Revisiting Environmental Citizenship: The Role of Information Capital and Media Use

Bruno Takahashi[1], Edson C. Tandoc Jr.[2], Ran Duan[1], and Anthony Van Witsen[1]

Abstract

This study proposes, from a cross-national perspective, a model of environmental citizenship that includes predictors at the individual and contextual levels. The model is based on multiple theoretical considerations from environmental sociology, media studies, and economics. The study, based on secondary data, reports that at the individual level, media use, environmental concern, and postmaterialism positively predict environmental citizenship. However, the data also allow to test whether the effects of these variables vary depending on social and environmental contexts. Beyond the individual level, results show that, overall, the effect of environmental concern is stronger in countries with better environment quality. The results also show that economic development at the country level positively explains a stronger effect of postmaterialism on environmental citizenship than in less developed countries. The study shows that environmental citizenship is stronger in countries with lower levels of environment quality, and in countries with less developed media systems.

[1]Michigan State University, East Lansing, MI, USA
[2]Nanyang Technological University, Singapore

Corresponding Author:
Bruno Takahashi, Assistant Professor and Research Director, Knight Center for Environmental Journalism, School of Journalism and Department of Communication, College of Communication Arts and Sciences, Michigan State University, 348 CAS Bldg. MSU Campus, East Lansing, MI 48824, USA.
Email: btakahas@msu.edu

Current global environmental problems such as climate change as well as regional- and local-level issues such as the intense drought in California require both policy actions and individual behavioral changes (Kazdin, 2009; Swim, Clayton, & Howard, 2011; Vlek & Steg, 2007). But understanding the factors that affect those behaviors across different cultural groups has remained a challenge. Studies in environmental sociology and environmental psychology have explored these factors at both the social level and the individual level. These variables have included socioeconomics such as age, education, and income as well as cognitive and perceptual factors like scientific knowledge, environmental attitudes, and environmental concern. The two approaches led to competing theoretical perspectives of causes of environmental concern and behavior including the postmaterialist thesis (Inglehart & Abramson, 1999; Steger, Pierce, Steel, & Lovrich, 1989) and the value-belief-norm (VBN) theory (de Groot & Steg, 2008; Stern, Kalof, Dietz, & Guagnano, 1995). However, research in this area has only begun to integrate disciplinary perspectives as well as to incorporate additional influences such as communication processes. Communication scholars have proposed expanded models that incorporate the role of the media in explaining environmental concern (Ahern, 2012), and environmental behaviors, such as purchasing behaviors (Lin & Huang, 2012), and curtailment behaviors (e.g., recycling, turning off lights; Ho, Liao, & Rosenthal, 2014).

This study has two overall aims. First, it expands recent models that incorporate a media perspective. A conceptual model that focuses on the concept of environmental citizenship was tested by incorporating the role of media sources from both social-psychological and cultural perspectives. Various theoretical approaches were used, particularly Ahern's (2012) work on media systems and postmaterialism; the VBN theory of environmental behaviors developed by Stern and colleagues (Dietz, Dan, & Shwom, 2007; Dietz, Fitzgerald, & Shwom, 2005; Stern, 2000, 2011; Stern & Dietz, 1994; Stern, Dietz, Abel, Guagnano, & Kalof, 1999; Stern, Dietz, & Guagnano, 1998; Stern, Dietz, & Kalof, 1993; Stern et al., 1995); and the work by Tandoc and Takahashi (2013) on the role of human, social, and natural capital on people's well-being. The study incorporates the concept of *information capital* that examines the role of media systems and media consumption on environmental concern and behavior. This builds on Ahern's (2012) incorporation of forms of information and natural capital into his analysis.

The study's second aim is to combine both the individual- and contextual-level aspects of environmentalism (e.g., concern, attitudes, behaviors) into a single model to overcome the limits of country-level analysis (Ahern, 2012; Gelissen, 2007; Oreg & Katz-Gerro, 2006). Country-level analyses alone do not fully account for patterns at the individual level that could explain the

conflicting evidence at the country level, such as higher levels of environmental concern in some poorer countries compared with developed nations. Therefore, one main contribution of this study is the inclusion of media variables at both the individual (media use) and contextual level (media system development) within well-established models of environmental behaviors, something not tested in past research.

Literature Review

Conditions at the individual level that affect people's lives are to a certain extent under the control of the individual—yet these are also affected by macro-level factors. Examples of the former include the decision to vote for a political candidate with a strong environmental agenda; examples of the latter include the state of the economy, existing environmental conditions, and the country's overall development. However, much of the literature treats these levels separately, ignoring the relationship between them. Ahern (2012) examined the relationship between environmental concern (i.e., willingness to pay), media systems, and postmaterialism, and incorporated variables both at the individual and contextual levels. Arguing that media system development has not been examined in the context of postmaterialism and environmental concern, he reported (2012, p. 553) that a highly developed media system "may be a prerequisite for correlational or causational associations between economic growth and postmaterialist attitudes such as environmentalism."

Using a similar multilevel approach, Oreg and Katz-Gerro (2006) integrated the Theory of Planned Behavior (TPB) and the VBN theory to explore the effect of country-level factors (i.e., harmony and postmaterialism), and individual-level factors (i.e., environmental concern, perceived threat, willingness to sacrifice, and perceived behavioral control) on self-reported environmental behaviors. Postmaterialism at the country level was found to precede environmental concern, which in turn was positively related to self-reported environmental behaviors. These recent studies illustrate the importance of studying predictors of environmental behaviors at both the contextual and individual level.

Environmental Citizenship

A key variable in this study is the multifaceted definition of environmental citizenship developed by Stern et al. (1999) to understand people who were not full-time activists but still supported and took part in some environmental activities, were willing to change policies, and were willing to make some

sacrifices for the environment. The authors define the concept of "low commitment active citizenship" as a series of political activities that include writing letters to political officials, joining and contributing funds to movement organizations, and reading movement literature. In addition, they suggest that support and acceptance of proenvironmental policies is related to this concept of citizenship. Similarly, this study defines environmental citizenship as the engagement in political activities aimed at supporting environmental causes. Stern et al. (1999) presented a reliable seven-item scale measuring environmental citizenship, which includes questions related to membership in environmental organizations, signing petitions, donating money to environmental groups, voting for environment-friendly candidates, among others. Environmental citizenship, environmental activism, policy support, and private-sphere behaviors are part of the broader concept of environmental behaviors (Stern et al., 1999). Most of the literature on environmental behaviors has examined policy support (Dietz et al., 2007; McCright, 2009; Zahran, Brody, Grover, & Vedlitz, 2006) and public-sphere behaviors (Kaiser & Shimoda, 1999; Nordlund & Garvill, 2002), making the examination of citizenship a much-needed area of research. Environmental citizenship is discussed as an alternative way to regulatory and economic mechanisms to achieve sustainable behavior (Dobson & Bell, 2006).

Media Use

The other main variable of interest in this study is media use, which has seldom been included in cross-cultural studies examining environmental concern and self-reported behaviors. One of those who did, Ahern (2012, p. 543), argued that "research suggests the media plays an important moderating role in the emergence and impact of environmentalism at the national level." Other media and communication researchers have studied the relationship between media use and self-reported environmental behaviors. For example, Hunter, Hatch, and Johnson (2004) found that media use enhanced awareness of climate problems and related behavioral intentions, but these did not always produce mobilization. Holbert, Kwak, and Shah (2003) looked at media use from a theoretical perspective of cultivation and uses and gratifications and found that there are both direct effects and potential mediating effects in the relationship between various forms of television viewing and self-reported environmental behaviors. Similarly, Ho et al. (2014) extended this literature by taking media types into consideration in the context of Singapore, a non-Western country. The researchers also applied the TPB and media dependency theory, and found that media dependency and attention have an impact on self-reported environmental behaviors. There is also some evidence that suggests

that media use has positive and significant effects on concern over global warming (Zhao, 2009). In addition to the amount of media use, the exposure to diverse television media content plays a positive role as well in the cultivation of concern about environmental risks (Dahlstrom & Scheufele, 2010). In general, mass media use has been found to play a large role in cultivating public environmental concern and self-reported environmental behaviors (Ader, 1995; Allan, 2002).

Previous media effects research has justified the inclusion of media use in study of self-reported environmental behavior by producing significant insights into the relationship between media use and environmental concern across a variety of environmental issue contexts, media channels, and age groups. Some of this research has explored the relationship in contexts outside the United States. Studying the media effects on young people in Hong Kong, Lee (2011) explained how environmental values, together with media, explain self-reported environmental behaviors. Similarly, Östman (2013) studied how Swedish adolescents' self-reported environmental behaviors are influenced by the use of media sources. The study reported that both traditional and Internet media use mediate the relationship between pre-existing environmental attitudes and self-reported environmental behavior.

Most of these studies, however, have used a single-country context. The challenge is to explain the processes that explain these relationships across environmentally, culturally, and economically diverse countries.

Values and Postmaterialism

Research in environmental sociology and psychology has determined that cognitive and affective measures are important in understanding variations in environmental concern and behaviors (Hansla, Gamble, Juliusson, & Gärling, 2008; Swim, Stern, et al., 2011). Much of this research has focused on environmental attitudes and values (Aoyagi-Usui, Vinken, & Kuribayashi, 2003; Dietz et al., 2005).

A robust body of literature explains the importance of human values in determining environmentalism (Dietz et al., 2005). With that in mind, the first theoretical framework that shapes our model is the VBN theory of environmental behaviors (Stern et al., 1999). Values are general guiding principles that interact with, and influence, our attitudes, beliefs, worldviews, and behaviors (Dietz et al., 2005; Schwartz & Bilsky, 1987). Schwartz and Bilsky (1987) suggested that individuals can be placed in continuums: from egoistic to altruistic, and from conservative to being open to change. Their universal values theory has become the benchmark of recent models and theories of environmental values.

However, Stern et al. (1993) recognized that this perspective was insufficient to explain environmentalism because it did not encompass a broader ecological perspective. Consequently, they developed a model that includes altruistic, egoistic, and biospheric values at its core. This model suggests that these values are the basic determinants of environmental behaviors. The model differs from other important attitudinal theories, such as the TPB, by placing emphasis on values while relegating attitudes toward the behavior as a by-product. Through a multinational study, Schultz and Zelezny (1999) found that values are strong predictors of environmental attitudes.

A second line of research that informs the proposed model, postmaterialism (Inglehart, 1971), argues that a generational value shift, mostly in wealthy nations, since the end of World War II, led younger people to place less value on basic material needs after the war. Postmaterialism has been one of the most debated developments in the literature of environmentalism and values. It was acknowledged as an accurate explanation of new social movements, especially in developed countries. However, it came under wide scrutiny for its inability to explain the rise of environmental concern in less developed countries. More specifically, Brechin and Kempton (1994) asked how the postmaterialism thesis could explain similar levels of environmental concern among developed and developing countries, if the former presumably have higher numbers of postmaterial individuals. This question prompted extensive debate about the validity of the thesis, its theoretical constructs and interpretations, and its methodological complexities. Also, within the environmental psychology field, Schultz and Zelezny (1999) found that postmaterialism is a poor predictor of environmental concern.

But if postmaterialism does not accurately or fully explain global levels of environmentalism, what does? Inglehart (1995) attempted to respond to Brechin and Kempton's (1994) challenge by suggesting that postmaterial values operate in conjunction with objective problems (degrading environmental problems) in poorer countries to incite environmental concern (hence explaining similar levels of environmentalism worldwide). Inglehart referred to this as "Objective Problems Subjective Values." Brechin (1999) again challenged this idea on the same grounds that the individual-level phenomenon does not explain national, regional, or global environmentalism, and that global issues and effects are rarely experienced by anyone. The idea that postmaterial values and objective problems "cancel" out to explain similar levels of environmentalism (and sometimes higher levels in poorer countries) across countries is problematic, to say the least. Dunlap and Mertig (1997) argued that objective problems in both developed and developing countries suggest that these conditions cannot explain environmentalism in poorer countries. Moreover, they suggested

that it is impossible to differentiate if environmental concern is either a function of postmaterial values, objective problems, or both.

Brechin (1999) reasoned that environmental concerns are not driven by postmaterialism or any single process, for that matter. In his view, they are the result of multiple overlapping processes. Environmental concern in poorer countries can grow in response to local environmental problems, which can be exacerbated by economic conditions. However, environmental concern (the value itself, rather than any one problem) is also spread through mass media; communication from NGOs, environmental organizations, and governments; as well as non-mediated interpersonal communication (Brechin & Kempton, 1994). These processes function holistically and cannot be viewed in isolation. They do not flow in only one direction but are learned and shared as they move back and forth between individuals and communities. Part of the problem with postmaterialism comes from its pervasiveness, which affects environmental programs (especially in poorer nations) that could be based on Inglehart's perception of objective problems and subjective values. Nevertheless, Brechin and Kempton's (1994) proposition represents a challenge for researchers attempting to understand how the actual processes operate. Further empirical studies are required to determine if these communication processes are applicable within different cultural contexts, and if they are consistent over time.

The study of values and culture includes a third major component to the postmaterialism and human values research streams reviewed above. Hofstede's five-dimensional theory of culture and the role of values include a measure of individualism-collectivism that distinguishes countries around the world (Hofstede & McCrae, 2004). For example, based on this continuum, the United States ranks high in the individualism end point, whereas Peru and the Philippines rank closer to the collectivist society definition. However, there is limited evidence exploring the relationship between national-level individualism-collectivism, and individual-level values, including altruistic and biospheric values. Some multinational studies have reported the importance of contextual and cultural factors in explaining the divergence of results across nations in regard to environmentalism (Bechtel et al., 1999; Schultz & Zelezny, 1999). In their study of values in the context of forest conservation in Costa Rica, Schelhas and Pfeffer (2005) suggested that environmental beliefs and values are located in individuals and cultural artifacts, but constructed through individual and social experiences. Others such as Pierce (1997) and Steger et al. (1989) found differences in environmentalism between postindustrial countries. Pierce (1997) reported differences between the United States (a mostly individualistic society) and Japan (a more ecocentric society). Steger et al. (1989) compared the United States

and Canada on the basis of postmaterialism and the New Ecological Paradigm (NEP), and revealed that the former had less value in explaining environmentalism than other sets of societal values. In Canada, the relationship between support for the NEP and postmaterialism was weaker because Canadians have a more community-oriented society, valuing the environment despite numbers of materialists and postmaterialists.

The evidence from all these studies suggests that environmental concern and individual behavior change must be placed within the systemic value orientations of each nation. It also suggests that values-based approaches designed to understand environmentalism and environmental behaviors are incomplete if they do not incorporate alternative explanations such as those described by Brechin (1999; for example, the mass media).

Contextual-Level Factors and Environmentalism

This study follows Brechin and Kempton (1994) and Ahern's (2012) rationale that environmental values can be transmitted through the mass media and interpersonal communication. This conceptualization has also taken a step further to borrow theoretical considerations from disciplines such as ecological economics that explore factors related to well-being. Vemuri and Costanza (2006), for example, examined the influence of built, human, social, and natural capital on life satisfaction. Similarly, Tandoc and Takahashi (2013) tested a model that included these forms of capital and their effect on life satisfaction, concluding that press freedom positively predicted life satisfaction. The addition of press freedom as a form of social capital supports the argument for the inclusion of media-related variables in the analysis of other cognitive and behavioral outcomes. This same logic is followed in exploring the determinants of self-reported environmental behaviors, which suggests that people's happiness, satisfaction, and well-being depend to a large extent on the social and environmental (both natural and man-made) conditions in their countries.

This study also argues that examining the role of the media at the country level could and should be expanded to include a measure of accessibility to media sources, which was conceptualized as information capital. Information capital also refers to the availability of communication infrastructure. In addition, press freedom allows the media to freely report wrongdoings (e.g., environmental degradation, corruption, etc.) and provides a sense of security to its citizens and therefore affects well-being. However, the lack of a reliable communication network (e.g., access to mobile phones, internet penetration, etc.) can affect the extent to which individuals can access these media. Ahern (2012) examined the influence of media systems on individual environmental

concern across nations and reported that overall, higher levels of development in media system were associated with lower levels of environmentalism.

Scholars have also examined the influence of economic development or the affluence of nations on environmental concern. Dunlap and Mertig (1995, 1997) reported that the only variable where affluent countries scored higher on environmental concern was perceptions of worldwide, rather than local, environmental problems. However, the use of GDP as a measure of human well-being is problematic, as it doesn't fully incorporate the concept of sustainable development as a means to improve the quality of life of individuals (Costanza, Hart, Posner, & Talberth, 2009). Research in the areas of economic development (e.g., Paraušić, Cvijanović, Mihailović, & Veljković, 2014) and ecological economics (Iraldo, Testa, Melis, & Frey, 2011; Sturm, Wackernagel, & Müller, 2004) explore the relationship between environmental conditions, environmental policies, pollution abatement measures, and global competitiveness instead (Pasurka, 2008). Pasurka (2008) argued that environmental pollution and policies dealing with such environmental conditions can negatively affect competitiveness of countries. Most developed nations base their development on carbon-based economies, with many emerging economies (e.g., China, India, Brazil) following a similar path. Presently, many of the most developed nations (e.g., Sweden, Germany) are now transitioning into new, less-polluting sources of energy. A complex relationship between the competitiveness of countries and both the environmental conditions and environmental concern of people is then anticipated. For example, developing countries (e.g., China) will see a negative relationship between competitiveness and environmental conditions, while this relationship might be positive for highly developed nations (e.g., Sweden). With this in mind, this study tests the effect of global competitiveness, as opposed to GDP (which was used by Ahern, 2012), on people's environmental concern and citizenship.

Finally, the quality of the environment, conceptualized as the state of natural stocks and semi-natural resources (those actively managed by humans) that form the raw material of economic goods production (Costanza & Daly, 1992; Prugh, Costanza, Cumberland, Daly, Goodland, & Norgaard, 1999), has been found to affect the level of happiness of individuals (Tandoc & Takahashi, 2013). However, few studies have examined the relationship between the state of the environment, people's perceptions of the environment, and people's self-reported behaviors. Ahern (2012) found limited support to the idea that environmental conditions affect environmental concern. It is argued that there is a need to further explore the relationship between these variables in conjunction with the individual- and contextual-level factors described above using more robust data sources.

Summary of Theoretical Considerations

This study seeks to build a comprehensive model explaining environmental citizenship. To do so, it included individual variables including individual media use and individual values from the VBN, as well as contextual values such as different forms of capital (natural, social, human and built) with Ahern's (2012) idea of information capital as a separate variable. It combined theoretical considerations from environmental sociology, media studies, and ecological economics. Previous studies have found many individual explanations for environmentalism, but in an increasingly globalized world, context must also play a role. Studying the relationships between individual and contextual factors will contribute to a more complete understanding of environmental behavior. Ignoring the effect of contextual variables might result in inaccurate conclusions by not accounting for contextual differences between countries and treating people from different social contexts as homogenous.

In summary, based on the literature review, this study proposes that environmental citizenship is influenced by media use, environmental concern, altruistic orientation, and postmaterialistic values at the individual level. It is also hypothesize that how strongly each of these variables can predict environmental citizenship will vary depending on contextual factors. Table 1 presents the variables of the conceptual model at the individual and country levels that emerged from the theoretical considerations described above. Based on the above discussion, the following hypotheses and research question are presented:

Hypothesis 1 (H1): Controlling for demographics, the following will be positive predictors of environmental citizenship at the individual level:

- a. Media use
- b. Environmental concern
- c. Altruistic-orientation values
- d. Postmaterialism

Research Question 1 (RQ1): What is the relationship between environmental quality at the country level and environmental citizenship at the individual level?

Hypothesis 2 (H2): Holding other variables constant, the effect of media use on environmental citizenship will be stronger in countries with higher levels of information capital.

Hypothesis 3 (H3): Holding other variables constant, the effect of environmental concern on environmental citizenship will be stronger in countries with better environmental quality.

Hypothesis 4 (H4): Holding other variables constant, the effect of altruistic orientation on environmental citizenship will be stronger in countries that are higher on collectivism.

Hypothesis 5 (H5): Holding other variables constant, the effect of post-materialism on environmental citizenship will be stronger in countries with higher levels of global competitiveness.

Method

This study used various data sources at both the individual and country levels to test our proposed theoretical model (see Table 1). The 2010-2014 wave of the World Values Survey was used for the dependent variable environmental citizenship and the individual-level independent variables. The World Values Survey administers a common questionnaire at regular intervals to nationally representative samples of people from almost a hundred countries, containing more than 90% of the world's population. All continents on the globe and countries at all levels of development, from very poor to very rich, are surveyed. Minimum sample in any country is 1,000, covering the entire population 18 years and older. Respondents are randomly chosen, with quota sampling used in places where a full probability sample is prohibitive. Surveys are carried out in face-to-face interviews, with telephone interviews used for remote areas (see http://www.worldvaluessurvey.org/ for more information).

Dependent Variable

Environmental citizenship. This variable is based on three items asked in the survey. The first item asked participants about their membership in environmental organizations (active inactive, or non-members). Some 4% reported they were active members whereas 8% reported they were inactive members. The second item asked if they have given money to an ecological organization in the last 2 years. Some 14% answered yes. The third item asked if they have participated in a demonstration for environmental issues. Only about 8% responded yes. The scores for the three items were combined to form an additive index of environmental citizenship, for a range of scores from 0 to 4 ($M = 0.37$, $SD = 0.75$).

Level 1 Variables

Control variables. Previous research has reported differences in environmental concern on the basis of gender (Freudenburg, 1991; McCright, 2010; Stern

Table 1. List of Variables.

	Dependent variables	Independent variables
Level 1	Environmental citizenship (EC)	Age (A)
		Gender (G)
		Income (I)
		Education (E)
		Media use (MU)
		Environmental concern (EC)
		Altruistic orientation (CO)
		Postmaterialism (PM)

$$PC_{ij} = \beta_{0j} + \beta_{1j}(A_{ij}) + \beta_{2j}(G_{ij}) + \beta_{3j}(I_{ij}) + \beta_{4j}(E_{ij}) + \beta_{5j}(MU_{ij}) + \beta_{6j}(EC_{ij}) + \beta_{7j}(CO_{ij}) + \beta_{8j}(PM_{ij}) + r_{ij}$$

	Dependent variables	Independent variables
Level 2	Average EC (intercept)	Environment quality (EQ)
	MU	ICT Development (ID)
	EC	Environment quality (EQ)
	CO	Individualism (IC)
	PM	Global competitiveness (GC)

Note. ICT = information communication technology.

et al., 1993), income (Dietz et al., 2007) education (Gelissen, 2007) and age (Honnold, 1984; Klineberg, McKeever, & Rothenbach, 1998; Newman & Fernandes, 2015). For example, females were found to report higher levels of environmental concern (Freudenburg, 1991; McCright, 2010; Stern et al., 1993). With this in consideration, the effects of age, gender, income level, and education were controlled for, which have been reported to be related to environmental concern (Marquart-Pyatt, 2012; Olli, Grendstad, & Wolle-baek, 2001) and self-reported behaviors (Holbert et al., 2003). The average age is 43.28 years ($SD = 16.9$). Some 48% were males while 52% were females. The respondents were also asked to rate their income using a 10-point scale, which starts at 1 and represents an increase up to 10. The average rating is 4.79 ($SD = 2.13$). In terms of education, 13% completed primary school, 37% completed secondary school, and 16% had university degrees (see Table 1 for the list of variables).

Media use. The respondents were asked to report how often they used the following information sources, using a scale of 1 (*never*) to 5 (*daily*): daily newspaper, print magazines, TV news, radio news, mobile phone, email, and internet. TV news was the most frequently used source ($M = 4.59$, $SD = .92$).

The items combined into a reliable measure of media use, Cronbach's α = .72. The items were combined in an additive index.

Environmental concern. This variable is based on one item asked in the questionnaire. The respondents were asked to rate in a 6-point scale, from 1 (*not at all like me*) to 6 (*very much like me*), how much they identified with a person described as "Looking after the environment is important to this person; to care for nature and save life resources." The average score was 4.48 (*SD* = 1.23).

Altruistic orientation. This variable is based on four items rated on a 6-point scale, from 1 (*not at all like me*) to 6 (*very much like me*). The respondents were asked how much they identified with a person described by the following statements:

> It is important to this person to do something for the good of society; It is important to help people living nearby, to care for their needs; It is important to this person to always behave properly, to avoid doing anything people would say is wrong; Tradition is important to this person, to follow the customs handed down by one's religion or family.

The items formed a reliable scale, Cronbach's α = .76.

Postmaterialism. This variable is based on a 12-item index rated on a 5-point scale, from 0 (*materialist*) to 5 (*postmaterialist*; for the specific items, see Inglehart, 1997). The average score was 2.03 (*SD* = 1.16). The postmaterialism scale has been continuously included in the World Values Survey (WVS) since Wave 2 (1990-1994). The WVS data set only reports the aggregated value of the scale items.

Level 2 Variables

As the respondents are nested into their respective countries, country-level variables were also measured using publicly available and previously validated country indices. The 2010 country-level indices for all variables were used. Countries that had missing data at any of the Level 2 variables were excluded from the analysis for both levels. This left the study with 37 countries (see Table 2).

Environmental Performance Index (EPI). The EPI developed by the Yale Center for Environmental Law & Policy, Yale University; and the Center for International Earth Science Information Network, Columbia University, as measure

Table 2. List of Countries.

Country	Sample size	Country	Sample size
Argentina	1,030	Nigeria	1,759
Australia	1,477	Pakistan	1,200
Brazil	1,486	Peru	1,210
Chile	1,000	Philippines	1,200
China	2,300	Poland	966
Colombia	1,512	Romania	1,503
Ecuador	1,202	Russia	2,500
Estonia	1,533	Singapore	1,972
Germany	2,046	Slovenia	1,069
Ghana	1,552	South Africa	3,531
India	1,581	Spain	1,189
Japan	2,443	Sweden	1,206
Jordan	1,200	Thailand	1,200
South Korea	1,200	Trinidad and Tobago	999
Malaysia	1,300	Turkey	1,605
Mexico	2,000	Egypt	1,523
Morocco	1,200	United States	2,232
Netherlands	1,902	Uruguay	1,000
New Zealand	841	Total	56,669

of environmental quality was used. The 2010 EPI covers 163 countries and applies 25 indicators across 10 policy categories measuring environmental public health and ecosystem vitality (see "2010 Environmental Performance Index," 2010). Scores can range from 0 (*worst performance*) to 100. The index has been considered as the most reliable objective measure of environmental quality across nations (see Bonini, 2008). Sweden got the highest rating in the sample (see Table 3 for descriptive statistics).

Global competitiveness. The World Economic Forum's index of global competitiveness was used. Competitiveness is defined as "the set of institutions, policies, and factors that determine the level of productivity of a country" (Schwab, 2014). Countries are ranked on a 1 to 7 scale, where 1 is the least competitive and 7 the most competitive based on over 100 indicators across different areas (e.g., institutions, infrastructure, business sophistication, innovation, etc.). The 2010-2011 data set where Sweden also got the highest rating for global competitiveness was used. Existing limitations in the index (Lall, 2001) are recognized, but it is still argued that it is a better measure of development than GDP.

Table 3. Descriptive Statistics.

Variable	*M*	*SD*	Minimum	Maximum
Individual-level variables				
Environmental citizenship	0.39	0.77	0.00	4.00
Age	42.59	16.67	16.00	99.00
Income	4.86	2.13	1.00	10.00
Media use	22.40	6.70	7.00	35.00
Environmental concern	4.52	1.22	1.00	6.00
Altruistic orientation	4.45	0.98	1.00	6.00
Postmaterialism	2.05	1.16	0.00	5.00
Country-level variables				
Environment quality	62.86	9.32	40.20	86.00
ICT development	4.86	1.96	1.71	8.45
Collectivism	60.97	23.45	9.00	92.00
Global competitiveness	4.47	0.60	3.38	5.56

Note. ICT = information communication technology.

Information capital. The Information Development Index (IDI) from 2010 was used to measure media technology at the country level. The International Telecommunications Union develops the Information Communication Technology (ICT) Development Index (IDI), a composite index combining 11 indicators into one benchmark measure that serves to monitor and compare developments in information and communication technology (ICT) across countries and regions across time (see Measuring the Information Society Report, 2012). IDI measures the level and evolution over time of ICT developments, the progress in ICT development, the digital divide, and the development potential of ICTs in countries and relative to other countries. The three main indicators are ICT infrastructure (access), ICT use (intensity), and ICT capability (skills). IDI represents a measurement of the information society and is a useful statistical tool. The data were rescaled and normalized on a scale from 0 to 10 (low to high) to compare the performance of the countries. South Korea ranked the highest for IDI score (8.56 out of 10). This measure is an improvement to the previous iteration of the index, the ICT Opportunity Index, which Ahern (2012) used.

Collectivism. The measure of individualism developed by the Hofstede Centre, which conducts research on cultural differences between nations, was used. Countries are scored based on a scale of individualism versus collectivism. Individualism is defined as a preference for only loose social networks in which individuals are seen as primarily responsible for themselves and

their immediate families. On the opposite end, collectivist societies are comprised of individuals who have more integration, more loyalty, as well as greater mutual expectations from the non-familial groups to which they belong. Original scores (1-100, where 1 = most collectivist and 100 = most individualist) were in the direction of individualism, and they were reverse-coded to be in the direction of collectivism. Of the countries retained in the sample, Ecuador ranked the highest in collectivism.

Data Analysis

This study used hierarchical linear modeling (HLM) conducted using full maximum likelihood estimation across two levels (individuals nested in countries). Unlike ordinary least squares (OLS) regression, HLM takes into account that the magnitude of effect (β) for independent variables might vary across different samples (Garson, 2013; Raudenbush & Bryk, 2002). This is because in social science, much research involves "hierarchical data structures" where cases are nested in groups with varying contexts (Raudenbush & Bryk, 2002, p. 3). This approach "allows researchers to analyze data from two or more levels of analyses while accounting for the non-independence in observations that the nested structure of multilevel data tends to produce" (Peng & Zhu, 2012, p. 1794). For example, journalists are nested in media organizations and media systems (Hanitzsch & Berganza, 2012). In this study, individual respondents are nested within countries. While individuals vary in personal-level factors, they also belong to countries that vary in terms of environment quality, media infrastructure, culture, and economic development. Thus, this study starts with an unconditional model to determine the proportion of total variance in environmental activism that lies systematically between countries, and offers a final inter intercept-and-slopes-as-outcomes model (Raudenbush & Bryk, 2002), guided by the literature on predictors of environmental citizenship at both the individual and country levels. This study used the HLM 7.01 software (Raudenbush & Bryk, 2002). The individual-level predictor variables were group-mean centered (Enders & Tofighi, 2007) and the variables of research interest—environmental concern, media use, postmaterialism, and altruistic orientation—were treated as fixed effects (Raudenbush & Bryk, 2002).

Results

An unconditional model was first ran (Snijders & Bosker, 1999). The model showed that more than 10% of the variance in environmental citizenship is between countries (intraclass correlation = 0.0999). Testing the unconditional model first allows comparison of variance explained as variables from Levels

Table 4. Intercept and Slopes as Outcomes.

Variable	Unconditional model	Level 1 model	Level 2 model
Individual-level variables			
Intercept	.386	.386	.584[a]
Age		.001	.001
Gender[e]		−.020	−.020
Income		.011	.011
Education		.017	.017
Media use		.015	.026
Environmental concern (EC)		.083	−.077[a]
Altruistic orientation (AO)		−.011[b]	.010[b]
Postmaterialism (PM)		.058	−.071[b]
Country-level variables			
Environment quality on intercept			−.003[b]
Environment quality on EC			.003
ICT development on media use			−.002
Collectivism on AO			−.001[b]
Global competitiveness on PM			.007[b]
Intercept 1, r_0	.059	.059	.041
Level-1, e	.533	.490	.501
Explained variance[c] (R^2)	10%[d]	7.2%	7.3%
Deviance	102,440	98,781	98,770
Number of parameters	3	25	30

Note. $p < .05$, unless otherwise noted: [a]$p < .10$; [b]$p > .10$; [c]Explained variance is calculated based on a formula from Snijders and Bosker (1999); [d]The percentage refers to intraclass correlation (ICC) which refers to variance that can be attributed to country-level factors; [e]female was coded as 2 while male was coded as 1. ICT = information communication technology.

1 and 2 are added to the model (Raudenbush & Bryk, 2002). The final model, which includes variables from both Levels 1 and 2, accounts for 7.3% of the variance in environmental activism (see Table 4).

H1 predicted that at Level 1, without considering contextual differences between countries at Level 2, as well as controlling for demographics (a) media use, (b) environmental concern, (c) altruistic orientation, and (d) post-materialism at the individual level will predict environmental citizenship. In terms of demographics, males were more likely to engage in environmental citizenship than females, $\beta = −.02$, $t = −2.13$, $p < .05$. Income ($\beta = .01$, $t = 2.41$, $p < .05$) and education ($\beta = .02$, $t = 5.30$, $p < .01$) were also positive predictors of environmental citizenship.

H1a is supported. Media use is a significant predictor, $\beta = .02$, $t = 8.48$, $p < .01$. H1b is likewise supported. Environmental concern is a significant predictor of environmental citizenship, $\beta = .08$, $t = 6.41$, $p < .01$. H1c is not supported. Altruistic orientation had no significant main effect. Finally, H1d is supported. Postmaterialism is a positive predictor of environmental citizenship, $\beta = .06$, $t = 7.31$, $p < .01$.

RQ1 asked about the relationship between environment quality at the country level and environmental citizenship at the individual level. The analysis tested the relationship between the intercept (mean) for environmental citizenship with environment quality at the country level but found no significant relationship.

The next set of hypotheses was focused on the impact of contextual factors on the respective effects of the individual-level variables. H2 predicted that the effect of media use on environmental citizenship would be stronger in countries with higher levels of ICT development. This is rejected. Instead, the effect of media use on environmental citizenship was stronger in countries with less developed ICT systems, $\beta = -.002$, $t = -2.44$, $p < .05$.

H3 predicted that the effect of environmental concern on environmental citizenship would be stronger in countries with better environment quality. This is supported. Environment quality is a positive, although weak, predictor of the slope for environmental concern, $\beta = .003$, $t = 3.71$, $p < .01$.

H4 predicted that the effect of altruistic orientation on environmental citizenship would be stronger in countries that are strong in collectivism. This is not supported. The level of collectivism had no effect on the effect of altruistic orientation on environmental citizenship.

Finally, H5 predicted that the effect of postmaterialism on environmental citizenship would be stronger in countries with higher levels of economic development. This is also unsupported.

Discussion and Conclusion

This study set out to measure predictors of the concept of environmental citizenship, not only at the individual level (which had been done before) but also at the country level. It also incorporated the variable of information capital as one of the predictors. It found that at the individual level, media use, environmental concern, and postmaterialism positively predict environmental citizenship, consistent with what previous studies have found (e.g., Holbert et al., 2003). However, the data also allowed to test whether the effects of these variables vary depending on social and environmental contexts.

The results at the individual level were at the predicted directions. Indeed, media use keeps people informed of environmental issues that potentially encourage them to engage in environmental citizenship, something Brechin

and Kempton (1999) speculated about. It is then plausible to argue that individuals are learning about environmental problems in the media and becoming more engaged in environmental behaviors. Finally, postmaterialism's main argument is consistent with the findings—people who have satisfied their material needs and wants are more willing to consider larger societal issues, such as taking care of the environment. Beyond the individual level, results showed that, overall, the effect of environmental concern is stronger in countries with better environment quality.

When these relationships were examined at the country level, the effect of media use on environmental citizenship, unexpectedly, turned out to be stronger in countries with less developed media systems. This finding is not unlike Ahern's (2012) finding that suggests that higher levels of development in media systems are related to lower environmental concern. One possible explanation is that the media system in countries with less developed information systems are more centralized, allowing a stronger agenda-setting effect at the national level that might potentially include environmental issues. In contrast, well-developed media systems offer a wide array of information sources to their citizens, making it easier for them to engage in selective media use that might disperse public opinion and therefore splinter environmental citizenship. That said, these are empirical assumptions that require testing in future studies, especially because this finding is consistent with what Ahern (2012) had found. Future studies should also incorporate the analysis of media content to fully explore this explanation.

The study also found a positive effect of postmaterialism on environmental citizenship, consistent with what previous studies had found. But altruism at the individual level did not explain environmental citizenship. Collectivism, at the country level, also did not play a role in this relationship. The individual level finding appears to contradict previous studies that suggest that altruistic values are significant predictors of environmental behaviors (Stern et al., 1995). These findings suggest that engagement in environmental citizenship might be explained by a set of factors different from those that predict other types of environmental behaviors (e.g., public-sphere behaviors).

Of course, this study is not exempt from limitations. First, the variables used in the analysis were constrained by how the data were structured in the original data set, a limitation faced by research depending on secondary data. For example, the items used to measure environmental citizenship were originally measured using nominal scales. However, secondary data, such as the ones used here, provide access to a wealth of information for research. The results reported here should be interpreted in the context of this limitation. Second, some variables of research importance (Uusi-Rauva & Tienari, 2010) in the theoretical models described in this study (e.g., biospheric

values) were not included in our model and it will be a worthwhile effort to account for the effects of these other variables in future research.

In conclusion, the findings in this study demonstrate the importance of accounting for contextual differences between countries. While single-country analysis is important in understanding what predicts environmental behavior, such results can only be generalized within the country of study. To generalize not just to a particular population but also to theoretical relationships, it is essential to consider whether such relationships within a country hold across other countries that are also different in numerous ways. This is particularly salient in understanding environmental behavior, which is not only tied to individual decisions and beliefs or values, but also explained by structural factors, such as level of environment quality, development of information networks, and even cultural values. In an increasingly globalized world, not just in terms of communication but also in terms of how individuals are affected by environmental issues, it also becomes increasingly important to understand factors that encourage environmental behavior. But these efforts must be done with an acknowledgement of not only our similarities as individuals but also our differences as social and cultural actors.

Declaration of Conflicting Interests

Funding

References

Ader, C. R. (1995). A longitudinal study of agenda setting for the issue of environmental pollution. *Journalism & Mass Communication Quarterly*, *72*, 300-311.

Ahern, L. (2012). The role of media system development in the emergence of post-materialist values and environmental concern: A cross-national analysis. *Social Science Quarterly*, *93*, 538-557.

Allan, S. (2002). *Media, risk and society*. Philadelphia, PA: Open University Press.

Aoyagi-Usui, M., Vinken, H., & Kuribayashi, A. (2003). Pro-environmental attitudes and behaviors: An international comparison. *Human Ecology Review*, *10*, 23-31.

Bechtel, R. B., Verdugo, V. C., & De Queiroz Pinherio, J. (1999). Environmental Belief Systems: United States, Brazil, and Mexico. *Journal of Cross-Cultural Pyschology*, *30*(1), 122-128.

Bonini, A. N. (2008). Cross-national variation in individual life satisfaction: Effects of national wealth, human development, and environmental conditions. *Social Indicators Research*, *87*, 223-236. doi:10.1007/s11205-007-9167-6

Brechin, S. R. (1999). Objective problems, subjective values, and global environmentalism: Evaluating the postmaterialist argument and challenging a new explanation. *Social Science Quarterly*, *80*, 793-809.

Brechin, S. R., & Kempton, W. (1994). Global environmentalism: a challenge to the postmaterialism thesis?. *Social Science Quarterly*, *75*(2), 245-269.

Costanza, R., & Daly, H. E. (1992). Natural capital and sustainable development. *Conservation Biology*, *6*, 37-46.

Costanza, R., Hart, M., Posner, S., & Talberth, J. (2009). *Beyond GDP: The need for new measures of progress* (Pardee Paper No. 4). Boston, MA: Pardee Center for the Study of the Longer-Range Future.

Dahlstrom, M. F., & Scheufele, D. A. (2010). Diversity of television exposure and its association with the cultivation of concern for environmental risks. *Environmental Communication*, *4*, 54-65. doi:10.1080/17524030903509709

de Groot, J. I. M., & Steg, L. (2008). Value orientations to explain beliefs related to environmental significant behavior: How to measure egoistic, altruistic, and biospheric value orientations. *Environment & Behavior*, *40*, 330-354. doi:10.1177/0013916506297831

Dietz, T., Dan, A., & Shwom, R. (2007). Support for climate change policy: Social psychological and social structural influences. *Rural Sociology*, *72*, 185-214.

Dietz, T., Fitzgerald, A., & Shwom, R. (2005). Environmental values. *Annual Review of Environment and Resources*, *30*, 335-372.

Dobson, A., & Bell, D. (2006). *Environmental citizenship*. Cambridge, MA: MIT Press.

Dunlap, R. E., & Mertig, A. G. (1995). Global Concern for the Environment: Is Affluence a Prerequesite? *Journal of Social Issues*, *51*, 122-137.

Dunlap, R. E., & Mertig, A. G. (1997). Global environmental concern: An anomaly to postmaterialism. *Social Science Quarterly*, *78*, 24-29.

Enders, C. K., & Tofighi, D. (2007). Centering predictor variables in cross-sectional multilevel models: A new look at an old issue. *Psychological Methods*, *12*, 121-138. doi:10.1037/1082-989x.12.2.121

Freudenburg, W. R. (1991). Rural-urban differences in environmental concern: A closer look. *Sociological Inquiry*, *61*, 167-198. doi:10.1111/j.1475-682X.1991.tb00274.x

Garson, G. D. (2013). *Hierarchical linear modeling: Guide and applications*. Thousand Oaks, CA: SAGE.

Gelissen, J. (2007). Explaining popular support for environmental protection: A multilevel analysis of 50 nations. *Environment & Behavior*, *39*, 392-415. doi:10.1177/0013916506292014

Hanitzsch, T., & Berganza, R. (2012). Explaining journalists' trust in public institutions across 20 countries: Media freedom, corruption, and ownership matter most. *Journal of Communication*, *62*, 794-814. doi:10.1111/j.1460-2466.2012.01663.x

Hansla, A., Gamble, A., Juliusson, A., & Gärling, T. (2008). The relationships between awareness of consequences, environmental concern, and value orientations. *Journal of Environmental Psychology*, *28*, 1-9.

Ho, S. S., Liao, Y., & Rosenthal, S. (2014). Applying the theory of planned behavior and media dependency theory: Predictors of public pro-environmental behavioral

intentions in Singapore. *Environmental Communication*, *9*, 77-99. doi:10.1080/17524032.2014.932819

Hofstede, G., & McCrae, R. R. (2004). Personality and culture revisited: Linking traits and dimensions of culture. *Cross-Cultural Research*, *38*, 52-88. doi:10.1177/1069397103259443

Holbert, R. L., Kwak, N., & Shah, D. V. (2003). Environmental concern, patterns of television viewing, and pro-environmental behaviors: Integrating models of media consumption and effects. *Journal of Broadcasting & Electronic Media*, *47*, 177-196. doi:10.1207/s15506878jobem4702_2

Honnold, J. A. (1984). Age and environmental concern some specification of effects. *The Journal of Environmental Education*, *16*, 4-9. doi:10.1080/00958964.1984.9942695

Hunter, L. M., Hatch, A., & Johnson, A. (2004). Cross-national gender variation in environmental behaviors. *Social Science Quarterly*, *85*, 677-694. doi:10.1111/j.0038-4941.2004.00239.x

Inglehart, R. (1971). The silent revolution in Europe: Intergenerational change in post-industrial societies. *The American Political Science Review*, *65*, 991-1017.

Inglehart, R. (1995). Public support for environmental protection: Objective problems and subjective values in 43 societies. *Political Science and Politics*, *28*, 57-72.

Inglehart, R. (1997). *Modernization and postmodernization: Cultural, economic, and political change in 43 societies* (Vol. 19). Princeton, NJ: Princeton University Press.

Inglehart, R., & Abramson, P. R. (1999). Measuring postmaterialism. *The American Political Science Review*, *93*, 665-677.

Iraldo, F., Testa, F., Melis, M., & Frey, M. (2011). A literature review on the links between environmental regulation and competitiveness. *Environmental Policy and Governance*, *21*, 210-222.

Kaiser, F. G., & Shimoda, T. A. (1999). Responsability as a predictor of ecological behavior. *Journal of Environmental Psychology*, *19*, 243-253.

Kazdin, A. E. (2009). Psychological science's contributions to a sustainable environment: Extending our reach to a grand challenge of society. *American Psychologist*, *64*, 339-356. doi:10.1037/a0015685

Klineberg, S. L., McKeever, M., & Rothenbach, B. (1998). Demographic predictors of environmental concern: It does make a difference how it's measured. *Social Science Quarterly*, *79*, 734-753. doi:10.2307/42863844

Lall, S. (2001). Competitiveness indices and developing countries: An economic evaluation of the Global Competitiveness Report. *World Development*, *29*, 1501-1525. doi:10.1016/S0305-750X(01)00051-1

Lee, K. (2011). The role of media exposure, social exposure and biospheric value orientation in the environmental attitude-intention-behavior model in adolescents. *Journal of Environmental Psychology*, *31*, 301-308. doi:10.1016/j.jenvp.2011.08.004

Lin, P.-C., & Huang, Y.-H. (2012). The influence factors on choice behavior regarding green products based on the theory of consumption values. *Journal of Cleaner Production*, *22*, 11-18.

Marquart-Pyatt, S. T. (2012). Contextual influences on environmental concerns cross-nationally: A multilevel investigation. *Social Science Research*, *41*, 1085-1099. doi:10.1016/j.ssresearch.2012.04.003

McCright, A. M. (2010). The effects of gender on climate change knowledge and concern in the American public. *Population and Environment*, *32*, 66-87. doi:10.1007/s11111-010-0113-1

McCright, A. M. (2009). The social bases of climate change knowledge, concern, and policy support in the US general public. *Hofstra Law Review*, *37*, 1017-1047.

Measuring the Information Society Report. (2012). *International telecommunication union*. Retrieved from http://www.itu.int/en/ITU-D/Statistics/Documents/publications/mis2012/MIS2012_without_Annex_4.pdf

Newman, T. P., & Fernandes, R. (2015). A re-assessment of factors associated with environmental concern and behavior using the 2010 General Social Survey. *Environmental Education Research*. Advance online publication. doi:10.1080/13504622.2014.999227

Nordlund, A. M., & Garvill, J. (2002). Value structures behind proenvironmental behavior. *Environment & Behavior*, *34*, 740-756.

Olli, E., Grendstad, G., & Wollebaek, D. (2001). Correlates of environmental behaviors: Bringing back social context. *Environment & Behavior*, *33*, 181-208.

Oreg, S., & Katz-Gerro, T. (2006). Predicting proenvironmental behavior cross-nationally: Values, the Theory of Planned Behavior, and Value-Belief-Norm Theory. *Environment & Behavior*, *38*, 462-483.

Östman, J. (2013). The influence of media use on environmental engagement: A political socialization approach. *Environmental Communication*, *8*, 92-109. doi:10.1080/17524032.2013.846271

Paraušić, V., Cvijanović, D., Mihailović, B., & Veljković, K. (2014). Correlation between the state of cluster development and national competitiveness in the Global Competitiveness Report of the World Economic Forum 2012–2013. *Economic Research-Ekonomska Istraživanja*, *27*, 662-672. doi:10.1080/1331677x.2014.974917

Pasurka, C. (2008). Perspectives on pollution abatement and competitiveness: Theory, data, and analyses. *Review of Environmental Economics and Policy*, *2*, 194-218. doi:10.1093/reep/ren009

Peng, T.-Q., & Zhu, J. J. H. (2012). Where you publish matters most: A multilevel analysis of factors affecting citations of internet studies. *Journal of the American Society for Information Science and Technology*, *63*, 1789-1803. doi:10.1002/asi.22649

Pierce, J. C. (1997). The Hidden Layer of Political Culture: A Comment on "Postmaterialist Values and the Environment: A Critique and Reappraisal". *Social Science Quarterly*, *78*(1), 30-35.

Prugh, T., Costanza, R., Cumberland, J. H., Daly, H. E., Goodland, R., & Norgaard, R. B. (1999). *Natural capital and human economic survival*. Boca Raton, FL: CRC Press.

Raudenbush, S., & Bryk, A. (2002). *Hierarchical linear models: Applications and data analysis methods*. Thousand Oaks, CA: SAGE.

Schelhas, J., & Pfeffer, M. J. (2005). Forest values of national park neighbors in Costa Rica. *Human Organization*, *64*, 386-398.

Schultz, P. W., & Zelezny, L. (1999). Values as predictors of environmental attitudes: Evidence for consistency across 14 countries. *Journal of Environmental Psychology*, *19*, 255-265.

Schwab, K. (2014). *The Global Competitiveness Report 2014–2015*. Geneva, Switzerland, World Economic Forum.

Schwartz, S. H., & Bilsky, W. (1987). Toward a universal psychological structure of human values. *Journal of Personality and Social Psychology*, *53*, 550-562.

Snijders, T., & Bosker, R. (1999). *Multilevel analysis: An introduction to basic and advanced multileveling modeling*. London, England: SAGE.

Steger, M. A. E., Pierce, J. C., Steel, B. S., & Lovrich, N. P. (1989). Political culture, postmaterial values, and the New Environmental Paradigm: A comparative analysis of Canada and the United States. *Political Behavior*, *11*, 233-254.

Stern, P. C. (2000). Toward a coherent theory of environmentally significant behavior. *Journal of Social Issues*, *56*, 407-424.

Stern, P. C. (2011). Contributions of psychology to limiting climate change. *American Psychologist*, *66*, 303-314. doi:10.1037/a0023235

Stern, P. C., & Dietz, T. (1994). The value basis of environmental concern. *Journal of Social Issues*, *50*, 65-84.

Stern, P. C., Dietz, T., Abel, T., Guagnano, G. A., & Kalof, L. (1999). A value-belief-norm theory of support for social movements: The case of environmentalism. *Human Ecology Review*, *6*, 81-97.

Stern, P. C., Dietz, T., & Guagnano, G. A. (1998). A brief inventory of values. *Educational and Psychological Measurement*, *58*, 984-1001. doi:10.1177/0013164498058006008

Stern, P. C., Dietz, T., & Kalof, L. (1993). Value orientations, gender, and environmental concern. *Environment & Behavior*, *25*, 322-348. doi:10.1177/0013916593255002

Stern, P. C., Kalof, L., Dietz, T., & Guagnano, G. A. (1995). Values, beliefs, and proenvironmental action: Attitude formation toward emergent attitude objects. *Journal of Applied Social Psychology*, *25*, 1611-1636.

Sturm, A., Wackernagel, M., & Müller, K. (2004). *The winners and losers in global competition: Why eco-efficiency reinforces competitiveness: A study of 44 nations*. Lafayette, IN: Purdue University Press.

Swim, J. K., Clayton, S., & Howard, G. S. (2011). Human behavioral contributions to climate change: Psychological and contextual drivers. *American Psychologist*, *66*(4), 251-264. doi:10.1037/a0023472

Swim, J. K., Stern, P. C., Doherty, T. J., Clayton, S., Reser, J. P., Weber, E. U., . . . Howard, G. S. (2011). Psychology's contributions to understanding and addressing global climate change. *American Psychologist*, *66*, 241-250.

Tandoc, E. C., & Takahashi, B. (2013). The complex road to happiness: The influence of human development, a healthy environment and a free press. *Social Indicators Research*, *113*, 537-550.

Yale Center for Environmental Law & Policy, Yale University; Center for International Earth Science Information-Network, Columbia University (2010).

2010 Environmental Performance Index. New Haven, CT: Author. Retrieved from http://epi.yale.edu/files/2010_epi_summary_for_policymakers.pdf.

Uusi-Rauva, C., & Tienari, J. (2010). On the relative nature of adequate measures: Media representations of the EU energy and climate package. *Global Environmental Change-Human and Policy Dimensions*, *20*, 492-501. doi:10.1016/j.gloenvcha.2010.03.001

Vemuri, A. W., & Costanza, R. (2006). The role of human, social, built, and natural capital in explaining life satisfaction at the country level: Toward a National Well-Being Index (NWI). *Ecological Economics*, *58*, 119-133.

Vlek, C., & Steg, L. (2007). Human behavior and environmental sustainability: Problems, driving forces, and research topics. *Journal of Social Issues*, *63*, 1-19.

Zahran, S., Brody, S. D., Grover, H., & Vedlitz, A. (2006). Climate change vulnerability and policy support. *Society & Natural Resources: An International Journal*, *19*, 771-789.

Zhao, X. Q. (2009). Media use and global warming perceptions A snapshot of the reinforcing spirals. *Communication Research*, *36*, 698-723. doi:10.1177/0093650209338911

Author Biographies

Bruno Takahashi (PhD, SUNY ESF) is an assistant professor at Michigan State University with a joint appointment with the School of Journalism and the Department of Communication. He is also the research director of the Knight Center for Environmental Journalism. His research focuses on environmental and science communication, environmental journalism practices, and the links between media and policymaking.

Edson C. Tandoc Jr. (PhD, University of Missouri) is an assistant professor at the Wee Kim Wee School of Communication and Information at the Nanyang Technological University in Singapore. His research focuses on the sociology of message construction, and the impact of journalistic roles and audience feedback on the various stages of the news gatekeeping process.

Ran Duan is a PhD student in the Media and Information Studies Program at Michigan State University. She studies international news flow related to environmental issues.

Anthony Van Witsen is a PhD student in the Media and Information Studies Program at Michigan State University. He researches media coverage of environmental and scientific issues.