Does Knowledge of Environmental Organizations Translate into Pro-Environmental Attitudes and Behaviors? Evidence from an Urbanized Tropical Watershed

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Abstract
Suitable watershed management and stewardship practices are essential in the provision of fresh water services. Several factors contribute to the degradation of surface water resources, including deforestation along coastal lowlands and weak regulatory environments. These conditions are observed in the Manatí river basin, a tropical urban watershed in Puerto Rico.
We will explore the association between knowledge of environmental organizations and pro-environmental attitudes and behaviors among those who benefit directly from ecosystem services in the Manatí watershed. Currently established measures of environmental consciousness and attitudes were tested to ensure they were not only appropriate for the local culture, but also comparable to a broader cultural context.
A 202 person stratified sample with a convenience component was obtained at three watershed sites in Puerto Rico during the summer of 2015. An exploratory analysis revealed that knowledge of environmental organizations is associated with pro-environmental behaviors such as recycling. Less knowledge of environmental organizations and espousing negative views of their role were associated with pessimism toward the possibility of changing the environment through personal behavioral change. Understanding how users' attitudes and behaviors are influenced by knowledge of pro-environmental organizations can help identify effective organizational roles as well as volunteering and stewardship efforts to implement watershed management and conservation strategies.

Keywords: pro-environmental organizations, environmental consciousness, environmental awareness, watershed management, pro-environmental behaviors.

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Introduction

During the second half of the 20th century, Puerto Rico's coastal population grew rapidly, slowing down or reversing forest restoration cover along the island's coastal lowlands, and resulting in the degradation of groundwater and surface water resources (Barreto, 1997). Population growth was accompanied by a less stringent enforcement of environmental laws compared to those of the U.S. mainland (Berman-Santana, 1996). Due to its urban character, the Manatí watershed is a location where ecosystem service degradation is evident. Its associated ecosystems have been impacted by coastal development, eutrophication, and debris disposal for decades but there have been minimal attempts to conduct formal studies of human attitudes and the behavior that may help reverse ecosystem degradation trends.

Until recently, the public sector has assumed jurisdiction and responsibility for appropriate watershed management and conservation. The Puerto Rico Department of Natural and Environmental Resources (DNER) and the Environmental Quality Board (EQB) are responsible for the enforcement of environmental protection laws and regulations. Budget cutbacks (Williams Walsh 2016), however, have made it increasingly difficult for the State to ensure compliance. As a result, pro-environmental non-profit organizations may have to assume a more prominent role in watershed conservation and management efforts.

Several stakeholders contribute to the deterioration of conditions in the watershed. For instance, there has been significant agricultural activity in the area during the last 35 years (M. Barreto, personal communication, April 13, 2016). While it is improper to diminish the contribution of any group to current watershed conditions, our aim is to further understanding of one particular sector that stands to lose much from the continued pattern of environmental degradation: resident and visitor recreationists.

The focus of this paper will be to examine potential determinants of knowledge and attitudes towards pro-environmental NGO's in the context of an urban tropical watershed. As pro-environmental organizations assume more environmental conservation and management responsibilities, resident involvement becomes increasingly important. Our research will focus on two components that may determine resident involvement in pro-environmental organizations: awareness or knowledge of their existence, and current attitudes towards their effectiveness in solving environmental problems. Previous studies have reported low levels of pro-environmental NGO awareness and involvement. For instance, Deale, Barber, Murray & Cashion (2012) examined awareness and involvement in non-profit pro-environmental NGO's in the Pamlico-Tar River basin in North Carolina. They reported that more than one-half of participants (54.5%) who stated not belonging to any pro-environmental organizations were not aware of any in their community. Dunlap & McCright (2008) also explored self-reported membership in environmental organizations using United States national Gallup Poll data, and found that only 9.3% of their respondents indicated belonging to local pro-environmental organizations, while 10.2% reported being unsympathetic.

We will initially examine determinants of knowledge or awareness of pro-environmental organizations. Are there any socio-demographic characteristics and

pro-environmental behaviors associated with awareness of pro-environmental organizations?

The second research area of interest is an exploration of possible determinants of attitudes toward the effectiveness of pro-environmental organizations. Are there any respondent socio-demographic characteristics associated with a more favorable opinion of pro-environmental organizations? Are there any particular pro-environmental attitudes and behaviors related to positive views of such organizations?

The current fiscal crisis has crippled the public sector's capacity to adequately manage environmental resources, and environmental NGO's may have to continue assuming increasing responsibilities to fill the resulting gap. This study aims to explore determinants of awareness and attitudes towards environmental organizations to identify possible initiatives undertaken by the public or nonprofit sector that may result in increased watershed resident and visitor involvement in NGO pro-environmental work.

Literature Review

There is ample literature on psychological processes that underlie a person's decision to engage in various pro-environmental behaviors (Kals, Schumacher & Montada 1999; Mayer & Frantz 2004; McPherson & Mayer 2014). Pro-environmental behavior is defined by Kollmuss & Agyeman (2002) as an individual's actions that consciously seek to reduce the negative impact of human activities on the environment. Jensen (2002) provided a similar definition, but focused on personal actions that are directly related to environmental improvements.

Participation in environmental organizations can be seen as a type of pro-environmental behavior that is of relevance to enhance the effectiveness of behavioral policies that require behavioral change (Saunders, Büchs, Papafragkou, Wallbridge, & Smith, 2014). McDougle, Greenspan & Handy (2011) describe environmental volunteerism as a non-activist form of pro-environmental behavior because engaging in environmental volunteer activities allows individuals to participate in civic actions with ecological implications (Liarakou, Kostelou & Gavrilakis 2011). Environmental movements influence behaviors of people, allowing them to engage in new lifestyles (Saunders, Büchs, Papafragkou, Wallbridge, & Smith, 2014), spreading beliefs across publics (Inglehart 1997), and encouraging new institutional practices (Epstein 1998).

Given the pivotal role of volunteerism in the work of pro-environmental organizations, various research efforts have focused on identifying determinants of environmental volunteerism. Environmental motivation, morale and pro-environmental attitudes have been shown to be highly relevant in understanding why people have a higher willingness to be involved in environmental protection, some through environmental organizations (Torgler & Garcia-Valiñas, 2006). Measham & Burnett (2007) describe a general attachment to the environment as well as opportunities to interact with nature as the most influential motives driving environmental volunteerism in urban areas. Liarakou et al. (2011) conducted a study with young adult environmental volunteers in Greece, finding they were more likely than non-volunteers to feel a strong emotional connection to the environment. Studies have also consistently found a positive relationship between pro-environmental

behavior and educational level (Van Liere & Dunlap, 1980; Nord, Luloff & Bridger 1998; Guerin, Crete, & Mercier 2001). Considering environmental participation as one of those behaviors, a correlation has also been observed between education and both environmental participation and unpaid work in environmental organizations (Torgler & Garcia-Valiñas, 2006).

Study Area and Methods

The Manatí watershed is located within 11 municipalities (equivalent to counties according to US Census geographic hierarchy) of the north-central region of Puerto Rico, and has a catchment area of approximately 609 km^2 (DNER, 2008) (see Figure 1). The region is characterized by a humid subtropical climate with an average annual precipitation of 190.5 cm (DNER, 2008). The watershed is mainly rural with a population of approximately 145,581 habitants (U.S. Census Bureau, 2010). Its land cover is mainly composed of forests and grasslands (74%), agriculture (19%), and urban zones (5%).

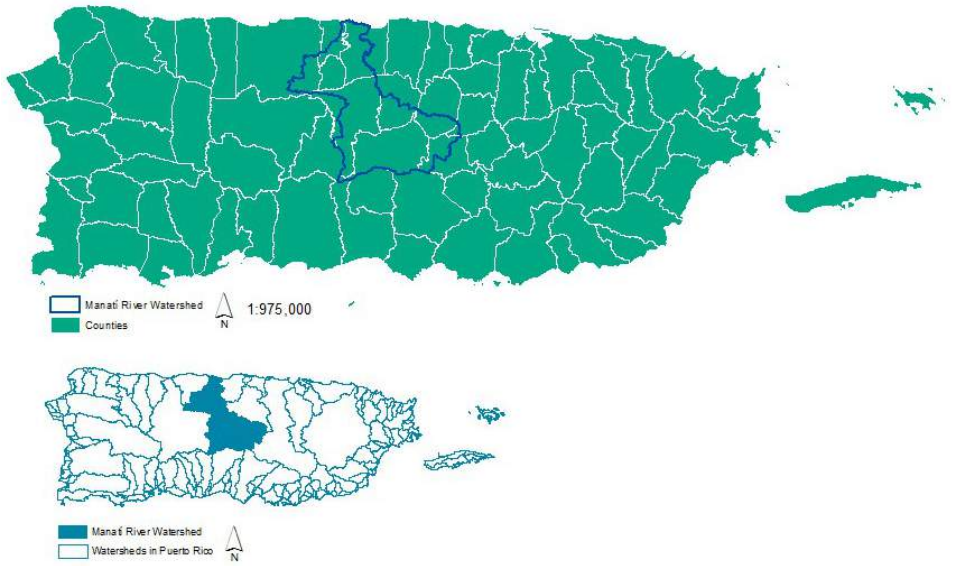

Figure 1: Study Area.

The intercept method was used to conduct in-person interviews in three Manatí watershed sites. The sampling technique has been used in previous studies on recreationists' attitudes towards the conservation and management of bodies of water (Loomis & Santiago 2013). Conducting interviews *in situ* allows us to ensure respondents are experiencing nature while being surveyed on pro-environmental attitudes and behaviors.

Three one-kilometer circles defined survey sites along upstream, midstream and downstream locations (see Figure 2). Upstream survey efforts were concentrated in Toro Negro, a recreation area in the central mountainous region. It is mainly covered by forest and secondary vegetation, and includes several recreation and conservation areas where visitors can bathe in the river and enjoy picnics. Midstream, the second sampling site was the Juan A. Corretjer Linear Walkway, popular as a rest stop for people to enjoy the views, eat and exercise. The downstream survey site, the river

basin outlet, is the location where the river meets the Atlantic Ocean. Alluvial and marine deposits rest over the northern limestone region where people enjoy fishing and surfing, among other recreational activities.

Figure 2: Survey Sites.

A total of 202 in person interviews were conducted during the months of June to August of 2015. Sampling was balanced by day of the week, i.e., weekdays, weekends and holidays. During interview hours (10:00AM to 4:00PM), the research team approached one adult per family, alternating between men and women to achieve a gender-balanced sample. The on-site refusal rate for the in person interviews was 5%, only 10 people out of the combined sample of 212 refused to participate.

The research team met to discuss some of the standard questions used to assess pro-environmental attitudes and behavior in the literature (i.e., Beery & Wolf-Watz 2014, Wilhelm-Rechmann, Cowling & Difford, 2014; Davis, Le & Coy 2011; Jimenez & La Fuente 2010; Perrin & Benassi 2009; and Van Liere & Dunlop 1980), and adapt them to the local cultural context. The survey instrument was designed to gather information on participants' attitudes and behavior by means of Likert scale and dichotomous choice questions. Respondent opinions on the following statements were of particular relevance to our research:

- Non-profit organizations are more interested in causing problems than in mitigating pollution.
- Pollution doesn't affect my life directly.
- Government should implement stronger policies to avoid pollution because people do not follow the rules.

- I think that it is better to solve water problems building more reservoirs and dams than reducing household consumption.
- The Puerto Rico Department of Natural Resources does a good job.
- Changing my behavior will not help environmental conditions.
- The value of nature is just because of its utility for human beings.

Respondents were asked to respond to the previous statements using a Likert scale ranging from 1 (Strong Disagreement) to 5 (Strong Agreement). The following dichotomous choice (Yes/No) questions were also asked as part of the interview process:

- Do you know any non-governmental organizations that deal with environmental issues?
- Do you buy organic products?
- Do you recycle in your house?

The survey instrument also gathered participant socio-demographic data. Questions were pre-tested before submitting them to IRB approval and conducting formal fieldwork.

Analysis

The sample was intentionally divided roughly evenly according to gender, so 53% of respondents were female and 47% were male. The remaining socio-demographic variables in our survey could not be controlled. Table 1 provides a summary of respondent socio-demographic characteristics. The mean age range of participants was 18 to 85, with an average of 42 years. The level of formal education varied from none to a doctoral degree, with the average participant reporting receiving some college education. Annual income, which was significantly correlated to education (r=0.4438***), also revealed a wide range, from $2,500 to $75,000, with an average of $29,557.

Table 1. Socio-Demographic Characteristics

	Average	Minimum Value	Maximum Value	Standard Deviation
Age (years)	42	18	85	15
Education (years)	14	1	22	3
Income (US dollars)	$29,557	$2,500	$75,000	$21,981
	Women		Men	
Gender	Count	Percentage	Count	Percentage
	107	53%	95	47%

Another background variable of interest was the percentage of the population living in rural areas within the respondent's home municipality. There were some home municipalities with no rural population while others had as much as 38% of their population residing in rural areas. On average, nearly one tenth of the population within the respondent home municipalities lived in rural areas.

Overall, respondents have demonstrated varying degrees of agreement with the statements indicating pro-environmental attitudes and behaviors. Table 2 provides a summary of answers to key survey questions. Likert responses were grouped according to three categories: agree, neutral, and disagree. Counts and percentages were presented for dichotomous choice questions.

Table 2. Attitude and Behavior Response Summary

Variable Description	Disagree	Neutral	Agree
The value of nature is just because of its utility for human beings.	71	19	112
Pollution does not affect my life directly.	180	7	15
Government should implement stronger policies to avoid pollution because people don't follow the rules.	6	8	188
I think that it is better to solve water problems building more reservoirs and dams than reducing household consumption.	49	34	118
The Puerto Rico Department of Natural Resources does a good job.	82	71	49
Non-profit organizations are more interested in causing problems than mitigating pollution.	48	74	80
Changing my behavior will not help environmental conditions.	146	20	36

The main focus of this research was to identify possible determinants of awareness and attitudes towards pro-environmental organizations considering variations in socio-demographic profile. Analysis groups were defined as follows: level of education (less or greater than 14 years), income (less or greater than $29,557), number of family members (less or greater than 3) and the degree to which the individual's municipality of residence is rural (less or greater than 9%). Given the exploratory nature of our research, variable associations were examined using Pearson correlation and Chi-square analysis. Statistically significant results were informed according to their significance level: 1% (***), 5% (**), and 10% (*).

There is a strong positive association between knowledge of pro-environmental organizations and two self-reported pro-environmental behaviors: recycling (0.2360***) and purchasing of organic products (0.2647***). The relationship between knowledge of environmental organizations and recycling was particularly strong among older adults (r=0.3395***), those with a lower level of formal education (r=0.2671***), lower income (r=0.2202**), and those living in a more urban surrounding (r=0.3049***).

It seems that respondents familiar with environmental organizations approve of the role of government in environmental management and protection. There is a positive association between reported knowledge of pro-environmental organizations and approval of the tasks undertaken by the Puerto Rico Department of Natural and Environmental Resources (0.1146*).

Those who are aware of pro-environmental organizations also have a more positive attitude towards them. There was significant disagreement with the statement indicating that pro-environmental organizations are more interested in causing problems than solving environmental problems (-0.1691**).

Age is a significant mediating factor when examining the links between knowledge of pro-environmental organizations and associated attitudes and behaviors. There is a strong positive link between knowledge of organizations and recycling behavior only among older adults. Similarly, only older respondents rejected a utilitarian vision of nature, and were more optimistic when considering the impact of behavioral changes on solving environmental problems such as water shortage issues.

Education was also a significant mediator between organizational knowledge and pro-environmental attitudes and behaviors. Those with a higher level of formal education who knew about pro-environmental organizations disagreed with a utilitarian vision of nature and finding technical, instead of behavioral, solutions to water shortage problems.

The extent of rural surroundings in a participant's home municipality was also a mediating factor between knowledge of pro-environmental organizations and attitudes towards environmental issues. Participants living in more urban municipalities tended to reject utilitarian visions of nature, as well as technical solutions to the water shortage problem. They also were less pessimistic about the effectiveness of behavioral changes when addressing environmental problems.

Income did not seem to be as strong a mediating factor when discerning possible patterns between knowledge of pro-environmental organizations and pro-environmental attitudes. There was a positive association among both high and low income groups when it came to recycling, as well as rejecting a utilitarian vision of nature. Pessimistic attitudes towards behavioral change, however, were shown to have a negative relationship with knowledge of pro-environmental organizations only among the lower income group.

Preference for technical solutions to solve water shortage problems was also associated with knowledge of pro-environmental organizations. A significant negative relationship was found, but only among respondents with a higher level of formal education (r=-0.1865*), and those living in a more urban municipality (r=-0.2140*).

There was a negative relationship between stating being pessimistic that behavioral changes can have an impact on environmental problems and reported knowledge of pro-environmental organizations; that is, the more pessimistic about the effectiveness of behavioral change to address environmental problems, the less their reported knowledge of pro-environmental organizations (r=-0.2198***). This relationship was even stronger among older, lower income, and a less formally educated respondents.

A positive relationship was observed between having a negative view of pro-environmental organizations and reporting that behavioral changes will have no impact addressing environmental problems (r=0.1367*). A utilitarian view of nature was also positively correlated with having a pessimistic attitude toward the effectiveness of pro-environmental organizations (r=0.1285*). This pattern was

significant among older, more formally educated and urban respondents. It seems those who express defeatist attitudes also gravitate towards technical solutions, downplaying the need for behavioral change.

Discussion and Policy Implications

There is a strong link between recycling and having a positive perception of environmental organizations. This relationship was especially strong among older urban adults with a lower level of income and formal education. Mukherji, Mukherji & Evans (2011) reported related results among US Latinos, identifying environmental concern as a partial driver of recycling. Several municipalities in Puerto Rico currently have recycling programs, but most still operate on a voluntary basis. Broader participation in pro-environmental NGO's may have an impact on the acceptance of stricter enforcement of recycling regulations.

It is worth exploring whether there is a causal relationship between participation in environmental organizations and a broader range of pro-environmental behaviors. Resulting information may provide evidence of the broader impacts of involvement in pro-environmental organizations. This knowledge may be used to inform pro-environmental NGO's on their role and broader impacts.

Knowledge of pro-environmental organizations is also associated with pro-environmental consumption patterns. There is a strong association between those who reported knowledge of pro-environmental organizations and buying organic and second-hand products. Findings on consumption supplement those of Sánchez, López-Mosquera & Lera-López (2015), who found that Spanish consumers who are more educated and well-informed about environmental issues choose pro-environmental consumption. One possible vehicle worth exploring for shifting consumption towards more sustainable patterns could be resident involvement in pro-environmental organizations.

Lack of knowledge about pro-environmental organizations is also associated with a pessimistic attitude towards the effectiveness of behavioral change in addressing environmental problems. Convincing the broader public of the effectiveness of behavioral change to solve environmental problems is an area of opportunity that could be highlighted more in future pro-environmental NGO agendas.

External attributions may also play a significant role in fostering involvement in pro-environmental organizations. Kalamas, Cleveland & Laroche (2014) found consumers ascribing environmental responsibility to powerful others (corporations or governments), were more likely to engage in pro-environmental behavior that those attributing changes to chance or fate (a higher power, natural earth cycle facets). The authors state:

"It is vitally important to persuade these consumers and powerful others currently viewing the state of the environment as fate to instead see it as karma".

Future research into external attributions can delve into the motivation for defeatist attitudes found in this research. A sense of impotence when dealing with environmental change needs to be addressed as effective strategies for organizational

involvement are devised. Findings point to the importance of affective involvement, which may be provided by NGO's through watershed stewardship and recreation experiences, when trying to incentivize pro-environmental behaviors among broad sectors of the population, but further exploration into the reason for defeatist attitudes, such as external attribution, is an important component of the puzzle.

Another item that could be included in future NGO agendas is the opportunity to discuss the benefits and costs associated with solutions to environmental problems. Technical solutions seem to be a preferred alternative to address degradation of key ecosystem services. Respondents consistently agreed with building reservoirs and dams in the watershed, which require significant monetary investment, more than adopting behavioral solutions. The public sector and pro-environmental organizations can take the lead in communicating a broad variety of more cost-effective behavior-based solutions to pressing environmental problems such as water shortages. Our results indicate that on the one hand, non-governmental organizations may be more effective in communicating messages, due to respondent disagreement with public sector effectiveness. On the other hand, many distrust non-governmental organizations, so there is also a need for these organizations to strengthen their legitimacy among the general public to effectively convey cost-effective alternatives to watershed pollution problems.

A key component in solidifying the legitimacy of pro-environmental organizations is the recognition of pollution as a problem that affects citizens in their daily life. A number of younger urban respondents with a negative perception of pro-environmental organizations indicate that pollution does not affect their daily life, so pro-environmental organizations can strengthen their legitimacy by raising awareness among citizens on the immediacy of the problems they address on a daily basis, including diminished watershed recreation opportunities. It seems communicating the capacity to achieve change may not be sufficient, there is a need to first convince a segment of the population that pollution affects them directly.

The previous exploratory analysis has shown that pro-environmental organizations may play a role in fostering pro-environmental behaviors among its members and the broader population. These behaviors included recycling as well as purchasing organic and second-hand products. They may also play a key role in increasing awareness among the broader population of not only the immediacy of behavioral problems, but also the effectiveness of behavioral change to address them. Once NGO legitimacy is broadly recognized, it may be easier to involve residents in stewardship efforts and fostering adoption of pro-environmental behaviors to address watershed and other immediate pollution problems.

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