

Conversion Aversion: Environmental Learning and PBS Viewer Preferences

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Abstract

Public Broadcasting System (PBS) television plays a unique role in informal learning for the US public. The network is generally perceived as one of the most reliable sources for information and has established itself as a primary distributor of natural history documentaries. Despite this long history, there is little survey data on what motivates viewership or how nature documentary viewing relates to environmental values, lifestyle choices, and learning outcomes. This article reports on a study of Californian PBS viewers' environmental identity, values, patterns of visiting parks, reactions to the desirability of a series of nature program scenarios, and their reasons for these reactions. Results revealed that viewers who had visited a park or viewed another nature program in the past two years were more likely to watch PBS programs on environmental topics irrespective of the scenario, and were more likely to feel that their identity is interconnected with nature. However, analysis of comments suggested that there were a handful of priorities that may present challenges to attracting these viewers, such as a mistrust of science and political motives for producing nature documentaries. The paper suggests that nature program viewing is an identity reinforcing behavior where information is used to elaborate on existing values and beliefs. By understanding these priorities, environmental educators may be able to strategically shape programming and promotion to broaden and diversify audiences for nature documentaries.

Keywords: Public broadcasting system; Environmental learning; Public television; Public service broadcasting

Introduction and Literature Review

Public Broadcasting System (PBS) [1] television plays a unique role as an educational and informational source in Americans' lives. Unlike commercial television or government funded networks in most countries, PBS is a non-governmental non-profit organization whose member stations pay fees to programs that are placed into an asset pool distributed by the network. These programs are frequently developed by member stations or independent non-profits. This means that PBS itself does not create programs yet has built brand recognition for a type of learning media and a host of associated beliefs and expectations by viewers and non-viewers alike. This study explored how Californian self-professed PBS program viewers perceive nature documentaries and their expectations for that network's programming in relation to their environmental identity and park visiting behaviors.

The general public finds PBS to be a reliable and trustworthy source for news. They believe that the network needs more funding and that it serves an important role in society [2]. Studies indicate that the popularity and emergence of other cable networks that feature nature documentary, such as A&E and Discovery, do not appear to dilute the perception that public television is important; nor does it manifest in different viewership patterns [3].

European public television is cultivating a communicative relationship between broadcasters and their audiences through new participatory technologies. Enli [4] examined the strategic functions of multi-platform participation for the UK-based Public Service Broadcasting (PSB) and identified a distinct contradiction between a focus on attracting large audiences while also being an alternative to commercial channels. The data suggested an emerging focus on digital participation as a central component for these networks, especially when they initiate democratic participation across several platforms.

The Role of Public Television in Teaching about Science and the Environment

Mass media-including print, television, radio, and other formats-plays a critical role in public dialogue about a range of issues. There is substantial research on the relationship between various forms of mass media and public opinions. Print and television media have traditionally been ascribed as having strength in influencing public perceptions [5], where newsroom staff and their broadcaster play an important role in shaping political reality by their choice of news to emphasize. Readers and viewers learn about an issue and how much importance to attach to that issue based on the amount of information in a news story and its position in the broadcast. While the media may have had the capacity to set the "agenda" during the latter half of the 20th century, new social media has reduced the impact of the central media narrative. Facebook, YouTube and other asynchronous information streams have changed the nature of discourse by making commentary more interactive and contextualized, rebroadcasting and influencing the information context for future consumption. This new phenomenon was notably evident in the use of media during what has become known as the "Arab Spring" [6]. This shift in authority

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is conferred by the various settings and the audience's willingness to accept the framing of voices in the documentary.

Public Broadcasting Service (PBS) is a private, nonprofit American corporation whose members are the public television stations of the United States and its unincorporated territories. PBS provides its member stations with programming in cultural, educational, and scientific areas, in children's fare, and in news and public affairs but does not itself produce programs; the programs are produced by the member stations, independent producers, and other program producers worldwide.

Today, there is considerable choice exercised by the public in what and how they choose to view content. This selective preference for specific forms of media have implications for viewing behavior and how any viewer's identity might influence their content interest and use [7]. Media preferences are a direct result of an individual's goals and needs, encompassing politics, religion, and lifestyle choices. This new social context for media consumption has a direct impact on how documentary film might influence awareness and understanding of science and the environment. It may be that science content is more likely to reinforce existing beliefs, may elaborate or clarify naive knowledge, or may be viewed simply to support a belief that discredits the source of the information. Thus, preferences and worldviews that influence people's normal decisions and choices are implicated in the media they seek out for learning purposes and how they will use that learning in their personal lives.

Topics such as earth science and environment have become highly politicized, something that has been altered by new media trends in journalism and entertainment viewing. Baym [8] situates Comedy Central's *The Daily Show* within an emerging media environment defined by the forces of technological multiplication, economic consolidation, and discursive integration—a landscape in which “real news” is becoming increasingly harder to identify or define. *The Daily Show* is reconceived not as “fake news,” but as an experiment in journalism, using techniques from genres of news, comedy, and television talk to revive a journalism of critical inquiry and advance a model of deliberative democracy. Given the increasing popularity of the program, Baym [8] concludes that *The Daily Show* has much to teach us about the possibilities of political journalism in the twenty-first century. Hot-button issues, such as environmental matters, are especially amenable to such presentation and portrayal to further audience clarity on these issues. *The Daily Show*, however, is not alone in creating this new journalism landscape. Rather, it has arisen alongside a refined conservative-libertarian media exemplified by the framing strategies of FOX News; strategies that seek to renegotiate science fact as part of the political discourses of rights and moral doctrine. This so-called “cowboy capitalism” seeks to discredit scientific reason and discourse. Therefore, any media that aims to address environmental topics will, of necessity, be considered in the context of the potential viewing audience—their beliefs and knowledge of such topics and how they perceive the authority and voice to provide reliable and useful information.

The landscape of American perspectives on environmental topics is shifting. Americans are now less worried about a series of environmental problems than at any time in the past two decades [9], in spite of the persistent environmental issues we face. This may be due, in part, to beliefs that environmental conditions in the US are improving. But it may simply reflect a greater emphasis on economic challenges rather than a drop in actual environmental concern. Greater action on environmental issues at the federal, state, and local levels

may also contribute to a decline in Americans' environmental worry. Regardless of the reason, the current lull in American concern about the environment may rise if innovative new broadcast strategies can be thoughtfully leveraged.

Understanding the antecedents of science knowledge and literacy can inform efforts to build more effective models for improving science literacy and civic engagement through broadcast documentary. In a study of the predictors of knowledge about global warming, Kahlor and Rosenthal [10] found that the strongest predictors of the outcomes were level of educational achievement, prior seeking effort related to the topic, and the number of news media sources used. The findings suggest that any research into a potential audience for documentary film should examine the relationships between information seeking intent, actual information seeking, and the possibility that knowledge might be gained or reinforced.

Nisbet and Scheufele [11] examined social science research on how the public makes sense of and participates in societal decisions about science and technology. After surveying cases of topics such as evolution, climate change, food biotechnology, and nanotechnology, they emphasized the need for science communication initiatives that: 1) are guided by careful formative research; 2) span a diversity of media platforms and audiences including television as a key information vector; and 3) facilitate conversations with a public that recognizes, respects, and incorporates differences in knowledge, values, perspectives, and goals.

Investigating public perceptions of science and technology in a media effects model, Nisbet et al. [12] examined the ways different media relate to the public's perception of science and technology. By analyzing data from the National Science Board's Science and Engineering Indicators Survey, they found that different media—newspapers, general television (including both public and regular programming), science television, and science magazines—are related to perceptions, though in different ways. Mediated through effects on science knowledge, these media effects were both direct and indirect. Although newspaper reading, science television viewing, and science magazine reading all promoted positive perceptions of science, the impact of general television viewing was considered most compelling for the general audience. Furthermore, though negative images of science on television appeared to cultivate reservations about science, television's portrayal of science as sometimes omnipotent and offering hope for the future, appeared to promote a competing schema related to the promise of science.

Scientists have also criticized the media for hindering the public's accurate understanding of science and technology. Scientists perceive the American public to have limited scientific knowledge, fueled primarily by media depictions of research that thwart proper understanding [13]. Yet the public also indicates positive perceptions of science and the scientific enterprise, which underscores their receptivity to media portrayals. These contradictory results suggest that television documentary may still serve a powerful role in the advancement of science literacy, but suggest that efficacy of these programs will be a function of how the audience assigns trust to the network, the content, and the framing of the documentary's narrative.

The Current Study

In 2009, the California Environmental Legacy Project received funding from the National Science Foundation to advance understanding about how various media tools influence advancement

of science literacy, and to develop science learning tools for use in public television broadcast, through website media and place-based learning settings. The current study was undertaken to support that effort by assessing public television viewer interest in these environmental science topics and the context surrounding their broadcast. Specifically, this study examined potential viewer preferences, and identified baseline information about knowledge related to the target themes of the program, while looking at attributes of stories that might have the likelihood of increasing or limiting viewership within the potential audience for this type of show. It also investigated how viewership was related to experiences with parks and other nature places.

The study recognized that knowledge about the environment is related to demographic factors such as education and income level, suggesting that various audience groups learn about environmental content differently, even if they are part of the same psychographic viewing groups. Audiences' unique preferences were explored to advise the program team on content creation and broadcasting context, while offering insight into how to provide reliable science content to the widest possible audience in the face of an increasingly polarized and politicized journalism landscape. In the development of television programming to educate and inform audiences about Californian landscapes and ecology, it was also deemed essential to learn about their preferences and the barriers to effective learning or engagement with the proposed program materials, an exercise that offered new insights into media consumption about environmental topics.

A focus of this study was to investigate how television viewing of a nature show and visits to a park were differentially related to PBS viewers' relationship with the environment, the relevance of the California landscape to their selves, and preferences for topics the project intended to feature in their programming. Considering the aforementioned research on this topic, such a focus situated viewership within a framework that encompassed viewers' preferences and interactions with the California landscape. Given that the project sought to increase understanding of environmental change and facilitate connections to personal relevance, this is a critical aspect of the current study.

Methods

Participants

The research team initially sought to recruit participants through partner public television stations. Of the ten stations contacted for support of a survey of their membership, only three stations participated and only one station forwarded the survey URL directly to their membership. Consequently, the total number of participants was 83, with the majority (n=57) representing viewers from one north/central California station. To expand the study, we elected to purchase an online consumer sample of pre-screened California PBS viewers (n=310). Data was collected in spring 2010.

An independent samples t-test was conducted on each numeric variable, with no effect between samples from the station membership and the supplementary data from the online survey for each variable. Consequently, the datasets were combined for all further analysis and are reported as one sample. The final sample consisted of 393 Californian PBS viewers.

The sample contained slightly more men (51.9%) than women (48.1%) and was primarily White/Caucasian (82.7%). The average respondent was likely to have an undergraduate degree (32.8%) and a median income ranging from \$50,000 – \$75,000 a year (19.8%). Slightly

more participants were aged 65-73 years old (21.4%), followed by 46-55 years old and 56-64 years old (both 20.6%). These percentages are consistent with findings from national studies of who is likely to watch PBS programs nationwide (Harris Interactive, 2012). This sample contained a slightly lower proportion of Black/African American (2.0%) and Spanish/Hispanic/Latino (3.8%) participants and a slightly higher proportion of Asian/Pacific Islander participants (9.9%) than the national data would suggest watch PBS programs. However, census data for California suggests that there may be slightly more Asian/Pacific Islanders living in the state. Similarly, those with Spanish/Hispanic/Latino also were more likely to have higher incomes than averages found in the census data for that group and were therefore considered to be proportionally representative of the typical PBS viewing audience. Not surprisingly, 73.3% of respondents were affiliated with three stations in the major market areas: Los Angeles (27.0%), Sacramento (23.9%), and San Francisco (22.4%). Likewise, 59% of participants stated that they live in a suburb of a larger city or metropolitan area. A majority of participants viewed a PBS nature show from beginning to end in the past two years (80.9%) and had visited a national or state park in the past two years (62.6%).

Instruments

The research team developed and implemented an online survey using Zoomerang web-based survey software, aimed at achieving a representative sample of public television viewers from each region in California and reflecting the viewership of these stations.

To establish baseline data on environmental attitudes and values, the analysis used two pre-validated scales:

Inclusion of nature in self scale: (INS) [14], A single-item graphic scale that measures the extent that an individual includes nature within their cognitive representation of the self. The scale is described by a series of seven overlapping circles, with letters converted to a score on a 7-point scale, with the score increasing as the circles increased in the degree of overlap. Those selecting circles with the least overlap correlate with individuals who view themselves as separate from nature, whereas those who select the single circle depicting complete overlap consider themselves as one with nature and having a higher likelihood of engaging in environmental behaviors and demonstrating deeper concern for the biosphere.

Place attachment scale: A two-part 12 item 7-point Likert-type scale was used to assess two identity variables, Place Identity and Place Dependence, modified to reference California as the target topic [15]. *Place identity* is an emotional attachment to place, in which individuals give special meaning to the relationship they have developed with a physical place. Place identity is part of one's self-identity and is a component of developing environmental values [16]. *Place dependence* is an indicator that an individual views a physical area as providing for their goals and needs [17]. Prior research has demonstrated that both place identity and place dependence can be developed through an individual's use of outdoor resources and that, as individuals increase in identity and dependence, they become more aware of the consequences of our activities on the environment [18].

To explore viewing preferences, participants were presented with brief descriptions of eight options for program topics. Descriptions were presented in four paired sets, as two potential topics that would characterize four different programs (Appendix A). Participants were asked to rate each program on a five-point scale indicating how likely they would be to view a program on each of the topics. After each

was rated, they were asked to provide commentary on why they gave that rating, and if they rated that they were less likely to view a topic what could be done to increase the likelihood that they would view a program on that topic.

Findings

Personal relevance

Results from the Nature In Self Scale (INS) indicated that participants who had visited a park in the past two years are significantly more likely to consider nature as part of their sense of self than those who did not visit parks, $t(391)=4.36, p<.001$ (Table 1). In contrast, watching a nature show in the past two years did not appear to have an impact on how someone rated her or his relationship between self and nature on the INS scale. There was, however, an additive effect for participants who both visited a park within the past 2 years and claimed to have watched a nature show in that same period, $t(241)=2.84, p<.001$. No significant differences were observed among means of the INS Scale based on primary PBS station affiliation.

The Place Identity scale indicated that those who had visited a park have a higher feeling of emotional attachment to place (Table 2). Participants who stated that they had visited a park in the past two years reported significantly higher means on the Place Identity Scale than those who had not, $t(391)=5.52, p<.001$. Likewise, participants who viewed a nature show in the past two years reported significantly higher means for this scale than those who did not, $t(391)=4.73, p<.001$. Participants who had both visited a park and viewed a nature show in the past two years reported significantly higher means on the Place Identity Scale over those who had done neither in the past two years, $t(241)=6.57, p<.001$. No significant differences were observed among means of the Place Identity Scale based on primary PBS station affiliation.

Individuals who had visited a park were more likely to rate themselves higher on the place dependence scale. Participants who

	N	%	Mean (± SD)	Median
Visit parks	246	63	4.76 (1.37)	5
Do not visit parks	147	37	4.08 (1.68)	4
Visit parks & watched nature show	207	53	4.85 (1.32)	5
Watched nature show	318	81	4.58 (1.49)	5
Did not watch nature show	75	19	4.21 (1.63)	4
Did not visit park or watch nature show	36	9	4.14 (1.74)	4
Total	393	100	4.51 (1.53)	5

Notes: Mean (± SD) and Median value for rating on the 7 point INS Scale [14]

Table 1: Park visiting and nature show watching behaviors in relation to INS scale.

	N	%	\bar{x}	Median	SD
Visit parks	246	63	5.52	5.67	1.11
Do not visit parks	147	37	4.65	4.67	1.35
Visit parks & watch nature show	207	53	5.67	5.83	1.03
Watched nature show	318	81	5.34	5.5	1.25
Did not watch nature show	75	19	4.59	4.67	1.23
Did not visit park or watch nature show	36	9	4.41	4.33	1.22
Total	393	100	5.20	5.33	1.28

Notes: 1. Number (N) and percent (%) of respondents, and mean (± SD) and median value for inclusion on the Place Identity Scale. 2. Mean and median values are based on responses to a 7-point Likert-type scale, with 1 representing that the respondent strongly disagree and 7 representing that they strongly agree

Table 2: Place identity and park visiting behavior.

	INS \bar{x}	Place identity \bar{x}	Place dependence \bar{x}	View nature show	Visit park	Do Both
INS \bar{x}	—					
Place identity \bar{x}	.468*	—				
Place dependence \bar{x}	.225*	.624*	—			
View nature show	.093	.233*	.164*	—		
Visit park	.215*	.330*	.211*	.106*	—	
Do both	.157*	.186*	.078	.260*	.537*	—

*Significant at $p<.001$

Table 3: Summary of correlation coefficients for studied variables.

stated that they had visited a park in the past two years reported significantly higher means on the Place Dependence Scale than those who did not, $t(391)=4.00, p<.001$. Likewise, participants who viewed a nature show in the past two years also reported significantly higher means on this scale than those who did not, $t(391)=3.29, p=.001$. Participants who had both visited a park and viewed a nature show in the past two years reported significantly higher means on the Place Dependence Scale than those who had done neither in the past two years, $t(241)=4.49, p<.001$. No significant differences were observed among means on the Place Dependence Scale based on primary PBS station affiliation.

Using a Pearson correlation analysis, all three personal relevance scales, INS, Place Identity, and Place Dependence, and whether participants viewed a nature show, visited a park or did both were significantly and positively correlated with one another (Table 3). Generally, viewing a PBS nature program, visiting a park, and doing both were significantly and positively correlated with the three scales. No significant correlations were observed between INS and viewing a nature show, and between place dependence and doing both (viewing a nature show and visiting a park).

Nature show viewing and park visiting

In summary, behaviors such as visiting parks and/or watching PBS nature programs are related to a greater sense of connection to nature, the environment in general, and California's nature, as indicated by both the Place Identity and Dependence scale results. Participants who had visited a park felt that nature was part of who they are more than those who had not. Participants who had visited a park and/or viewed a PBS nature program also displayed stronger place dependence and place identity.

Program Topics

Perceived relevance

In varying ways, participants indicated that programs would be more interesting if they more clearly related to their own lives. In particular, they wanted information about what they could do, on a regular basis, to improve environmental issues that are relevant to their lives. In some cases, the information they sought was as specific as to their own city or metro area, but often it referred to a more general appeal. For example:

Highlight how threatening and destroying habitat and species will lead to human suffering, and what small and significant changes we can make now to fix.

Advertising may play a strong role in attracting and sustaining the public's attention to a program. For some audiences the challenge may be to inform them about the relevance of particular environmental

concerns. As a descriptor, biodiversity was considered uninteresting to some participants even though the topic is ranked among California environmentalists as a high priority. In the open-ended surveys, participants tended to request a focus on specific species rather than systems, suggesting that empathy and a connection with these species may entice some potential viewers who are unsure as to whether or not they would commit to watching the program.

Mistrust of science and scientists

A small number of participants indicated mistrust in science and scientists who work on environmental issues. For example, when the topic description mentioned or hinted at the climate change topic (Program 1, Topic 1 and 2), it was noted that *These "scientific" studies are flawed.*

Some comments suggested a disbelief in science based on religious views. For these viewers, science and their religious values may be at odds. For example, two respondents commented:

Big bang theory...God said let there be...BANG, there it is

This sounds like evolutionist lies to me.

Mention of the term evolution in the description of Program 2, Topic 2 challenged the beliefs of some of the participants. The word "evolution" continues to be a hot button term that elicits negative feedback for audiences, even the PBS audience. These results indicate that framing discussions around the topic of biological diversity may have a higher likelihood of a gaining a more heterogeneous audience and offer greater opportunities to communicate the concepts at the heart of this program to a broader audience. While these comments represented a small portion of the participants' feedback, they indicate that some science programs should be sensitive to different worldviews, perhaps focusing on the compatibility of religious beliefs rather than disproving Creationist views. Programming that is inclusive of a range of perspectives and backgrounds may show that multiple voices and people of varying belief systems can participate in science.

Apprehension about political bias

For various topic descriptions, particularly in Program 1, participants showed apprehension about potential political bias. One respondent noted:

Description suggests it can possibly be a political statement in the making.

Such responses indicate concerns that the topical subject matter will be presented solely with a liberal-environmentalist, political agenda that will demonize humans and more mainstream or conservative American values. Some of the strongest responses related to politics centered on public figures and leaders who focus on environmental issues. These participants are extremely apprehensive of the potential politicizing of environmental programming, which is evident in the extreme mistrust and anger that some expressed over a highly publicized player in the climate change debate: Al Gore. In particular, four participants mention Gore in their responses, all in a negative manner. For example:

The Earth's climate moves in repetitive cycles, and there's nothing humans can do about it. However, the average working man can be reduced to living in caves, while Al Gore, the climate change guru, lives in an \$8-million mansion on the Pacific coast. What hypocrisy!

Whether true or not the above statements reflect that Al Gore—

once thought to be an inspirational leader in the climate change conversation—has lost his luster with some PBS viewers. These comments suggest that Al Gore's role is not considered bipartisan and may have contributed to the politicization of the scientific reporting of climate change. This sentiment would suggest that filmmakers use caution when making references to Al Gore and the *Inconvenient Truth* programs, or at minimum, present an examination of the claims made by that film in the context of politicians' lifestyles in order to retain credibility.

The shift in attitudes is noticeable between geology and climate change, in that political views begin to be expressed around the topic of climate change. It is no secret that America has politicized the issue of global climate change [11]. Consequently, this will need to be addressed up front and with a clear statement that the purpose of the program is not to take sides politically. Explaining the science behind climate change in a way that reassures the viewer that the facts have been thoroughly examined may serve to reduce some doubt.

Negative overtones

Participants noted the negative implications that they sensed in the topic descriptions, particularly in Program 3, Topics 1 and 2. Generally, their descriptions characterized the negative side of environmental issues as unnerving; with a small number of participants suggesting that these topics would make the program unappealing. The negative overtone was most commonly linked to characterizations of people as "bad." Two cases in point:

It would just depress me further than I already am.

The premise of this program topic as shown seems to be predisposed toward portraying man/civilization as an inherently evil force on California's natural systems.

Such responses suggest that programs that emphasize the severity of environmental issues may ward off potential viewers, particularly if they feel that the topics are laying the blame on humans. Urbanization and industrialization are potential buzzwords that may provoke feelings of sadness and despair in some, while angering others. Some potential viewers seemed to describe natural threats such as earthquakes or fires as more immediately threatening to human survival in contrast to the anthropogenic causes of change to the biosphere which may be perceived as incremental and possibly outside their sphere of concern.

Preferences for topics

Over a range of options for a nature documentary, a focus on California geology emerged as the highest rated topic, and more likely to be rated higher by park visitors, highest by PBS nature show viewers, and highest by those who had both visited a park and viewed a PBS

	N	%	\bar{x}	median	SD
Visit parks	246	63	4.36	4.25	1.36
Do not visit parks	147	37	3.84	3.75	1.36
Visit parks & watch nature show	207	53	4.44	4.5	1.05
Watched nature show	318	81	4.26	4.25	1.19
Did not watch nature show	75	19	3.76	3.75	1.16
Did not visit park or watch nature show	36	9	3.54	3.38	1.37
Total	393	100	4.17	4.25	1.00

Notes: 1. Number (N) and percent (%) of respondents, and mean (\pm SD) and median value for inclusion on the Place Dependence Scale. 2. Mean and median values are based on responses to a 7-point Likert-type scale, with 1 representing that the respondent strongly disagree and 7 representing that they strongly agree

Table 4: Place dependence and park visiting behavior.

nature program (Appendix A, Table 5). For those who didn't visit a park or watch a nature documentary, two other topics were rated at an equally high level. Although we did not quantify the comments made by viewers who rated programs at 4 or 5, a scan of these comments suggests that geology, and earthquakes in particular, are considered easy to understand and relevant to their lives in California. Two representative examples of statements included:

We live in earthquake country and the more we understand earthquakes the safer we can be.

I was born in Calif. and have experienced several earthquakes. I would be interested in knowing more about how they are caused.

Comments made by those who stated a lower likelihood to view this program also suggest that geology is considered more benign than the other topics offered. The geology topic did not elicit emotional and political terms in participants' reasons for not wanting to view a program, unlike all other topics.

Examining the reasons given by participants who rated their likelihood of viewing this program at a 4 or 5 suggests one of the reasons motivating these participants is the message of hope and empowerment that they would assume is linked to geological stories rather than those that focus on the biotic world.

Discussion

Based on measures from the INS Scale, and the place attachment scales, our results suggest that California PBS viewers have a moderate level of being connected to the environment. We consistently found that those who had visited a park in the past two years and those who viewed a PBS nature program in the past two years report significantly higher levels of connection to nature, environment, and place. This suggests that these viewing audiences may be more inclined to participate in environmental programming and be receptive to the key messages typical in environmental education.

This study also found strong implications for viewers' political and religious identity and their preferences for program topics, findings consistent with Slater's [7] results. Slater found that media preferences are tied to aspects of individuals' political and religious stances. In the current study, participants rated the program topic on geology as most likely to be viewed. Findings on program topics suggest that some topics are perceived as politicized and must be carefully addressed in programs and advertising if a more diverse audience is sought. These results suggest that potential viewers anticipate being influenced by the language used to describe the ecological concepts. For example, words that include *evolution*, *urbanization*, and *modernization* spark a very negative reaction for some groups. There is also a tendency to assume that an environmental show might set a more negative tone because respondents were more likely to recommend that program creators focus on telling upbeat solutions as preferable to stories to what they felt were the typical "doom and gloom" approach to most environmental documentaries.

Even though Jones [9] showed that Americans are less concerned about the environment than in past decades, it appears that there is an implicit assumption that environmental stories generally have a negative tone when they focus on the country's critical environmental problems. Substantiating the study by Jones [9], the results from the current study demonstrate that viewers are not interested in watching a program that places blame for environmental change on human behavior. Moreover, potential viewers are aware that some environmental change can be

accounted for naturally. There is evidence that some potential viewers react negatively to a perceived liberal agenda for PBS programming. Indeed, they believe that environmental issues aired on PBS stations will be more likely to have an underlying political agenda. These potential viewers are also skeptical of those who are presented as "leading experts" and link this term to a political agenda. We suggest from these results that environmental documentaries are more likely to appeal to individuals who are more connected with environmental issues and leisure practices. Therefore, nature documentaries are likely to reinforce beliefs and attitudes for those already aware of the content basics, potentially creating a ceiling effect where learning becomes refined topical knowledge rather than the broad impact sought by many documentary producers. While television is potentially a powerful and effective communication tool on such complicated topics, particularly those related to science [11,12], our results suggest that environmental programming is faced with a perceived bias that will likely limit the prospective audience. To garner a more diverse audience and achieve higher levels of satisfaction with the program, careful attention must be given to reframing the environmental narrative to focus on realistic solutions.

Conclusion

PBS viewers do not feel that their lives are significantly overlapped with the natural environment. These findings suggest that greater focus on understanding basic concepts about interconnected scales of environmental change is possible, but may only be achieved through a focus on a personal scale as a starting point and as a scaffold to larger scales by reducing the politically charged atmosphere around the topics. It appears that the environmental education films more likely to generate larger viewing audiences will be those characterized by hopeful stories about small-scale personal actions that are resulting in larger impacts.

For Californians in particular, topical issues like air pollution and water shortage are more likely to garner feelings that the programming is personally relevant. Natural resource depletion, on the other hand, may only be considered personally relevant to those who visit parks and may be more suited to place-based learning programs rather than a topic for television.

We have found that PBS viewers [19] have moderate levels of awareness and understanding of environmental change, with some viewers relying on political ideology and religion as guides to their beliefs and opinions. Public programming leaders will need to carefully re-craft their messaging for environmental programs and program promotion in order to achieve efforts to diversify audiences and increase viewership.

As a multi-scale phenomenon linked across geographic area, environmental change continues to be perceived as abstract, political, and incomprehensible to some. Current non-viewers are sensitive to terminology that may be interpreted as eco-centric, where natural systems, plants, or animals are prioritized over humans. Continuing to pursue the historical tropes of environmental broadcasting with negative framing is likely to reduce viewer interest and may be counter-productive to the goals of the broadcasters, producers and those who seek to promote environmental literacy.

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