the motivations behind the survey responses would be worthwhile.

Another useful avenue for future research would be to compare the opinions of environmental and natural resource economists to other groups of economists. In the survey of the wider profession by Geide-Stevenson and La Parra Perez (2021), for example, one result they find is that there is large agreement among professional economists with the statement that climate change poses a major risk to the US economy. In a survey of financial economists, Stroebel and Wurgler (2021) find that the regulatory risk stemming from climate change is considered a major short-term future risk to businesses and investors world-wide. How these opinions compare to environmental economists themselves would be useful to assess.

[15] President Truman: "I need a one-armed economist on staff." Aide: "Why?" President Truman: "So he can't say, on the other hand" (multiple sources, including Haab and Whitehead, 2017).

Another area for future research would be to compare the results of this survey to opinions by the public, in the vein of Sapienza and Zingales (2013) who compare the opinions of economics experts to those of the average American on topics such as bank bailouts and CEO compensation. The fascinating, though perhaps not wholly unexpected result, is that they find vast areas of disagreement on important policy questions. A comparison of economists to politicians and political actors would also be useful. Note that ideally this would include not just U.S. based economists, but the wider international profession as well.

Finally, the results of this survey, including the noted changes in consensus over time, illustrate the usefulness of continuing to engage in measures of professional consensus over time, preferably at least once a decade. This would allow a consistent track record of the opinions of environmental and natural resource economists to be kept over time, and it would also aid in gathering new information on contemporary topics as they arise on the policy stage.

**Disclosure Statement:**
All authors declare that they have no relevant or material financial interests that relate to the research described in this paper.

**Table 1:** Characteristics of the Sample

| Variable | Description | Mean | | |
|---|---|---|---|---|
| | | 2012 | 2023 | p-value |
| Years worked | Number of years worked as an environmental/natural resource economist | 12.19 | 16.42 | <0.01 |
| Student | =1 if a student | 4% | 4% | 0.99 |
| Teaching | =1 if work involves teaching | 61% | 73% | <0.01 |
| Research | =1 if work involves research | 82% | 91% | <0.01 |
| Policy | =1 if work involves policy | 26% | 30% | 0.41 |
| Administration | =1 if work involves administration | 19% | 26% | 0.07 |
| Extension | =1 if work involves extension | 5% | 6% | 0.67 |
| JEL Q0 General | =1 if JEL category is General | 12% | 15% | 0.38 |
| JEL Q1 Agriculture | =1 if JEL category is Agriculture | 19% | 21% | 0.57 |
| JEL Q2 Renewable | =1 if JEL category is Renewable Resources and Conservation | 36% | 27% | 0.03 |
| JEL Q3 Nonrenewable | =1 if JEL category is Nonrenewable Resources and Conservation | 14% | 12% | 0.56 |
| JEL Q4 Energy | =1 if JEL category is Energy | 25% | 35% | 0.01 |
| JEL Q5 Environmental | =1 if JEL category is Environmental Economics | 72% | 85% | <0.01 |
| Academic | =1 if works at an academic institution | 79% | 82% | 0.55 |
| PhD | =1 if holds the PhD degree | 86% | 90% | 0.14 |
| Age | Age of respondent | 42.44 | 46.75 | <0.01 |
| Household size | Household size | 2.79 | 2.75 | 0.08 |
| Children | Number of children age 17 or younger | 1.80 | 1.70 | 0.84 |
| Male | =1 if male | 65% | 70% | 0.20 |
| White | =1 if white | 76% | 81% | 0.18 |
| Liberal | =1 if political views are very, somewhat, or moderately liberal | 60% | 77% | <0.01 |

**Table 2:** Statements With a Supermajority and High Levels of Strong Consensus (2023)

| Statement | Summary | Consensus Rank |
|---|---|---|
| Unregulated markets provide public goods in optimal quantities. | 96.84% disagree | 1 |
| Air pollution and hazardous waste siting decisions disproportionately affect low-income communities. | 91.05% disagree | 6 |
| Air pollution and hazardous waste siting decisions disproportionately affect minority communities. | 90.53% agree | 3 |
| Emissions taxes or marketable emissions permits are a more economically efficient approach to pollution control than emissions standards. | 90.5% disagree | 7 |
| How concerned are you about climate change? | 88.95% concerned | 4 |
| Forests should be managed to provide multiple uses. | 88.42% agree | 2 |
| Unregulated common-pool resources face the "tragedy of the commons" problem. | 87.96% agree | 9 |
| We worry too much about the future of the environment and not enough about prices and jobs today. | 87.43% disagree | 10 |
| The management of resource use should aim to meet the needs of the present generation without compromising the ability of future generations to meet their own needs. | 85.86% agree | 26 |
| Individual transferable quotas are a more economically efficient approach to fishery regulation than open access regulations. | 84.32% agree | 5 |
| The U.S. should increase energy taxes. | 83.33% agree | 11 |
| Unregulated markets provide optimal quantities of goods whose production and consumption generate negative externalities. | 82.72% disagree | 39 |
| Regulation in the U.S. should be implemented to address environmental justice concerns. | 81.15% agree | 14 |
| Reducing the regulatory power of the Environmental Protection Agency (EPA) would improve the economic efficiency of the U.S. economy. | 80.63% disagree | 33 |
| Communities that exist close to hazardous waste sites are aware and accepting of the hazardous waste site(s) near their home. | 75.39% disagree | 8 |
| Establish strict limits on the release of methane in the production of natural gas. | 75.39% favor | 31 |
| For environmental problems, there should be international agreements that U.S. and other countries should be made to follow. | 74.35% agree | 11 |
| The free market, property rights, and tort law provide the best tools to preserve the health and sustainability of the environment. | 73.44% disagree | 37 |
| How concerned are you about biodiversity? | 71.51% concerned | 26 |
| Economic growth always harms the environment. | 70.16% disagree | 16 |
| Spend federal money to increase the number of electric vehicle charging stations in the U.S. | 68.95% favor | 13 |
| Tax imports based on the greenhouse gases used to make them. | 67.72% favor | 22 |
| Set higher fuel efficiency standards for cars, trucks and buses | 66.84% favor | 17 |

**Table 3:** Statements Without a Supermajority but With a Majority (2023)

| Statement | Summary | Consensus Rank |
|---|---|---|
| How concerned are you about groundwater? | 63.49% concerned | 30 |
| Provide tax incentives to businesses to promote their use of wind, solar and nuclear power. | 63.35% favor | 25 |
| How concerned are you about fish and wildlife habitat? | 61.29% concerned | 26 |
| Provide tax credits to Americans who install clean energy systems, like solar power, in their homes. | 61.26% favor | 32 |
| Forests should be managed to achieve the maximum sustainable yield of timber resources. | 58.95% disagree | 47 |
| How concerned are you about air quality? | 57.14% concerned | 19 |
| Carbon markets and carbon offsets are an efficient mechanism for private firms to meet their carbon reduction goals. | 56.84% agree | 40 |
| Emissions tax or permit auction revenues should be returned to the public through dividends or lower income taxes. | 55.5% agree | 20 |
| The optimal forest rotation is when the harvest generates the maximum economic yield of timber and ecosystem services. | 54.3% agree | 51 |
| How concerned are you about environmental justice? | 53.97% concerned | 41 |
| How concerned are you about overfishing? | 52.94% concerned | 17 |
| Provide tax credits to individuals who purchase electric vehicles. | 51.85% favor | 29 |
| Ocean fisheries should be managed to achieve the maximum sustainable yield from commercial catch. | 51.6% disagree | 52 |

**Table 4:** Statements Without a Majority of Without Agreement/Disagreement (2023)

| | Summary | Consensus Rank |
|---|---|---|
| **Statements without a majority** | | |
| Emissions standards are rigid, and insensitive to geographical and technological differences. | 49.74% agree | 38 |
| How concerned are you about surface water quality? | 48.13% concerned | 21 |
| How concerned are you about land conservation? | 46.52% concerned | 44 |
| How concerned are you about forest conservation? | 45.99% concerned | 36 |
| How concerned are you about renewable energy? | 45.21% concerned | 47 |
| There exists a maximum level of economic growth that can be sustained without undermining the resource base upon which it depends. | 44.21% agree | 49 |
| Ocean fisheries should be managed to achieve the maximum economic yield from commercial and recreational catch. | 43.55% disagree | 50 |
| How concerned are you about drinking water quality? | 43.09% concerned | 41 |
| How concerned are you about food safety? | 41.8% unconcerned | 43 |
| Population growth inevitably degrades the environment. | 41.58% disagree | 46 |
| How concerned are you about mining impacts? | 40.64% concerned | 34 |
| How concerned are you about solid waste? | 39.46% unconcerned | 45 |

| | | |
|---|---|---|
| **Statements without agreement/disagreement** | | |
| Nonrenewable resource prices tend to rise at the rate of interest over time (adjusted for new discoveries, etc.). | 44.39% neutral | 15 |
| How concerned are you about invasive species? | 43.01% neutral | 24 |
| Emissions tax or permit auction revenues should be used to reduce the national debt. | 42.63% neutral | 22 |
| How concerned are you about hazardous waste? | 38.38% neutral | 35 |

**Table 5:** Consensus Level Comparisons Across Common Questions (2023-2012)

| Statements | Change in Agree-ment | Change in Disagree-ment | Average % Change | Change in Consensus Rank |
|---|---|---|---|---|
| Emissions tax or permit auction revenues should be used to reduce the national debt. | ↓ 12% | ↑ 16% | 14% | ↓ 3 |
| The free market, property rights, and tort law provide the best tools to preserve the health and sustainability of the environment. | ↓ 8% | ↑ 14% | 11% | 0 |
| The optimal forest rotation is when the harvest generates the maximum economic yield of timber and ecosystem services. | ↓ 10% | ↑ 5% | 7% | ↓ 1 |
| Ocean fisheries should be managed to achieve the maximum economic yield from commercial and recreational catch. | ↓ 6% | ↑ 8% | 7% | ↑ 1 |
| Population growth inevitably degrades the environment. | ↓ 7% | ↑ 6% | 7% | 0 |
| Nonrenewable resource prices tend to rise at the rate of interest over time (adjusted for new discoveries, etc). | 0% | ↓ 11% | 5% | ↑ 4 |
| Emissions tax or permit auction revenues should be returned to the public through dividends or lower income taxes. | ↑ 6% | ↓ 4% | 5% | ↑ 2 |
| There exists a maximum level of economic growth that can be sustained without undermining the resource base upon which it depends. | ↓ 4% | ↑ 6% | 5% | ↑ 1 |
| Economic growth always harms the environment. | ↑ 2% | ↓ 8% | 5% | ↓ 1 |
| Forests should be managed to achieve the maximum sustainable yield of timber resources. | ↑ 4% | ↓ 4% | 4% | 0 |
| Unregulated markets provide optimal quantities of goods whose production and consumption generate negative externalities. | ↓ 1% | ↑ 5% | 3% | ↑ 2 |
| Emissions standards are rigid, and insensitive to geographical and technological differences. | ↓ 6% | 0% | 3% | ↓ 2 |
| Ocean fisheries should be managed to achieve the maximum sustainable yield from commercial catch. | ↑ 3% | ↓ 3% | 3% | 0 |
| We worry too much about the future of the environment and not enough about prices and jobs today. | ↑ 1% | ↑ 4% | 2% | ↓ 3 |
| Emissions taxes or marketable emissions permits are a more economically efficient approach to pollution control than emissions standards. | ↑ 4% | 0% | 2% | 0 |
| The management of resource use should aim to meet the needs of the present generation without compromising the ability of future generations to meet their own needs. | ↑ 3% | 0% | 2% | 0 |
| Unregulated common-pool resources face the "tragedy of the commons" problem. | ↑ 2% | ↓ 2% | 2% | ↑ 1 |
| Unregulated markets provide public goods in optimal quantities. | ↓ 2% | ↑ 1% | 2% | 0 |
| Reducing the regulatory power of the Environmental Protection Agency (EPA) would improve the economic efficiency of the U.S. economy. | ↑ 1% | ↑ 1% | 1% | ↓ 3 |
| Individual transferable quotas are a more economically efficient approach to fishery regulation than open access regulations. | ↓ 2% | 0% | 1% | ↑ 2 |
| Forests should be managed to provide multiple uses. | ↑ 1% | ↓ 1% | 1% | 0 |
| The U.S. should increase energy taxes. | 0% | 1% | 1% | 0 |

**Table 6:** Correlation Levels Among Consensus Measures

**Year 2023**

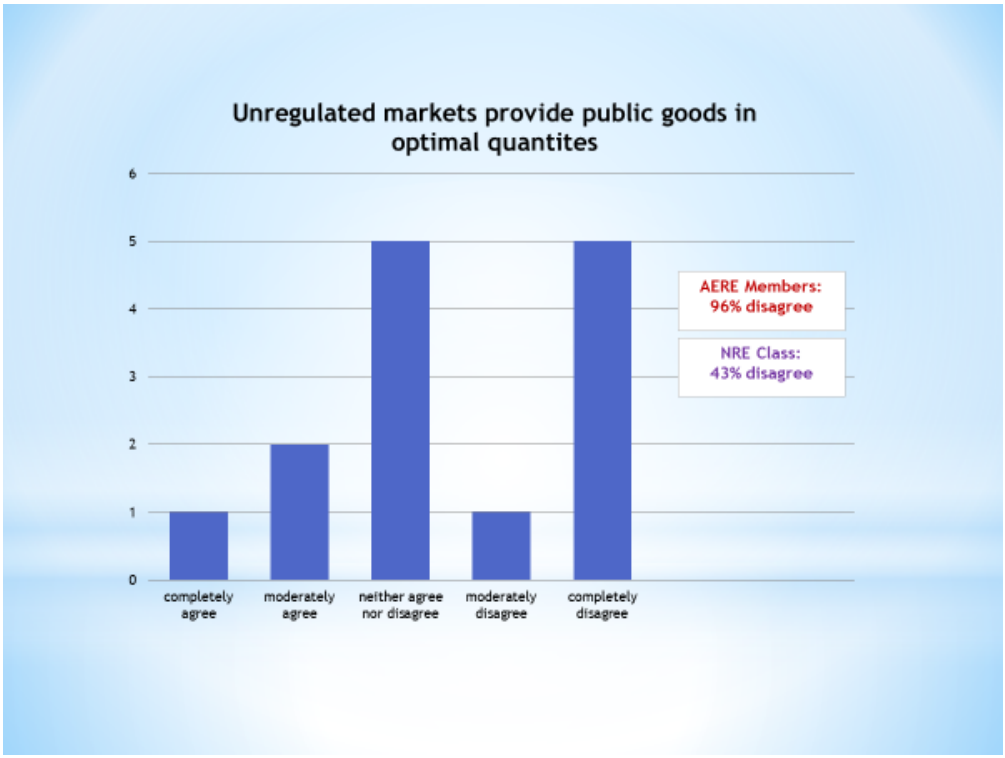
| | SD 2023 | SE 2023 | TW 2023 |
|---|---|---|---|
| SD 2023 | 1 | | |
| SE 2023 | 0.84 | 1 | |
| TW 2023 | -0.99 | -0.81 | 1 |

**Year 2012**

| | SD 2012 | SE 2012 | TW 2012 |
|---|---|---|---|
| SD 2012 | 1 | | |
| SE 2012 | 0.86 | 1 | |
| TW 2012 | -0.97 | -0.82 | 1 |

* Results based on the subset of questions common across both surveys.

**Figure 1:** Pedagogical survey question comparison examples

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**Appendix.**

**Table A1:** Tests for Equality of Common Questions, Across Survey Year

| | Answer | Percent 2012 | Percent 2023 |
|---|---|---|---|
| Unregulated markets provide optimal quantities of goods whose production and consumption generate negative externalities.<br>n=379 (2012), 191 (2023)<br>$\chi^2$ (4 df)=4.05, p=0.40 | Disagree completely | 61 | 68 |
| | Disagree mostly | 17 | 15 |
| | Neither agree nor disagree | 8 | 5 |
| | Agree mostly | 11 | 9 |
| | Agree completely | 3 | 4 |
| Unregulated markets provide public goods in optimal quantities.<br>n=384 (2012), 190 (2023)<br>$\chi^2$ (4 df)=6.55, p=0.16 | Disagree completely | 72 | 77 |
| | Disagree mostly | 24 | 19 |
| | Neither agree nor disagree | 2 | 3 |
| | Agree mostly | 2 | 0 |
| | Agree completely | 1 | 1 |
| Unregulated common-pool resources face the "tragedy of the commons" problem.<br>n=385 (2012), 190 (2023)<br>$\chi^2$ (4 df)=1.66, p=0.80 | Disagree completely | 2 | 1 |
| | Disagree mostly | 4 | 4 |
| | Neither agree nor disagree | 8 | 7 |
| | Agree mostly | 48 | 50 |
| | Agree completely | 38 | 38 |
| The free market, property rights, and tort law provide the best tools to preserve the health and sustainability of the environment.<br>n=385 (2012), 192 (2023)<br>**$\chi^2$ (4 df)=22.21, p<0.01** | Disagree completely | 18 | 34 |
| | Disagree mostly | 42 | 39 |
| | Neither agree nor disagree | 20 | 14 |
| | Agree mostly | 19 | 11 |
| | Agree completely | 2 | 2 |
| The optimal forest rotation is when the harvest generates the maximum economic yield of timber and ecosystem services.<br>n=375 (2012), 186 (2023)<br>$\chi^2$ (4 df)=5.15, p=0.27 | Disagree completely | 6 | 8 |
| | Disagree mostly | 13 | 16 |
| | Neither agree nor disagree | 17 | 22 |
| | Agree mostly | 44 | 39 |
| | Agree completely | 20 | 16 |
| Forests should be managed to provide multiple uses.<br>n=382 (2012), 190 (2023)<br>$\chi^2$ (4 df)=1.60, p=0.66 | Disagree completely | 0 | 0 |
| | Disagree mostly | 2 | 1 |
| | Neither agree nor disagree | 11 | 11 |
| | Agree mostly | 46 | 44 |
| | Agree completely | 41 | 45 |
| Forests should be managed to achieve the maximum sustainable yield of timber resources.<br>n=381 (2012), 190 (2023)<br>$\chi^2$ (4 df)=3.89, p=0.42 | Disagree completely | 23 | 16 |
| | Disagree mostly | 40 | 43 |
| | Neither agree nor disagree | 19 | 19 |
| | Agree mostly | 14 | 17 |
| | Agree completely | 4 | 5 |

| | | | |
|---|---|---|---|
| Emissions standards are rigid, and insensitive to geographical and technological differences.<br>n=380 (2012), 191 (2023)<br>$\chi^2$ (4 df)=2.80, p=0.59 | Disagree completely | 3 | 4 |
| | Disagree mostly | 19 | 19 |
| | Neither agree nor disagree | 22 | 28 |
| | Agree mostly | 44 | 41 |
| | Agree completely | 11 | 9 |
| Emissions taxes or marketable emissions permits are a more economically efficient approach to pollution control than emissions standards.<br>n=381 (2012), 191 (2023)<br>$\chi^2$ (4 df)=6.17, p=0.19 | Disagree completely | 0 | 2 |
| | Disagree mostly | 3 | 2 |
| | Neither agree nor disagree | 10 | 6 |
| | Agree mostly | 51 | 51 |
| | Agree completely | 36 | 39 |
| Emissions tax or permit auction revenues should be returned to the public through dividends or lower income taxes.<br>n=382 (2012), 191 (2023)<br>$\chi^2$ (4 df)=4.33, p=0.36 | Disagree completely | 3 | 2 |
| | Disagree mostly | 17 | 14 |
| | Neither agree nor disagree | 31 | 29 |
| | Agree mostly | 38 | 47 |
| | Agree completely | 11 | 9 |
| Emissions tax or permit auction revenues should be used to reduce the national debt.<br>n=379 (2012), 190 (2023)<br>**$\chi^2$ (4 df)=19.38, p<0.01** | Disagree completely | 5 | 11 |
| | Disagree mostly | 22 | 32 |
| | Neither agree nor disagree | 47 | 43 |
| | Agree mostly | 21 | 12 |
| | Agree completely | 5 | 3 |
| Ocean fisheries should be managed to achieve the maximum sustainable yield from commercial catch.<br>n=376 (2012), 188 (2023)<br>$\chi^2$ (4 df)=2.43, p=0.66 | Disagree completely | 22 | 17 |
| | Disagree mostly | 32 | 35 |
| | Neither agree nor disagree | 19 | 19 |
| | Agree mostly | 19 | 22 |
| | Agree completely | 7 | 7 |
| Ocean fisheries should be managed to achieve the maximum economic yield from commercial and recreational catch.<br>n=375 (2012), 186 (2023)<br>$\chi^2$ (4 df)=4.28, p=0.37 | Disagree completely | 9 | 9 |
| | Disagree mostly | 26 | 34 |
| | Neither agree nor disagree | 18 | 16 |
| | Agree mostly | 38 | 34 |
| | Agree completely | 8 | 7 |
| Individual transferable quotas are a more economically efficient approach to fishery regulation than open access regulations.<br>n=375 (2012), 185 (2023)<br>$\chi^2$ (4 df)=4.70, p=0.32 | Disagree completely | 1 | 0 |
| | Disagree mostly | 1 | 2 |
| | Neither agree nor disagree | 12 | 14 |
| | Agree mostly | 41 | 47 |
| | Agree completely | 46 | 37 |
| The management of resource use should aim to meet the needs of the present generation without compromising the ability of future generations to meet their own needs.<br>n=388 (2012), 191 (2023)<br>$\chi^2$ (4 df)=9.36, p=0.053 | Disagree completely | 4 | 3 |
| | Disagree mostly | 5 | 5 |
| | Neither agree nor disagree | 9 | 6 |
| | Agree mostly | 50 | 40 |
| | Agree completely | 33 | 46 |
| | | | |

| | | | |
|---|---|---|---|
| Population growth inevitably degrades the environment.<br>n=389 (2012), 190 (2023)<br>$\chi^2$ (4 df)=4.53, p=0.34 | Disagree completely | 7 | 10 |
| | Disagree mostly | 28 | 32 |
| | Neither agree nor disagree | 24 | 25 |
| | Agree mostly | 34 | 30 |
| | Agree completely | 7 | 4 |
| There exists a maximum level of economic growth that can be sustained without undermining the resource base upon which it depends.<br>n=385 (2012), 190 (2023)<br>$\chi^2$ (4 df)=5.44, p=0.24 | Disagree completely | 7 | 7 |
| | Disagree mostly | 21 | 27 |
| | Neither agree nor disagree | 24 | 22 |
| | Agree mostly | 35 | 36 |
| | Agree completely | 13 | 8 |
| Nonrenewable resource prices tend to rise at the rate of interest over time (adjusted for new discoveries, etc).<br>n=376 (2012), 187 (2023)<br>$\chi^2$ (4 df)=8.66, p=0.07 | Disagree completely | 5 | 4 |
| | Disagree mostly | 30 | 21 |
| | Neither agree nor disagree | 34 | 44 |
| | Agree mostly | 28 | 28 |
| | Agree completely | 3 | 2 |
| The U.S. should increase energy taxes.<br>n=391 (2012), 192 (2023)<br>$\chi^2$ (4 df)=2.43, p=0.65 | Disagree completely | 2 | 1 |
| | Disagree mostly | 3 | 3 |
| | Neither agree nor disagree | 11 | 13 |
| | Agree mostly | 42 | 45 |
| | Agree completely | 42 | 39 |
| Reducing the regulatory power of the Environmental Protection Agency (EPA) would improve the economic efficiency of the U.S. economy.<br>n=389 (2012), 191 (2023)<br>$\chi^2$ (4 df)=8.06, p=0.09 | Disagree completely | 39 | 48 |
| | Disagree mostly | 40 | 33 |
| | Neither agree nor disagree | 13 | 10 |
| | Agree mostly | 8 | 8 |
| | Agree completely | 0 | 2 |
| Economic growth always harms the environment.<br>n=389 (2012), 191 (2023)<br>$\chi^2$ (4 df)=6.78, p=0.15 | Disagree completely | 29 | 24 |
| | Disagree mostly | 49 | 46 |
| | Neither agree nor disagree | 15 | 21 |
| | Agree mostly | 5 | 8 |
| | Agree completely | 2 | 1 |
| We worry too much about the future of the environment and not enough about prices and jobs today.<br>n=379 (2012), 191 (2023)<br>**$\chi^2$ (4 df)=17.15, p<0.01** | Disagree completely | 32 | 48 |
| | Disagree mostly | 52 | 40 |
| | Neither agree nor disagree | 14 | 9 |
| | Agree mostly | 2 | 3 |
| | Agree completely | 0 | 1 |
| Note: Chi-square statistics in bold indicate statistically significance across survey year in a test of differences in frequencies. | | | |

**Table A2.:** Consensus Level Comparisons Across Common Questions (2023-2012)

| Statements | 2023 Consensus Rank | 2012 Consensus Rank | Change in Consensus Rank |
|---|---|---|---|
| Unregulated markets provide public goods in optimal quantities. | 1 | 1 | 0 |
| Forests should be managed to provide multiple uses. | 2 | 2 | 0 |
| Individual transferable quotas are a more economically efficient approach to fishery regulation than open access regulations. | 3 | 5 | ↑ 2 |
| Emissions taxes or marketable emissions permits are a more economically efficient approach to pollution control than emissions standards. | 4 | 4 | 0 |
| Unregulated common-pool resources face the "tragedy of the commons" problem. | 5 | 6 | ↑ 1 |
| We worry too much about the future of the environment and not enough about prices and jobs today. | 6 | 3 | ↓ 3 |
| The U.S. should increase energy taxes. | 7 | 7 | 0 |
| Nonrenewable resource prices tend to rise at the rate of interest over time (adjusted for new discoveries, etc). | 8 | 12 | ↑ 4 |
| Economic growth always harms the environment. | 9 | 8 | ↓ 1 |
| The management of resource use should aim to meet the needs of the present generation without compromising the ability of future generations to meet their own needs. | 10 | 10 | 0 |
| Emissions tax or permit auction revenues should be returned to the public through dividends or lower income taxes. | 11 | 13 | ↑ 2 |
| Emissions tax or permit auction revenues should be used to reduce the national debt. | 12 | 9 | ↓ 3 |
| Reducing the regulatory power of the Environmental Protection Agency (EPA) would improve the economic efficiency of the U.S. economy. | 13 | 10 | ↓ 3 |
| Unregulated markets provide optimal quantities of goods whose production and consumption generate negative externalities. | 14 | 16 | ↑ 2 |
| The free market, property rights, and tort law provide the best tools to preserve the health and sustainability of the environment | 15 | 15 | 0 |
| Emissions standards are rigid, and insensitive to geographical and technological differences. | 16 | 14 | ↓ 2 |
| Population growth inevitably degrades the environment. | 17 | 17 | 0 |
| Forests should be managed to achieve the maximum sustainable yield of timber resources. | 18 | 18 | 0 |
| There exists a maximum level of economic growth that can be sustained without undermining the resource base upon which it depends. | 19 | 20 | ↑ 1 |
| The optimal forest rotation is when the harvest generates the maximum economic yield of timber and ecosystem services. | 20 | 19 | ↓ 1 |
| Ocean fisheries should be managed to achieve the maximum economic yield from commercial and recreational catch. | 20 | 21 | 1 |
| Ocean fisheries should be managed to achieve the maximum sustainable yield from commercial catch. | 22 | 22 | 0 |