2016

Controlling Marine Debris: An Exploration of the Responsible Behavior of Recreational Users in Rhode Island

Sarina Lyon

University of Rhode Island, sarina_lyon@my.uri.edu

Follow this and additional works at: <https://digitalcommons.uri.edu/theses>

Recommended Citation

Lyon, Sarina, "Controlling Marine Debris: An Exploration of the Responsible Behavior of Recreational Users in Rhode Island" (2016). *Open Access Master's Theses*. Paper 850.
<https://digitalcommons.uri.edu/theses/850>

This Thesis is brought to you for free and open access by DigitalCommons@URI. It has been accepted for inclusion in Open Access Master's Theses by an authorized administrator of DigitalCommons@URI. For more information, please contact digitalcommons-group@uri.edu.

CONTROLLING MARINE DEBRIS: AN EXPLORATION
OF THE RESPONSIBLE BEHAVIOR OF RECREATIONAL
USERS IN RHODE ISLAND

BY
SARINA LYON

A THESIS SUBMITTED IN PARTIAL FULFILLMENT OF THE
REQUIREMENTS FOR THE DEGREE OF
MASTER OF ARTS
IN
MARINE AFFAIRS

UNIVERSITY OF RHODE ISLAND

2016

MASTER OF ARTS IN MARINE AFFAIRS

OF

SARINA LYON

APPROVED:

Thesis Committee:

Major Professor David Bidwell

Richard Pollnac

Caroline Gottschalk-Druschke

Nasser H. Zawia

DEAN OF THE GRADUATE SCHOOL

UNIVERSITY OF RHODE ISLAND

2016

ABSTRACT

Like many other coastal communities, people are attracted to Rhode Island's waters for the range of recreational activities available among the diverse marine habitats. This large influx of people to coastal areas leads to increased threats to the marine environment. One prominent issue is the presence of debris in the ocean, which is predominantly a result of land-based sources such as runoff or trash left by coastal visitors. Among the debris items in the ocean, plastic is the most persistent due to its chemical composition. For this reason and the difficulty in cleaning up the waste, marine debris is a growing concern with no simple solution. In order to begin reducing the amount of debris entering the marine environment, human behavior must be addressed. The scope of this study is to understand how people participating in coastal recreation in Rhode Island behave towards the environment, with particular attention to behaviors that could reduce the amount of plastic debris entering the environment. This study uses multiple variables such as the New Ecological Paradigm, marine environmental concern, connectedness towards the marine environment, and basic demographic variables as potential indicators of one's environmentally responsible behavior. This presentation will highlight results from regressions of 186 surveys conducted of recreationalists in coastal Rhode Island during the summer of 2015. By studying behavior towards the environment, areas of future research can be addressed among the people who use Rhode Island's coasts.

ACKNOWLEDGEMENTS

I wish to thank my advisor, David Bidwell for his guidance and support throughout the process and my graduate studies. I also wish to thank my committee members, Richard Pollnac and Caroline Gottschalk-Druscke for their insight and encouragement. This work would not have been possible without their help. I also appreciate the support from Frank Hall Boat Yard, Point Judith Marina, Brewer Wickford Cove Marina, and Sail Newport for allowing me to interview those who use their facilities.

PREFACE

Please note that the following thesis is in Manuscript format to be prepared for submission in part to the Journal of Environment and Behavior.

TABLE OF CONTENTS

ABSTRACT	ii
ACKNOWLEDGEMENTS	iii
PREFACE.....	iv
TABLE OF CONTENTS	v
LIST OF TABLES.....	vii
LIST OF FIGURES	viii
MANUSCRIPT - 1	1
CHAPTER 1	2
INTRODUCTION	2
CHAPTER 2	4
BACKGROUND	4
<i>A. The Environmental Issue: Marine Debris</i>	4
<i>B. What is Environmentally Responsible Behavior?</i>	8
<i>C. Factors Influencing Environmentally Responsible Behavior (ERB)</i>	10
<i>D. Study Context</i>	16
<i>Research Questions</i>	17
CHAPTER 3	19
METHODOLOGY	19
<i>Data Collection</i>	19
<i>Measurement of the Dependent Variable</i>	22
<i>Measurement of Independent Variables</i>	24
<i>Analytical Approach</i>	26
CHAPTER 4	28
RESULTS	28
<i>Profile of Survey Respondents</i>	28
<i>Heuristic model of Environmentally Responsible Behavior</i>	30
<i>Recreation Participation and Predictors of Behavior</i>	34
CHAPTER 5	38

DISCUSSION	38
<i>Practical Implications</i>	44
CHAPTER 6	49
CONCLUSION	49
<i>Limitations and Future Directions</i>	49
APPENDICES	53
BIBLIOGRPAHY.....	55

LIST OF TABLES

TABLE	PAGE
Table 1. Place surveyed in Rhode Island. Table provides the number of people approached at each site as well as the response rate.....	21
Table 2. Self-reported ERB scale used to determine how frequently the respondent has done the following actions in the last year.....	23
Table 3. Breakdown of respondents and their sociodemographic characteristics based on the recreational activity identified as most important to the individual The profile of respondents for the whole sample (N=186) is also included.....	30
Table 4. Zero-order Pearson correlation of all the variables initially used in this study. The correlational relationships identified were used to build regression models in further analyses.....	32
Table 5. Regression summary showing the explanatory power each set of variables have on the dependent variable (ERB).....	33
Table 6. Regression summary with the Interconnectedness scale (a strong predictor of behavior) as the new dependent variable.....	36
Table 7. Regression summary with the Environmental Concern scale (another strong predictor of behavior) as the new dependent variable.....	37
Table 8. NEP scale is meant to measure a person's ecological worldview and to understand the respondent's perspective of the environment as a whole.....	53
Table 9. The Environmental Concern Scale measures level of seriousness to current marine environmental issues as a specific attitudinal variable.....	53
Table 10. A list of ten true/false statements used to measure how much each respondent knows about marine debris.....	54

LIST OF FIGURES

FIGURE	PAGE
Figure 1. Location of the eight places surveyed in Rhode Island.....	20
Figure 2. Interconnectedness Scale showing overlapping Venn Diagrams to depict the respondent's level of felt connection to the marine environment.....	54

MANUSCRIPT - 1

Prepared to publication in the Journal of Environment and Behavior

Controlling Marine Debris: An Exploration of the Responsible Behavior of Recreational Users in Rhode Island

Sarina Lyon, David Bidwell

Marine Affairs, University of Rhode Island, Kingston, RI USA

Corresponding Author: Sarina Lyon

Marine Affairs

University of Rhode Island

1 Greenhouse Rd

Kingston, RI 02881

Email: sarina_lyon@my.uri.edu

CHAPTER 1

INTRODUCTION

There are many approaches to understanding and solving certain environmental problems. Policy-makers and researchers contend that behavior is one way to ameliorate environmental problems (Mobley et al., 2010, Sheavly, 2007). Environmentally responsible behavior is studied to explore how people currently act towards the environment in different settings, as well as a way to inform behavior through educational programs and outreach that target sustainable action (Cottrell, 2003). While behavior is not the only way to address environmental problems, like marine debris, small changes in a person's actions are steps in the positive direction. Actions to mitigate the amount of trash entering the marine environment have yet to be studied in a comprehensive setting using theoretical frameworks. For this reason, this study will explore how environmental beliefs and attitudes and sociodemographic variables align with one's environmentally responsible behavior specifically related to plastic debris.

Additionally, outdoor recreation has been shown to influence how a person feels and behaves toward the environment (Theodori et al., 1998). Participation in recreational activities is thought to enhance environmental awareness and appreciation for one's surroundings (Tarrant & Green, 1999). Marine recreation attracts a large number of people to Rhode Island's diverse coastlines. Therefore, in order to

understand how recreation influences behavior, the targeted participants for this study are those who recreate on Rhode Island's coast. As direct users of the ocean, recreationists' behavior can be studied as a first step to minimize the amount of debris introduced to the ocean. The following section explores these components related to an extensive literature review. It is meant to highlight all the variables considered in this study and why they are important to the overall issue of concern: marine debris.

CHAPTER 2

BACKGROUND

A. The Environmental Issue: Marine Debris

Debris in the ocean has become a prevalent threat to marine ecosystems and attracted worldwide attention (Lebreton, 2012). Debris of all sizes has become a pervasive global issue due to its ability to travel far distances across the oceans. Because of this, assessing global accumulation of trash in the ocean is quite challenging. The most widely used methods for assessing the amount of marine litter in the environment is through beach surveys (Ribic, 1998; Sheavly, 2007; Silva-Iñiguez & Fischer, 2003; Somerville et al., 2003) or surface water trawling (Barnes et al., 2009). These studies are used to project global quantification estimates. Results from these studies indicate that the amount of marine debris collected has not drastically changed in some time (Sheavly, 2007). This leads people to believe that debris entering the marine environment is either stabilizing or decreasing as a result of increased policy in the disposal of waste. An example being the implementation of MARPOL Annex V established by the International Maritime Organization (Sheavly, 2007). Since this regulation, surveys conducted in Alaska found a reduction in the amount of debris from fishing gear and ships has reduced by 60 percent (Johnson, 1994). This example sheds lights on how international intervention can be effective

provide support for the appearance of stabilization in global quantification of debris. However, this intervention only addresses the dumping of waste by maritime activities. Another major source of debris is through the deliberate or accidental introduction of materials into the ocean from land (Lebreton, 2012). Examples include runoff from storm drains or waterways and trash left by beach-goers. It has been more difficult to control the land-based sources of debris because of the challenge in enforcing regulations against littering laws (Derraik, 2002). For this reason, it is hard to accurately predict how much trash is currently polluting our oceans. Even though studies suggest that debris entering the marine environment is stabilizing, Barnes et al. (2009) noted that the amount of trash being collected on beaches has increased. This implies that debris that was previously in the ocean is now surfacing and getting deposited along various beaches. Based on these differing conclusions, it is reasonable to assume that debris is everywhere and difficult to quantify globally.

As mentioned above, several studies have surveyed beaches and water basins to assess the accumulation of debris along the coastline. In many of these studies, plastic products are identified as the leading debris item accumulating in the marine environment (Ribic, 1998; Silva-Iñiguez & Fischer, 2003). The most common items found in surveys include plastic film, packaging products, straws, balloons, and metal beverage cans (Sheavly, 2007; Barnes et al., 2009). Halifax Harbour in Nova Scotia has frequently been surveyed for debris scattered across its beaches (Ross et al., 1991;

Walker et al., 2006). Additionally, land-based recreational activities are the leading sources of litter on these beaches. Walker et al. (2006) reported that 86 percent of the debris collected was plastic. In another survey, at 1,000 meters depth, Barnes et al. (2009) recorded an accumulation of plastic bottles and individual plastic bags in abyssal canyons in the Mediterranean. Plastics bags are one of the most common litter items in the ocean because they are easily windblown (Barnes et al. 2009). Based on these findings, it is not surprising that plastic constitutes 60-80 percent of all the marine debris and most of the plastic waste comes from those packaging products (Derraik, 2002). Over one third of production of plastic is for the use of disposable single-use packaging items (Thompson et al., 2009; Barnes et al., 2009). Even though a global quantification of marine debris can only give projections through modeling and estimates; it is clear that as long as humans continue to produce plastic, plastic will continue to be a major contributor of debris in the ocean (Kako et al. 2014).

Plastic is also the most abundant debris item because of its chemical composition and durability. Seawater and the reduced exposure to light tends to slow the rate of degradation of plastic. The growth of algal biofilms on plastic also delays degradation in the water column known as fouling (Andrady, 1990; Barnes et al. 2009). A study conducted by Gregory (1978) assessed the time of complete degradation by virgin plastic pellets found on New Zealand beaches. Small plastic pellets (~5mm) made by manufacturing companies can be melted to become a wide range of products. Gregory (1978) suggested that these pellets could take anywhere

from 3-10 years to deteriorate on beaches and with chemical additives the pellets could last as long as 30-50 years. Furthermore, plastic in the marine environment could persist for thousands of years or longer depending on where it is within the water column and the initial size of the debris item (Barnes et al., 2009).

With these persistent qualities, plastic can continuously impact marine organisms through entanglement or ingestion (Derraik, 2002). This has been publically documented and is a prominent concern. Since plastic can be found at a range of fragments, organisms from all levels of the trophic system can be affected. Reported ingestion of plastic has been identified in species of fish, cetaceans, seabirds, shellfish, and even zooplankton (Cole et al., 2011). A less studied topic, but still important to address is the effect chemical additives have on organisms that ingest plastic. These additives and other toxic pollutants (such as Persistent Organic Pollutants) that adsorb onto the plastic are known to have negative health effects (Cole et al., 2011). It is these indirect impacts of plastic in the ocean that need more attention in order to more fully understand the implications of plastic waste accumulating in the marine environment.

This overview highlights what researchers currently know about marine debris, and more specifically plastic debris, and why this area of research needs more attention. One way to address this issue is through examination of the impacts of human behavior on this phenomenon. Very few studies in the social science literature have focused on the behavioral aspect of marine debris. As stated by The Ocean

Conservancy National Marine Debris Monitoring Program, “Only through changes in human behavior and informed choices in products and packaging, can this pollution issue be effectively addressed and dealt with worldwide” (Sheavly, 2007). For this reason, this study explores the attitudes and behaviors of people using Rhode Island’s coasts to understand the attitude-behavior relationship as it relates to the presence of plastic debris.

B. What is *Environmentally Responsible Behavior*?

Environmental conservation and efforts to protect our natural surroundings are still growing areas of attention (Minton & Rose, 1997; Stern, 2000; van der Linden, 2015). Many environmental problems are rooted in human behavior and can begin to be managed by addressing these actions (Steg & Vlek, 2009). Therefore, in this study marine debris is addressed to reduce our impact on the amount of trash accumulating in the environment. There has been a rich body of literature on environmentalism and how behaviors or behavioral intentions impact the environment to protect its natural resources. Behaviors aimed at reducing an individual’s impact on nature are presented in many forms, but essentially all are centered on protecting the environment. Stern (2000) uses the terminology *environmental significant behavior*, defined as actions which cause changes directly or indirectly to the environment. *Pro-environmental behavior* is the “behavior that consciously seeks to minimize the negative impact of one’s actions on the natural and built world” (Kollmuss & Agyeman, 2002). Pro-environmental behavior is also motivated by self-interest (such as minimizing one’s

own health risk) and pro-social motives (such as doing what is right for the good of the population) (Bamberg & Möser, 2007). In this study, the term *environmentally responsible behavior* (ERB) will be used to describe intentional and unintentional actions by an individual to do what is right to reduce environmental problems (Cotrell, 2003; Lee et al., 2015). These actions range from everyday performance to site-specific best practices (Zhang et al., 2014).

In much of the literature, a measurement of behavior has been in the form of self-reported behavior. Self-reported behavior is defined as the actions respondents say they do or their perception of their own behavior (Manfredo & Shelby, 2001). There are limitations in the use of self-reported behavior as an accurate measure (Barker et al., 1994; Manfredo & Shelby, 2001). For example, Fujii et al. (1985) compared self-reported responses to actual energy consumption and found that, while small, participants would over-report their conservation behavior. Several reasons for this response error were identified, including: faulty recall, lack of information, misunderstanding, or an urge to give a more socially desirable response. This shows that a person will respond based on how they perceive themselves and their actions. However, self-reports have also shown to be adequate indicators of behavior and have been used often in the literature (Ebreo & Vining, 2001; Cotrell, 2003; Mobley, 2010; Lee et al., 2011; Lee & Jan, 2015, van der Linden, 2015; etc.).

This study was developed with the use of theory and predictive indicators described in the literature to assess what encourages someone to behave in an

environmentally responsible manner. In particular, this study if focused on behavior that would prevent debris, and more importantly plastic debris, from entering the ocean. The following section will highlight several factors typically considered to influence ERB.

C. Factors Influencing Environmentally Responsible Behavior (ERB)

There are multiple frameworks that have been previously developed to try to explain the cognitive paths that influence behavior. Each of these frameworks incorporates different variables as important predictors of behavior. The extent of the literature used to formulate this study was based on the theory of planned behavior (TPB) and value-belief-norm (VBN) theory to serve as the primary frameworks. Variables included within these frameworks and relevant literature include environmental beliefs and attitudes, knowledge, and choice of recreation activity as they relate to the theoretical background and behavior.

Environmental Beliefs

Beliefs provide important information that guides our attitudes and a component of the value-belief-norm (VBN) model (Stern, Dietz, Guagnano, 1995). The New Ecological Paradigm (NEP) uses environmental statements to understand a belief orientation. Within the VBN model, the NEP was added as a way to measure someone's general belief or environmental worldview (Dunlap et al., 2000). NEP is thought to be the precursor to more specific beliefs and shape how a person intends to behave. Stern et al. (1995) argue that "the NEP can be seen as a link between social

structural forces and socialization processes that influence them and specific attitudes and behavior that flow from them” (pp. 739). This means NEP is an important indicator of behavior which can help relate sociodemographic variables and attitudes to behavior.

Because NEP is such a commonly used scale, with high reliability and validity, there have been some ambiguities in the literature about what NEP is meant to measure. NEP has been treated as an indicator of environmental worldview, environmental attitudes, primitive beliefs, and even values (Dunlap et al., 2000). The initial development of NEP was for assessing the belief that humans are a part of nature and a component that needs to be considered when using natural resources (Dunlap et al., 2000). However, much of the literature draws on the attitude-behavior complex and therefore uses NEP as a measure of general environmental attitudes which are influenced by one’s beliefs (Tarant & Green, 1999; Cotrell, 2003; Thapa, 2010). For example, Kil et al. (2014) used NEP to study the relationship between a person’s perception towards the environment, recreational involvement, and environmentally responsible behavior. They determined that NEP as a measure of environmental attitudes shape pro-environmental behavior partially through the experience and involvement of nature-based activities.

Another study used NEP to assess pre-service teachers’ level of environmentalism and knowledge on marine pollution in Greece (Boubonari et al., 2013). This is because teachers must have a certain level of environmental literacy

and orientations to teach future generations and produce students who are more environmentally responsible. Therefore, it was studied whether more a positive environmental attitude (measured using NEP) and awareness of marine pollution led to responsible action. Boubonari et al. (2013) concluded that a higher reported score on the NEP scale translated to stronger environmental behavior toward marine pollution. Despite the confusion in how NEP is utilized in the literature, for clarification in this study, the NEP will be treated as a general environmental belief factor.

Environmental Attitudes

An environmental attitude is described as a degree of favor or disfavor to an object or about an environmental issue (Milfont & Duckitt, 2010). The VBN and theory of planned behavior (TPB) assert that there are both general and specific attitudes which should be considered as potential indicators of behavior (Stern, Dietz, Guagnano, 1995; Fishbein & Ajzen, 1975). Two marine specific attitudinal variables included in this study are connectedness to the environment and environmental concern.

Connection to nature is an important component when understanding environmental attitudes and pro-environmental behavior (Schutlz et al., 2004; Mayer & Franz, 2004). This connection to nature has been associated as a reflection of one's environmental values based on the VBN theory (Dutcher et al., 2007); however, another interesting interpretation is that connection to nature can be considered a core

belief (Schultz et al., 2004). A core belief infers that the respondent has a previous explicit belief about his or her connection with nature. However, Schultz et al. (2004) argue that a person's sense of connection is not be a belief that is readily available. For this reason, interconnectedness is referred as an environmental attitude. Theoretically, connectivity as a measure of behavior is rooted in the psychological literature on the spiritual relationship humans have with nature and a feeling of oneness with the environment (Davis et al., 2009). Nature should be understood as a part of our community and our intuitive connection with nature is based on how we experience it (Dutcher et al., 2007). Interconnectedness is not only a reflection of one's attitudes, but it can also arguably be dependent on one's previous knowledge and recreation involvement.

Marine environmental concern is included in this study because it is thought to be a better predictor of behavior than NEP (Mobley et al. 2010). Additionally, more expressed concern towards the environment is thought to coincide with a person's level of awareness and knowledge on the environmental issue (Kaiser et al. 1999).

Knowledge

Traditionally in environmental education studies, it is assumed that if people become more knowledgeable on environmental issues they will develop more awareness of the problem and therefore become more motivated to behave more responsibly towards the environment (Hungerford & Volk, 1990). Kaiser et al. (1999), an advocate of the TPB framework when studying general ecological

behavior, state that environmental knowledge is an important component within the model. Bamberg & Möser's (2007) meta-analysis also identified knowledge as an indirect determinant of pro-environmental behavior. This meta-analysis was concerned with past studies adapting the TPB theory that used intention as the single variable having a direct relationship with behavior. Results showed that knowledge and awareness on the environmental issues were directly correlated to attitudes (Bamberg & Möser, 2007). However, it is important to note that awareness and knowledge are not the only influential factors to encourage pro-environmental behavior (Hungerford & Volk, 1990).

Recently, Ajzen et al. (2011) argued that knowledge as a predictor of behavior was neither necessary nor sufficient. This is because when people are uncertain in a knowledge test, their response may be consistent with their attitudes on the subject matter and do not reflect true knowledge. These results were consistent with their expectation that knowledge will not be correlated to any of the variables within the TPB framework or on reported actions. Ajzen et al. (2011) points to some of the discrepancies in the literature on the use of knowledge as a predictor of behavior. However, because of the strong presence of knowledge and education as being crucial factors in encouraging responsible behavior, it is included in this study.

Recreation Participation

Overall, it is assumed that outdoor recreation promotes environmental awareness by exposing people to impacts of environmental issues (Tarrant & Green,

1999). The recreational activity a person chooses is consistent with how one values the environment and their basic attitudes of natural resources (Jackson, 1986). Much of the research on outdoor recreation participation has focused on the relationship of participation to attitudes and behaviors. This is because much of literature draws from the theory of planned behavior; however, the value-belief-norm theory has also been incorporated in some cases.

Many studies have offered different conclusions on the relationship between recreation and environmental attitudes and behavior leading to some discrepancy in the literature. Dunlap & Heffernan (1975) suggested that those who participate in appreciative activities such as sight-seeing and hiking express stronger environmental concern (measured using NEP) compared to consumptive activities like fishing and hunting. However, a restudy of Dunlap & Heffernan (1975) in Wisconsin showed different results when age, sex, education, income, and place of residence were controlled. Geisler et al. (1977) concluded that demographic characteristics play a larger role in affecting environmental concern than recreation participation. Studies argue that this inconsistency was reached because people have the ability participate in multiple activities in a given day. Therefore, this classification scheme is not indicative of a person's environmental attitudes (Geisler et al., 1977; Theodori et al., 1998). In other studies, recreation involvement has shown to act as both a mediator between environmental attitudes and behaviors as well as a moderator within behavior models (Jackson, 1986; Tarrant & Green, 1999; Thapa, 2010). This means in a

structural model; recreation participation is a variable having a direct impact on behavior (moderator) or a person's attitudes are antecedent to recreation involvement which then has an effect on behavior (mediator). Therefore, the inclusion of recreation participation as a predictor of both attitudes and behaviors have led to different results.

Lastly, much of the recreation literature also involves tourism studies since a person's motivation to visit a destination is based on leisure. Studies interested in tourist behavior often explore recreation experience or involvement as direct correlates to that behavior (Lee, 2011, Lee & Jan, 2015). These studies conclude that recreationists with stronger commitment to the environment also, not surprisingly, exhibit stronger pro-environmental behaviors.

In Rhode Island, recreation participation is a major draw for both visitors and residents to the state's diverse coasts. As a result, the following section will briefly cover the study site of Rhode Island and the significance of recreation and tourism to the state.

D. Study Context

The Ocean Special Area Management Plan (OSAMP) defines recreation as "any type of leisure activity carried out for enjoyment by either Rhode Island residents or visitors" (CRMC, 2010). As the Ocean State, saltwater-based recreation is the most popular and has the highest demand of participants (RIDEM, 2002). In this study, participants said they visited beaches the most out of all the water-based recreation

activities. Rhode Island is largely dependent on its seasonal tourism by benefiting the local economy and it is considered the fourth largest industry in the state (CRMC, 2010). Two-thirds of visitors of the southern coast are out-of-state and largely from Massachusetts, Connecticut, New York, and New Jersey. Recreational boating (including sailing) is a specifically popular activity in Rhode Island because it also allows for fishing and diving. Additionally, non-resident boaters provide a key market for marinas located along the southern shore. The OSAMP also identified Misquamicut State Beach in Westerly, RI as accounting for 51% of the tourist revenue stream in 2008. Because recreation and tourism is so prevalent in the state, Rhode Island provides an opportunity to focus on both resident and non-resident recreational users who rely on its coastline.

Research Questions

Overall, the purpose of this study is to explore the relationship between attitudes, behavior, and recreation participation. Therefore, based on an understanding of the literature provided, three research questions were developed to elucidate some of these relationships.

1. What predictors can be used to explain why someone reportedly behaves more or less environmentally responsible towards the marine environment?

2. How much does the choice of participation in a recreational activity influence these predictors and self-reported environmentally responsible behavior?
3. How can understanding the relationships among variables in this study help reduce the amount of marine debris entering the environment?

CHAPTER 3

METHODOLOGY

Data Collection

Intercept surveys were conducted in eight carefully selected sites in the two southern counties of Rhode Island (Washington and Newport) between the months of August 2015 to September 2015. The sites were chosen to capture a wide range of recreational activities restricted to the southern half of the state. The areas surveyed are identified on the map below (Figure 1) and include: Fort Adams, Fort Wetherill, Frank Hall Boat Yard, Misquamicut State Beach, North Kingstown Town Beach, Point Judith Marina, Scarborough State Beach, and Wickford Cove Marina. The state parks, Fort Adams and Fort Wetherill, were selected because they attract a diverse array of recreational activities. Fort Wetherill is popular for kayaking and diving while Fort Adams contains Sail Newport facilities in order to reach those who sail. Both state parks also have popular fishing platforms. The state beaches are large and known to attract both residents and tourists. North Kingstown Town Beach is a resident only beach that was sampled to get a mixture of beach-goers. Lastly, the selected marinas were large facilities along the southern coastline of Rhode Island in order to maximize sampling on days spent at the marinas.

Figure 1: Location of the eight places surveyed in Rhode Island.

Each questionnaire took no more than 15 minutes to complete. A total of 186 surveys were completed out of the total 265 people approached to participate in the survey. This demonstrates a 70% response rate during the sampling months. A breakdown of responses for each site are shown in Table 1.

Table 1: Places Surveyed in Rhode Island. Table provides the number of people approached at each of the eight sites as well as the response rate.

Study Site	Total Number of People Approached	Number of Surveys Completed	Number of Rejections	Response Rate
Fort Adams	47	30	17	64%
Fort Wetherill	56	37	19	66%
Frank Hall Boat Yard	18	13	5	72%
Misquamicut State Beach	42	29	13	69%
North Kingstown Town Beach	11	7	4	64%
Point Judith Marina	21	15	6	71%
Scarborough State Beach	44	34	10	77%
Wickford Cove Marina	26	21	5	81%
Total	265	186	79	70%

Since the number of people who would visit each selected sites varied, different approaches were developed to collect an adequate sample. Depending on the site there was either a systematic method of sampling or a convenience sampling method (Robson, 2011). The beaches (North Kingstown Town Beach, Misquamicut and Scarborough State Beach) were sampled systematically by walking down a single transect in the middle of the beach. People were confronted every twenty steps along that transect line while also alternating the group approached on either the left or the right of the path. This initial decision was based on the time surveying started (minutes ending in an odd number meant the first people approached were going to be on the right and an even number represented the left). State parks and marinas were less populated and sampling involved asking everyone encountered to participate in

the survey otherwise known as convenience sampling (Robson, 2011). Fort Adams and Fort Wetherill were too large to sample the whole area; therefore, specific regions of the park were focused in order to obtain responses from certain recreational users (i.e. fishermen, sailors, kayakers, divers, etc.). Fort Adams was restricted to the fishing platforms and docks as well as the front of Sail Newport's rental facility. Concentrations in Fort Wetherill were boat ramps used by divers and kayakers and another commonly used fishing platform. In order to obtain an even distribution of responses from each site, sampling on the state beaches was restricted to ten completed surveys a day to avoid oversampling of beach-goers.

Measurement of the Dependent Variable

Self-reported environmentally responsible behavior (ERB) was based on eleven items adapted from Mobley (2010), Cottrell (2003), Lee (2011) and Lee & Jan (2015). A single behavioral scale has yet to be developed relative to actions which would reduce the amount of trash being introduced into the ocean. Therefore, statements from previous studies were worded to relate specifically to marine debris and how one can act to reduce the amount of plastic waste entering the marine environment. Each respondent was asked to state how often they participated in an activity in the last year using a 5-point Likert scale (never, rarely, sometimes, frequently, and very frequently). The items were broken into two sections based on activities performed in everyday life and activities around the ocean or the coast. A single item unrelated to the Likert scale, but still relevant was "Have you joined in a

beach clean-up in the last year – yes or no”. The Likert statements making up this scale are provided below (Table 2).

Table 2: Self-reported Environmentally Responsible Behavior Scale (ERB) used to determine how frequently the respondent has done the following actions in the last year.

How frequently you have done the following things around the ocean and the coast in the LAST YEAR.	
1	Avoided an area of the coast or ocean because of amount of debris
2	<i>Left your trash at a beach or other coastal area because you had no way to dispose of it</i>
3	Picked up litter after leaving a beach, park, or dock
4	Encouraged others to pick up litter after leaving a beach, park, or dock
These next refer to activities you have done in the LAST YEAR in your everyday life	
5	Chose products made from recycled materials
6	Chose a product because it had less packaging than others
7	Reused plastic bags and containers
8	<i>Sorted your trash to separate non-recyclable from recyclable materials</i>
9	<i>Recycled materials with food and dirt still on them</i>
10	Notified local officials about the amount of litter in a public beach or park

The overall Cronbach reliability alpha of these 11 statements yielded a low value ($\alpha = 0.58$). Considering the low reliability of the scale, a factor analysis was conducted to initially determine which statements held together. The factor analysis revealed three components identified as Direct Action, Consumer Action, and Disposal of Waste. Individual reliability tests of the statements within these components showed that the Disposal of Waste component (statements 2, 8, and 9 from table above) had the lowest $\alpha = 0.25$. For this reason these statements were

excluded from the ERB scale in future analyses. Therefore, the ERB scale used was the average of responses to eight of the statements above (1, 3, 4, 5, 6, 7, and 10) as well as the dichotomous beach-clean-up question stated earlier. With this change, Cronbach alpha increased to 0.67 which was determined sufficient considering the importance of the scale in this study.

Measurement of Independent Variables

New Ecological Paradigm (NEP) has been cited frequently throughout the literature as a strong measure of one's environmental worldview (Dunlap et al. 2000). The NEP for this study was revised to an eight item measure of general environmental beliefs. To be consistent with the dependent variable, a 5-point Likert scale was used indicating level of agreeability to the statements. These ranged from strongly disagree to strongly agree. The complete scale is included in the Appendix (Table 8). Of the eight statements used in this study, one was excluded in further analyses due to inconsistency in responses. Therefore, the average of seven Likert scale responses was used for each participant. Cronbach α for this scale was 0.66 which is also considered sufficient to include in this study.

Environmental Concern was a scale established to measure specific environmental attitudes adopted by Mobley et al. (2010). Specific attitudes are thought to have a strong relationship with pro-environmental behavior and address some limitations of the NEP (Stern, Dietz, & Guagnano, 1995; Mobley et al., 2010; Stern, 2000). Fishbein & Azjen (1975) contend that specific variables are better

predictors of related behavior than general measurements. This scale was also developed to be consistent with ERB and NEP to reduce any confusion between scales by participants. Respondents were asked to rate the level of seriousness to nine threats to the marine environment using a 5-point Likert scale (not serious at all, not very serious, neutral, somewhat serious, very serious). Examples of statements in the environmental concern scale include amount of debris in the ocean, introduction of non-native plants and animals to coastal waters, and littering along the shoreline. The complete scale is provided in the Appendix (Table 9). For further analyses, this scale was represented as the average of Likert responses to all nine statements ($\alpha = 0.85$).

Interconnectedness to the marine environment was a single-item scale to measure the respondent's personal connection to the marine environment based on a series of seven Venn diagrams (Schultz, 2000; Davis et al., 2009; Steg & De Groot, 2012). This pictorial method was adapted from Aaron et al.'s (1992) Inclusion of Other in the Self scale. Aaron et al. (1992) used the Venn diagrams to describe an individual's level of closeness to their marital partners. The Venn diagrams in this study showed seven diagrams with increasing overlapping bubbles. One bubble represented "you" the participant and the other bubble was the marine environment supplemented by pictures which symbolized multiple activities commonly practiced in Rhode Island such as lounging on the beach, sailing, and fishing. The complete Venn diagram scale is included in the Appendix (Figure 2).

Knowledge specifically related to marine debris was assessed using ten true or false statements (i.e. “Most ocean pollution comes from dumping of trash by ships.”). All ten statements are displayed in the Appendix (Table 10). Several studies have attributed environmental education and knowledge on specific environmental issues as a predictor of pro-environmental attitudes and behavior (Cottrell, 2003; Hungerford & Volk, 1990; Mobley et al., 2010). While it is difficult to fully measure someone’s true knowledge on a subject matter; it was determined that ten statements would reduce the chance the participant could answer all correctly by solely guessing.

Recreation measured by asking each respondent to identify the recreational activity they consider the most important to them when they visit the coast (Thapa & Graefe, 2001; Barker & Dawson, 2012). Therefore, this separated each participant into a single category and enabled each respondent to become associated with the activity they valued most (Barker & Dawson, 2012). This method was deemed sufficient for ensuring each participant was associated with the activity they identify most with.

Sociodemographics variables included age, education, gender, income, and place of residence. Personal characteristics have been shown to have direct and indirect influences on ERB.

Analytical Approach

Analysis for this study utilized the strengths of both SYSTAT 13 and SPSS 23. As an exploratory method, a multiple stepwise regression was initially conducted to

determine the predictors within the independent variables which had the most explanatory power over the dependent variable (ERB). Further regressions were conducted using other variables as the dependent. These other dependent variables were used because they showed to be strong predictors on behavior. The further regressions were incorporated in the analysis to provide more insight into the relationship of variables used in this study.

CHAPTER 4

RESULTS

Profile of Survey Respondents

Of the 186 people surveyed, 113 of the participants were male while the remaining 73 were female. Those surveyed ranged from 18 (the minimum age required to participate) to 86 years old with an average age of 48. The activities respondents identified as the most important activity to them were the following: fishing, diving, walking, relaxing, kayaking, swimming, sailing, boating, wildlife viewing, boogie boarding, and surfing. Because some of the activities yielded a low number of participants based on the total number of people surveyed, activities were condensed into four categories (Table 3). As one of the targeted recreational users in this study, there were 31 fishermen sampled and required their own group. Sailors and power-boaters were combined into a single activity of boating in general with 44 participants. All boaters were surveyed on a dock or on their specific boat. Activities centered around passive recreation (walking, wildlife viewing, and relaxing by the coast) had a total of 60 participants and lastly the rest of the activities identified as important to the participant (diving, kayaking, surfing, boogie boarding, and swimming) were placed in the active recreation category with 51 respondents.

A breakdown of the demographic characteristics for each of the four recreation categories are shown in Table 3 below. Chi-square tests also show that responses within each recreation activity differ significantly in their demographics (gender, age, annual income, and place of residence) except for education. In each activity, the majority of the participants completed some college or received a Bachelor's Degree.

Table 3: Breakdown of respondents and their sociodemographic characteristics based on the recreational activity identified as most important to the individual. The profile of respondents for the whole sample (N=186) is also included.

Variable	<u>Fishing</u>		<u>Boating</u>		<u>Passive Recreation</u>		<u>Active Recreation</u>		<u>Total</u>		<u>Chi-square test</u>	
	N	%	N	%	N	%	N	%	N	%	X ²	p
Gender											21.45	0.000
Male	26	83.9	34	77.3	32	53.3	21	41.2	113	60.8		
Female	5	16.1	10	22.7	28	46.7	30	58.8	73	39.2		
Age (years old)											11.37	0.010
18-34	5	16.7	6	15.8	16	27.1	14	29.2	41	23.4		
35-50	4	13.3	7	18.4	12	20.3	19	39.6	42	24		
51-65	17	56.7	20	52.6	23	39	13	27	73	41.7		
> 65	4	13.3	5	13.2	8	13.6	2	4.2	19	10.9		
Education											7.19	0.066
High School	5	16.7	1	2.4	7	11.7	2	4	15	8.2		
College	21	70	27	64.3	33	55	31	62	112	61.6		
Graduate	4	13.3	14	33.3	20	33.3	17	34	55	30.2		
Income											14.15	0.003
Less than \$15,000	2	8	0	0	2	3.8	1	2.2	5	3.2		
\$15,000 - \$34,999	3	12	1	2.9	4	7.7	2	4.4	10	6.4		
\$35,000 - \$74,999	10	40	4	11.4	11	21.2	14	31.1	39	24.8		
\$75,000 - \$199,999	7	28	18	51.4	26	50	20	44.4	71	45.2		
More than \$200,000	3	12	12	34.3	9	17.3	8	17.9	32	20.4		
Residence											12.63	0.006
RI Resident	20	64.5	30	68.2	22	36.7	27	52.9	96	51.6		
Visitor	11	35.5	14	31.8	38	63.3	24	47.1	90	48.4		

Heuristic model of Environmentally Responsible Behavior

A zero-order Pearson correlation matrix with all the variables identified in this study was calculated to initially determine which predictors relate to the dependent

variable (ERB). The matrix also shows the strength of association as well as direction of correlation. There was a strong positive correlation between environmental concern, NEP, interconnectedness, and gender on behavior (Table 4). Pearson correlations were used to develop models for a regression and interpret results of each model. Tolerance levels of all the variables were above 0.1 and Variance Inflation Factors (VIFs) were well below the acceptable limit of 10 (VIF ranged from 1.09 to 1.89). This indicates that variables in each regression are only weakly associated with each other as predictors of behavior no multicollinearity was identified in this study.

SPSS 23 was used to conduct an initial multiple step regression with four models tested, as summarized in Table 5. Model 1 started with the background information (education, age, income, gender, and residence); Model 2 included environmental worldview (NEP); Model 3 included environmental attitudes (interconnectedness and environmental concern); and lastly, primary recreation was added as the last step to show that it does not have significant explanatory power over ERB. In all the regression models tested, knowledge showed to have no statistically significant impact on behavior despite the literature highlighting the importance of knowledge as a predictor. Knowledge is an essential component when developing ways to encourage conservation behaviors; however, for the purpose of this study as a predictor of behavior, knowledge will be excluded in all further analyses.

Table 4: Zero-order Pearson correlation matrix of all the variables initially used in this study. The correlational relationships identified were used to build regression models in further analyses.

	ERB	Environmental Concern (EC)	NEP	Knowledge	Connect- edness (Connect)	Fishing	Boating	Passive	Active	Gender	Age	Education	Income
EC	0.392***	1.000											
NEP	0.289***	0.677***	1.000										
Knowledge	0.012	0.154*	0.083	1.000									
Connect	0.244**	0.153*	0.051	0.019	1.000								
Fishing	-0.056	-0.263***	-0.193*	-0.080	-0.014	1.000							
Boating	-0.058	0.086	0.087	0.015	0.216	-0.249	1.000						
Passive	0.019	-0.022	-0.041	0.026	-0.154	-0.309	-0.384	1.000					
Active	0.082	0.161*	0.122	0.025	-0.033	-0.275	-0.342	-0.424	1.000				
Gender	0.259***	0.263***	0.278***	-0.087	-0.030	-0.212*	-0.188*	0.105	0.246	1.000			
Age	0.104	-0.081	-0.042	-0.042	0.291*	0.143	0.148*	-0.001	-0.258	-0.164	1.000		
Education	0.057	0.132	0.061	0.142	0.059	-0.288***	0.085	0.073	0.083	-0.018	0.174*	1.000	
Income	0.043	-0.013	-0.069	0.062	0.109	-0.237	0.255**	-0.013	-0.030	-0.239*	0.248*	0.336***	1.000
Residence	0.082	-0.056	-0.004	-0.003	0.196*	0.115	0.185*	-0.206*	-0.056	-0.015	0.116	-0.108	-0.207*
*** $p < 0.001$, ** $p = 0.001$, * $p < 0.05$													

Table 5: Regression summary showing the explanatory power each set of variables have on the dependent variable (ERB).

Environmentally Responsible Behavior^a				
	Model 1	Model 2	Model 3	Model 4
Background Characteristics				
Gender	0.281***	0.234**	0.186*	0.189*
Age	0.190*	0.173*	0.130	0.087
Education	0.120	0.093	0.068	0.098
Income	-0.008	0.009	-0.011	0.063
Residence	NS	NS	NS	NS
Environmental Worldview				
NEP		0.189*	-0.006	0.013
Environmental Attitudes				
Interconnectedness			0.192*	0.220**
Environmental Concern			0.287**	0.317**
Recreation Participation				NS
R ²	0.107	0.139	0.232	0.263
R ² Change		0.033	0.093	0.031
Significance (F Change)	0.011	0.021	0.000	0.125
^a = Standard Beta Coefficients (β)				
* $p \leq 0.05$, ** $p \leq 0.01$, *** $p \leq 0.001$				

Based on Table 5 of the regression summary, model 1 of sociodemographic variables had significant influence on environmentally responsible behavior accounting for 10.7 percent of the variance explained ($p = 0.01$). The statistically significant predictors on the dependent variable were gender ($t = 3.40$, $p = 0.001$) and age ($t = 2.30$, $p < 0.04$). This means that females and older individuals reported to be more environmentally responsible. The addition of NEP (model 2) increased the

variance explained by only 3.3 percent ($p = 0.02$). At this step, with the addition of the environmental worldview variable; gender ($t = 2.80$, $p = 0.006$), age ($t = 2.11$, $p = 0.037$), and NEP ($t = 2.34$, $p = 0.021$) have significant explanatory power on ERB. However, once environmental attitudes in Model 3 were added to the regression, NEP and age lose their explanatory power and variance increased by 9.3 percent ($p < 0.001$). Interconnectedness ($t = 2.32$, $p = 0.022$) and environmental concern ($t = 2.86$, $p = 0.005$) were both strong predictors on self-reported behavior. A strong connection to the ocean and concern for the marine environmental threats indicate a stronger environmentally responsible behavior. Since choice of “most important” recreation had no significant influence on the dependent, it was included in the regression as Model 4 to show that it can be rejected in the analysis.

Recreation Participation and Predictors of Behavior

Since recreation participation did not have a significant independent effect on behavior in the previous stepwise regression model, further regressions were conducted using the attitudinal variables as the dependent. Interconnectedness and Environmental Concern were strong predictors of ERB; therefore, they were used to determine whether recreation had any explanatory power on perceptions of environmental attitudes. The summaries of each regression are outlined below (Table 6 and Table 7).

The felt connection to the marine environment was not affected by any of the recreational categories; even though there was a significant difference in R^2 change (p

= 0.044). While those who go boating were close to being statistically significant, background characteristics still have a stronger impact. Place of residence initially had an influence on behavior before recreation participation was included in the regression ($t = 2.188, p = 0.03$). Those who live in Rhode Island and, therefore, live closer to the water felt more connected to the ocean than those participants who were visitors to RI. Age was also the single strongest predictor of felt connection to the marine environment in both models ($t = 3.402, p = 0.001$) and based on the directionality of β , older individuals felt a stronger connection to the ocean than younger respondents. The explained variance by this regression using interconnectedness was about 18 percent.

The other dependent variable used in an additional regression model was the attitudinal environmental concern scale (Table 7). Gender largely affected a person's concern towards the marine environment ($R^2 = 0.107, p = 0.005$) even after it was controlled by recreation participation. Again females reported higher concern towards the ocean ($t = 2.818, p = 0.006$). However, even though 84% of the fishermen sampled in this study were male, identifying fishing as the most important recreational activity showed to have an impact on felt concern towards the marine environment ($t = -2.063, p = 0.041$). This indicates that people who identify fishing as the most important feel less concerned about the ocean relative to active recreationists.

Table 6: Regression summary with the Interconnectedness scale (a strong predictor of behavior) as the new dependent variable

	Interconnectedness^a	
	Model 1	Model 2
Background Characteristics		
Gender	0.092	0.104
Age	0.281***	0.299***
Education	0.031	0.025
Income	0.075	0.008
Residence	0.176*	0.103
Recreation Participation		
Fishing		-0.045
Boating		0.152
Passive Recreationist		-0.130
Active Recreationist		NS
R ²	0.127	0.175
R ² Change		0.048
Significance (F Change)	0.001	0.044
^a = Standard Beta Coefficients (β)		
* $p \leq 0.05$, ** $p \leq 0.01$, *** $p \leq 0.001$		

Table 7: Regression summary with the Environmental Concern scale (another strong predictor of behavior) as the new dependent variable

Environmental Concern ^a		
	Model 1	Model 2
Background Characteristics		
Gender	0.282***	0.240**
Age	0.030	0.084
Education	0.171	0.114
Income	-0.025	-0.119
Residence	-0.064	-0.118
Recreation Participation		
Fishing		-0.214*
Boating		0.107
Passive Recreationist		-0.105
Active Recreationist		NS
R ²	0.107	0.165
R ² Change		0.057
Significance (F Change)	0.005	0.023
^a = Standard Beta Coefficients (β)		
* $p \leq 0.05$, ** $p \leq 0.01$, *** $p \leq 0.001$		

CHAPTER 5

DISCUSSION

Results from the three stepwise regressions conducted for this study agree somewhat with the literature as well as lead to some new questions to be researched further. This discussion focuses on three categories of predictors of environmental attitudes and behaviors. In this study, environmental attitudes are the strongest predictors of ERB. However, background characteristics also play a very important role in explaining attitudes and behaviors. Lastly, while respondents' choice of coastal recreation was not a strong predictor of most of the dependent variables, there were differences between the effects of consumptive and appreciative activities on environmental concern.

Environmental Attitudes

According to the theoretical framework, those who have more concern for the environment and feel a stronger connection to the ocean reported behaviors that are more environmentally responsible. In this study, the addition of the environmental attitudinal variables had the largest positive effect in explaining behavior. Both environmental concern (Table 7) and interconnectedness (Table 6) showed to be strong predictors of ERB. This result is similar to Mobley et al. (2010) where more specific indicators related to the ocean had stronger explanatory power than general environmental beliefs. Mobley et al. (2010) had a parallel finding where

environmental concern was a stronger predictor than NEP. Also similar to other findings (Table 6), individuals who report higher levels of felt connection to the environment also express more pro-environmental behaviors (Davis et al., 2009). Previous studies have also reached similar conclusions when connection to nature was incorporated in regression models for behavior (Lee & Jan, 2015; Tarrant & Green, 1999).

Background Characteristics

Sociodemographic variables were consistently reported as an influential factor in all regression models indicating that background characteristics are an important component in explaining attitudes and behavior.

Of the background characteristics gender was the strongest independent predictor throughout the stepwise regression on behavior (Table 5). More specifically females felt more environmentally responsible than males. In a separate regression where the attitudinal variable, environmental concern, was the dependent (Table 7), females also felt a greater sense of concern towards the ocean. These findings that females are more pro-environmental falls in line with the literature. Zelezny, Chua, and Aldrich (2000) extensively studied gender differences and environmentalism through a meta-analytic approach. Explanations of these gender differences are based on socialization theory and value orientations. From a sociology perspective, attitudes and behaviors are dependent on social norms and gender expectations (Zelezny et al., 2000). Women are socialized to be compassionate, nurturing, cooperative, and helpful

in care-giving. On the other hand, men are socialized to be competitive and independent. Additionally, these socialized expectations can be related to one's value orientations, in particular when it comes to environmentalism (Stern, Dietz, & Kalof, 1993). Therefore, since women are more strongly socialized to consider the needs of others, women are also more altruistic than men. As a result, in the meta-analysis conducted by Zelezny et al. (2000), women were reported to have stronger environmental attitudes and behaviors across age groups and 14 countries. The findings from this study are supported by Zelezny et al.'s (2000) conclusion. It is also notable that gender remained a significant predictor of behavior even when held constant by other variables added into the regression (Table 5). Additionally, gender has a significant correlation with behavior in the Pearson correlation matrix (Table 4). This implies that gender has a strong independent relationship with ERB, specifically when the action is related to marine debris. Therefore, as a relevant predictor of behavior and environmental concern, it can be concluded that females will be influential in future policy development, political leadership, and environmental activism (Zelezny et al., 2000).

In addition to gender, age was also a significant predictor of connection to the marine environment (Table 6). This background characteristic can be supported by Stern's (2000) claim that sociodemographic variables serve as proxies for personal capabilities. Personal capabilities are defined as the knowledge and skills to perform a certain action. Therefore, certain background characteristics (such as age, education,

income, and place of residence) may help explain why a person behaves more or less environmentally responsible. While Stern was focused on behavior, personal capabilities can also be related to attitudes because a person's background may lead to different perspectives on a given subject (2000). Age as a personal capability showed to have strong influence on felt connection to the marine environment. This is because the way a person perceives the ocean and therefore feels connected to it is limited foremost by that person's age. Older individuals felt a stronger connection to the ocean. This stronger connection implies that older participants feel more empathetic in protecting the marine environment. Previous studies indicate that age is usually a negatively associated predictor of attitudes and behaviors, meaning that younger individuals express more environmentalism (Cotrell, 2003; Ebreo & Vining, 2001). However, because certain recreational activities were targeted, an older demographic participated in this study. The average age was 48 with 42 percent of those surveyed being between the ages of 51 and 65 years old. Additionally, only 23 percent were between the ages of 18 and 24.

Before recreation was included in the regression model, place of residence was also a predictor of felt connection to the marine environment (Table 6). Place of residence can also be considered a personal capability affecting how a respondent perceives the environment. As being citizens of the Ocean State, residents felt more connected than visitors meaning they have more incentive to want to protect the marine environment. Davis et al. (2009) noted that connection to the environment was

strongly correlated to both commitment to the environment and pro-environmental behaviors. Similar to other studies, place of residence has a relationship with both behaviors and attitudes. Boubonari et al. (2013) focused on pre-service teachers and acknowledged that teachers who grew up in a coastal hometown environment demonstrated stronger pro-environmental attitudes and action than those teachers who grew up in a non-coastal community. This parallels the argument that childhood experience strongly influences a person's perceptions about their surroundings (Chawla, 1999). While it cannot be assumed that all residents surveyed in this study were born and raised in Rhode Island, perhaps being a resident of Rhode Island leads one to be more inclined to visit the coast than tourists on a yearly basis. Therefore, as being closer to the ocean, residents feel more connected and have a stronger desire to want to protect the community's marine environment.

Recreation Participation

Preference for a specific recreational activity had no significant effect on ERB or connectedness among coastal recreationists (Table 5 & 6). This result is different from findings in previous studies which measured recreation as a predictor of behavior (Jackson, 1986; Theodori et al., 1998; Tarrant & Green, 1999; Thapa & Graefe, 2001; Barker & Dawson, 2012). This study highlights the difficulty in using choice of recreation as a potential predictor of environmental attitudes and behaviors and the challenge in finding effective ways to measure recreation since participants can enjoy multiple activities. Results also show that sociodemographic variables are stronger

predictors of attitudes and behaviors than identified recreational activities as supported by Geisler et al. (1977).

In the final regression model (Table 7), however, recreational fishermen felt statistically less concerned about the marine environment than active recreationists even when controlling for background characteristics. This emphasizes that there is a distinct difference between extractive and appreciative activities, in terms of environmental concern. This finding coincides with one of Dunlap and Heffernan's original hypotheses that appreciative activities are more strongly associated with environmental concern than consumptive activities (1975). Additionally, Jackson (1986) supports this classification and argues that people choose recreational activities which are consistent with their basic outlook on resources or beliefs and attitudes about the environment.

Some studies have tried to debunk the use of these categories because the terminology tends to be misleading (Theodori et al., 1998). For example, appreciative activities imply that the recreationist is not altering the environment they are in and consumptive refers to action that physically takes something from the environment. Geisler et al. (1977) also note that a person can partake in both consumptive and appreciative activities on any given day. For this reason, the recreation literature has moved away from using these terms in more recent years. However, by asking the respondent for a single activity they consider the most important to them, each person becomes associated with an activity they value most. Therefore, based on each

respondent's choice of recreation, there was a distinct difference between those who identified fishing over those who enjoy kayaking, diving, swimming, surfing, and boogie boarding (active recreation). This infers that there was a difference in appreciative and consumptive activities; however, it is also important to note that 26 of the 31 respondents (84 percent) who identified fishing as the most important were male. Gender was also a significant predictor of environmental concern indicating that this distinction between appreciative and consumptive may be foremost impacted by gender. Additional research would be needed to explore this result further.

Practical Implications

The attitude-behavior complex is a complicated process with many variables playing a role in a person's decision to behave in a certain fashion. There is no single theoretical framework or measurement of a variable to explain the whole cognitive pathway. However, based on previous studies and a combination of approaches, we can begin to provide some insight into how our beliefs and attitudes impact our behavior. In this study, we used an environmentally responsible behavior scale which encompassed various actions that are related to mitigating trash in the ocean. These behaviors included those that people perform in the marine environment such as picking up litter and actions people perform at home such as purchasing environmentally friendly products. By covering a range of behaviors, it becomes challenging to determine how the information in this study can be used to induce a specific behavior change. Most studies using a general pro-environmental behavior

scale are focused on conducting studies for theoretical research and academia to further understand the attitude-behavior relationship. However, from a practitioner's point of view, these studies can be quite beneficial in finding ways to encourage pro-environmental behavior and eventually promote some type of behavioral change which will reduce our environmental impact and help protect our planet.

Based on the findings in this study, the groups of individuals found to express the least environmentally responsible behavior were men. However, those who identified with recreational fishing along Rhode Island's coast tended to report less environmental concern when considering threats to the ocean also because the majority of those fishing were men. Therefore, these categories can act as the targeted audience in social marketing campaigns that encourage action to reduce the amount of trash entering the marine environment. For example, those who enjoy fishing can be targeted on popular fishing platforms in Rhode Island using a campaign which also attracts males. Since previous research has supported the findings of these groups as being less pro-environmental, this study can be also generalizable to similar coastal landscapes. Once the targeted audience is selected, information must be provided to this audience which is meaningful enough to them to eventually encourage a change. Therefore, further research on this targeted audience would need to be conducted to effectively reach and draw the attention of this crowd. However, similar research in business marketing can act as a platform where gender differences have been studied

extensively. These marketing tactics can be used as a way to encourage environmentally responsible behavior.

There have been some ambiguities about the use of environmental knowledge to predict and promote behavior. Some studies suggest environmental knowledge is an important predictor of behavior while other research concludes otherwise (Ajzen, 2011). The ten true false statements used in this study were a poor predictor of reported behavior. However, this could be due to the difficulty in gauging knowledge on marine debris as a comprehensive issue as being a relatively new area of research. Another argument against this knowledge test is that the method of using true false statements pushed people to guess leading to unreliable results. Even though the use of knowledge did not work in this study, increased knowledge on an environmental issue is always a preferred approach when beginning to encourage a certain behavior. This is because an increase in environmental literacy is assumed to engage people in more environmentally friendly behaviors since they are aware of the negative consequences of their actions (Schwartz, 1977; Sheavly & Register, 2007; Boubonari et al. 2013). Therefore, in order to stimulate awareness, efforts through environment-based education and significant life experiences have been explored (Monroe, 2003). The educational outreach approach is very dependent on the type of targeted behavior and the anticipated audience of the program. Educational outreach is difficult to effectively lead to a behavior change because of the lag between the event and the opportunity to perform that behavior. This lag is often too large and suggests that the

information learned during the event is not considered or quickly recalled when it comes time to act responsibly (Monroe, 2003). A worthier avenue may be finding ways to prompt a significant life experience.

In some situations, when a personal experience is positive and significant, that experience can have a larger impact on behavior than educating people of the negative impacts humans have on the environment. These personal experiences are, therefore, able to instill a long lasting effect on a person's perceptions and behavior towards the environment. Through interviews with environmentalists, Chawla (1999) identified several influential experiences with the most cited experiences being, "extended time spent outdoors in natural areas, often in childhood; behavior of parents or other family members; teachers or classes; involvement in environmental organizations; books; and the loss or degradation of a valued place" (p. 15). Furthermore, teaching the younger generation pro-environmental action can have large implications for the future (Boubonari et al. 2013). A possible avenue could be targeting those younger fishermen and exposing those to a significant life experience related to marine debris. For example, events, such as beach clean-ups with comments on harmful effects of plastic debris on marine organisms, hosted by recreational fishing organizations can be a way to encourage environmentally responsible behavior among the younger population.

Findings from this study can help direct practitioners to focus on changing human behavior which need further research in order to encourage a cleaner marine

environment. It also adds to the abundance of research focused on understanding the complex attitude-behavior relationship. While marine debris cannot only be addressed from a behavioral aspect, this study illuminates ways in which behavior along the coast can help mitigate the issue.

CHAPTER 6

CONCLUSION

Several studies have examined the attitude-behavior complex and incorporated the findings into practical implications for the research. Yet, none of the studies have focused on general behaviors concentrated on reducing the amount of trash in the marine environment. The findings in this current study will advance our understanding of marine debris from a social perspective and how this problem can be controlled on an individual level. While human impact on the environment is small on an individual level; aggregated behaviors of the same type can end up having a significant impact (Stern, 2000). For this reason, this study was focused on self-reported behavior in the hopes of beginning to understand recreational users who behave more or less environmentally responsible. This study concluded that men, and more specifically recreational fishermen, tend to report less pro-environmentalism in relation to active recreationists. This indicates where programs and marketing campaigns can begin to focus their efforts through future research on controlling marine debris along Rhode Island's coastline.

Limitations and Future Directions

Several constraints to this study lie within the use of the ERB scale because it is such an essential element of this research. As discussed, ERB manifested a low

reliability score, yet it was still used because of its central focus on the other variables. This low reliability could be a result of trying to cover a range of behaviors from those practiced in both the marine environment and in everyday life. Campaigns for encouraging conservation behavior emphasize the importance of using targeted behaviors to begin addressing the issue (Monroe, 2003). Therefore, it may be more beneficial to focus on only actions performed on the coast or at home and not both. This also explains why recycling behaviors yielded unreliable responses and was excluded from the ERB scale. This study attracted a large portion of tourists who lived in surrounding states. The recycling regulations and availability in those communities could lead to less responsible behavior because of the constraint of their home towns. This was not a concern when developing the environmentally responsible behavior scale which should have been controlled. For this reason, as a component in the theory of planned behavior framework, perceived behavioral control is a measured variable which should be considered if recycling behavior becomes the targeted behavior in future studies. However, with the focus on marine debris, actions performed in the environment could lead to a stronger correlation to recreation participation and environmental attitudes. Cialdini et al. (1991) even report that anti-littering behavior had a greater probability of being activated when attention was drawn to related concepts rather than more indirect concepts. Therefore, buying environmentally friendly products has less of a connection to the issue than littering or

clean-up behavior. Thus, focusing on behaviors solely performed in the marine environment might have led to more cohesive results.

Another variable within the theory of planned behavior model is the use of behavioral intentions which are thought to be antecedent to actual behavior. This study measured self-reported behavior rather than behavioral intentions which could be another reason for the low reliability of the scale. Even though self-reported behavior is often used in other studies, they can sometimes lead to a false interpretation of actual behavior since people have a tendency to over report good behavior (Fujii et al., 1985). For example, because of the social norms of littering, it is likely individuals will not admit if they littered in the past year. While behavioral intentions might lead to the same limitation of over-reporting or inaccurate responses, it is an interesting variable which could produce a different outcome if measured.

Most directly, future research can begin by studying those within the target audience of men and recreational fishermen to develop meaningful changes in behavior. However, due to the constraints in measurements, an improved ERB scale could vastly enhance this line of research. Similarly, since knowledge can be an important indicator and a way to assess what people currently know about marine debris, a refined development of knowledge questions could also be beneficial. An early attempt in this process was to use path analysis to infer some kind of causal relationship among variables. There are many reasons why this method did not work, but a multi-year study with a larger and more diverse sample population could

improve the ability to conduct this type of analysis. Lastly, other latent variables such as perceived values and conservation commitment may be interesting indicators to address in future research.

APPENDICES

Table 8: The New Ecological Paradigm (NEP) scale which is meant to measure a person's environmental worldview

How much do you agree with the following statement: strongly disagree, disagree, neutral, agree, or strongly agree?	
1	Humans have the right to modify the environment to suit their needs
2	Humans are severely abusing the environment
3	Plants and animals exist primarily to be used by humans
4	The environment has plenty of natural resources if we just learn how to develop them
5	When humans interfere with nature, it often produces disastrous consequences
6	The balance of nature is strong enough to cope with the impacts of modern industrial nations
7	Humans must live in harmony with nature in order to survive
8	We are approaching the limit of the number of people the earth can support

Table 9: Environmental Concern scale used to measure level of seriousness of marine environmental threats as a specific attitudinal variable

How serious of a threat to the marine environment do you consider the following: not serious at all, not very serious, neutral, somewhat serious, or very serious?	
1	Amount of debris in the ocean
2	Sea level rise
3	Noise pollution in the marine environment
4	Introduction of non-native plants and animals to coastal waters
5	Overfishing of the ocean
6	Ocean habitat destruction
7	Littering along the highways and rural areas
8	Littering along the shoreline (including beaches and marinas)
9	Littering out on the water (including bays and salt ponds)

Table 10: Ten true/false statements used to measure how much each respondent knows about marine debris.

Correct Answer	Statement
F	All trash in the ocean migrates to open water where it cannot harm any marine life.
T	Aluminum will eventually fully degrade in the ocean.
F	Plastic will eventually fully degrade in the ocean.
T	There is trash present in all five oceans.
T	Most garbage in the ocean is in the form of a floating island of debris that collects in the center of the ocean currents.
T	Plastic bags are one of the most abundant debris items in Narragansett Bay.
F	Most of the debris in the ocean are large items such as refrigerators, old boats, or tangled fishing line.
F	Animals avoid ingesting debris in the ocean.
F	Most ocean pollution comes from dumping of trash by ships.
T	Floating debris in the ocean become habitats for some animals leading to the introduction of non-native wildlife to coastal areas.

Figure 2: Interconnectedness Scale showing overlapping Venn Diagrams to depict the respondent's level of felt connection to the marine environment.

BIBLIOGRAPHY

- Ajzen, I., (1991). Theory of Planned Behavior. *Organizational Behavior and Human Decision Processes*, 50, 179-211.
- Ajzen, I., Joyce, N., Sheikh, S., & Cote, N. G. (2011). Knowledge and the Prediction of Behavior: The Role of Information Accuracy in the Theory of Planned Behavior. *Basic and Applied Social Psychology*, 33(2), 101–117.
- Andrady, A. L. (1990). Environmental Degradation of Plastics under Land and Marine Exposure Conditions. *Proceedings of the Second International Conference on Marine Debris*, 848–869.
- Aron, A., Aron, E. N., & Smollan, D. (1992). Inclusion of Other in the Self Scale and the structure of interpersonal closeness. *Journal of Personality and Social Psychology*, 63(4), 596–612.
- Bamberg, S., & Möser, G. (2007). Twenty years after Hines, Hungerford, and Tomera: A new meta-analysis of psycho-social determinants of pro-environmental behaviour. *Journal of Environmental Psychology*, 27, 14–25.
- Barker, K., Fong, L., Grossman, S., Quin, C., & Reid, R. (1994). Comparison of Self-Reported Recycling Attitudes and Behaviors on Actual Behavior. *Psychological Reports*, 75, 571–577.
- Barker, L., & Dawson, C. (2012). Exploring the Relationship Between Outdoor Recreation Activities, Community Participation, and Environmental Attitudes. *Proceedings of the 2010 Northeastern Recreation Research Symposium*, 190–196.
- Barnes, D. K., Galgani, F., Thompson, R. C., & Barlaz, M. (2009). Accumulation and fragmentation of plastic debris in global environments. *Philosophical Transactions of the Royal Society*, 364, 1985–1998.
- Blake, D. E. (2001). Contextual Effects on Environmental Attitudes and Behavior. *Environment and Behavior*, 33(5), 708–725.

- Boubonari, T., Markos, A., & Kevrekidis, T. (2013). Greek Pre-Service Teachers' Knowledge, Attitudes, and Environmental Behavior Toward Marine Pollution. *The Journal of Environmental Education*, 44(4), 232–251.
- Cole, M., Lindeque, P., Halsband, C., & Galloway, T. S. (2011). Microplastics as contaminants in the marine environment: A review. *Marine Pollution Bulletin*, 62, 2588–2597.
- Cottrell, S. P. (2003). Influence of Sociodemographics and Environmental Attitudes on General Responsible Environmental Behavior among Recreational Boaters. *Environment and Behavior*, 35(3), 347–375.
- CRMC. (2010). Rhode Island Special Area Management Plan (SAMP). (Wakefield, RI).
- Davis, J. L., Green, J. D., & Reed, A. (2009). Interdependence with the environment: Commitment, interconnectedness, and environmental behavior. *Journal of Environmental Psychology*, 29, 173–180.
- Derraik, J. (2002). The pollution of the marine environment by plastic debris: A review. *Marine Pollution Bulletin*, 44, 842–852.
- Dunlap, Riley E and Heffernan, R. B. (1975). Outdoor Recreation and Environmental Concern: An Empirical Examination. *Rural Sociology*, 40(1), 18–30.
- Dunlap, R. E., Liere, K. D. Van, Mertig, A. G., & Jones, R. E. (2000). Measuring Endorsement of the New Ecological Paradigm : A Revised NEP Scale. *Journal of Social Issues*, 56(3), 425–442.
- Dutcher, D.D., Finley, J.C., Luloff, A.E., Johnson, J. B. (2007). Connectivity With Nature as a Measure of Environmental Values. *Environment and Behavior*, 39(4), 474–493.
- Ebreo, A., & Vining, J. (2001). How Similar are Recycling and Waste Reduction?: Future Orientation and Reasons for Reducing Waste As Predictors of Self-Reported Behavior. *Environment and Behavior*, 33(3), 424–448.
- Fujii, E. T., Hennessy, M., & Mak, J. (1985). An Evaluation of the Validity and Reliability of Survey Response Data on Household Electricity Conservation. *Evaluation Review*, 9(1), 93–104.

- Geisler, C. C., Martinson, O. B., Wilkening, E. A., (1977). Outdoor Recreation and Environmental Concern: A Restudy. *Rural Sociology*, 42(2), 241-249.
- Gregory, M. R. (1978). Accumulation and distribution of virgin plastic granules on New Zealand beaches. *New Zealand Journal of Marine and Freshwater Research*, 12(4), 399-414.
- Jackson, E. L. (1986). Outdoor Recreation Participation and attitudes to the environment. *Leisure Studies*, 5, 1-23.
- Johnson, S. W., (1994). Deposition of trawl web on an Alaskan beach after implementation of MARPOL Annex V Legislation. *Marine Pollution Bulletin*, 28, 477-481.
- Kaiser, F. G., Wolfing Kast, S., & Fuhrer, U. (1999). Environmental attitude and ecological behaviour. *Journal of Environmental Psychology*, 19, 1-19.
- Kaiser, F. G., Hübner, G., & Bogner, F. X. (2005). Contrasting the theory of planned behavior with the value-belief-norm model in explaining conservation behavior. *Journal of Applied Social Psychology*, 35(10), 2150-2170.
- Kako, S., Isobe, A., Kataoka, T., & Hinata, H. (2014). A decadal prediction of the quantity of plastic marine debris littered on beaches of the East Asian marginal seas. *Marine Pollution Bulletin*, 81, 174-184.
- Kil, N., Holland, S. M., & Stein, T. V. (2014). Structural relationships between environmental attitudes, recreation motivations, and environmentally responsible behaviors. *Journal of Outdoor Recreation and Tourism*, 7-8, 16-25.
- Kollmuss, A., & Agyeman, J. (2002). Mind the Gap: Why do people act environmentally and what are the barriers to pro-environmental behavior? *Environmental Education Research*, 8(3), 239-260.
- Lebreton, L. C. M., Greer, S. D., & Borrero, J. C. (2012). Numerical modelling of floating debris in the world's oceans. *Marine Pollution Bulletin*, 64(3), 653-661.
- Lee, T. H. (2011). How recreation involvement, place attachment and conservation commitment affect environmentally responsible behavior. *Journal of Sustainable Tourism*, 19(7), 895-915.

- Lee, T. H., & Jan, F. H. (2015). The Effects of Recreation Experience, Environmental Attitude, and Biospheric Value on the Environmentally Responsible Behavior of Nature-Based Tourists. *Environmental Management*, 56, 193–208.
- Madden, T. J., (1992). A Comparison of the Theory of Planned Behavior and the Theory of Reasoned Action. *Personality and Psychology Bulletin*, 18(1), 3-9.
- Manfredo, M., & Shelby, B. (2001). The Effect of Using Self-Report Measures in Tests of Attitude-Behaviour Relationships. *The Journal of Social Psychology*.
- Mayer, F. S., & Frantz, C. M. (2004). The connectedness to nature scale: A measure of individuals' feeling in community with nature. *Journal of Environmental Psychology*, 24(4), 503–515.
- Milfont, T. L., & Duckitt, J. (2010). The environmental attitudes inventory: A valid and reliable measure to assess the structure of environmental attitudes. *Journal of Environmental Psychology*, 30, 80–94.
- Minton, A. P., & Rose, R. L. (1997). The Effects of Environmental Concern on Environmentally Friendly Consumer Behavior: An Exploratory Study. *Journal of Business Research*, 40, 37–48.
- Mobley, C., Vagias, W. M., & DeWard, S. L. (2010). Exploring Additional Determinants of Environmentally Responsible Behavior: The Influence of Environmental Literature and Environmental Attitudes. *Environment and Behavior*, 42(4), 420–447.
- Monroe, M. C. (2003). Two Avenues for Encouraging Conservation Behaviors. *Human Ecology Review*, 10(21), 113–125.
- Ribic, C. A. (1998). Use of Indicator Items to Monitor Marine Debris on a New Jersey Beach from 1991 to 1996. *Marine Pollution Bulletin*, 36(11), 887–891.
- Robson, C. (2011) *Real World Research Third Edition*. Wiley.
- Ross, J. B., Parker, R., Strickland, M. (1991) A survey of shoreline litter in Halifax Harbor 1989. *Marine Pollution Bulletin*, 22(5), 245-248.
- Schultz, P. W., Shriver, C., Tabanico, J. J., & Khazian, A. M. (2004). Implicit connections with nature. *Journal of Environmental Psychology*, 24, 31–42.

- Sheavly, S. B., & Register, K. M. (2007). Marine debris & plastics: Environmental concerns, sources, impacts and solutions. *Journal of Polymers and the Environment*, 15, 301–305.
- Sheavly, S. B. (2007). “National Marine Debris Monitoring Program: Final Program Report, Data Analysis and Summary.” Prepared for U.S. Environmental Protection Agency by Ocean Conservancy, Grant Number X83053401-02 76 pp.
- Silva-Iñiguez, L., & Fischer, D. W. (2003). Quantification and classification of marine litter on the municipal beach of Ensenada, Baja California, Mexico. *Marine Pollution Bulletin*, 46, 132–138.
- Somerville, S., Miller, K., & Mair, J. (2003). Assessment of the aesthetic quality of a selection of beaches in the Firth of Forth, Scotland. *Marine Pollution Bulletin*, 46, 1184–1190.
- Steg, L., & Vlek, C. (2009). Encouraging pro-environmental behaviour: An integrative review and research agenda. *Journal of Environmental Psychology*, 29(3), 309–317.
- Stern, P. C., Dietz, T., & Kalof, L. (1993). Value Orientations, Gender, And Environmental Concern. *Environment and Behavior*, 25(3), 322–348.
- Stern, P. C., & Dietz, T. (1994). The Value Basis of Environmental Concern. *Journal of Social Issues*, 50(3), 65–84.
- Stern, P. C., Dietz, T., & Guagnano, G. A. (1995). The New Ecological Paradigm in Social-psychological Context. *Environment and Behavior*, 27(6), 723–743.
- 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(18), 1611–1636.
- Stern, P. C. (2000). Toward a Coherent Theory of Environmentally Significant Behavior. *Journal of Social Issues*, 56(3), 407–424.
- Tarrant, M. A., & Green, G. T. (1999). Outdoor Recreation and the Predictive Validity of Environmental Attitudes. *Leisure Sciences: An Interdisciplinary Journal*, 21(1), 17–30.

- Thapa, B., & Graefe, A. R. (2001). Environmental attitude-behavior correspondence between different types of forest recreationists. *Ethnicity*, 5(2), 20–27.
- Thapa, B. (2010). The Mediation Effect of Outdoor Recreation Participation on Environmental Attitude-Behavior Correspondence. *The Journal of Environmental Education*, 41(3), 133–150.
- Theodori, G. L., Luloff, a E., & Willits, F. K. (1998). The Association of Outdoor Recreation and Environmental Concern: Reexamining the Dunlap-Heffernan Thesis. *Rural Sociology*, 63(1), 94–108.
- Thompson, R. C., Swan, S. H., Moore, C. J., & vom Saal, F. S. (2009). Our plastic age. *Philosophical Transactions of the Royal Society*, 364, 1973–1976.
- van der Linden, S. (2013). Exploring Beliefs About Bottled Water and Intentions to Reduce Consumption: The Dual-Effect of Social Norm Activation and Persuasive Information. *Environment and Behavior*, 47(5), 526–550.
- Walker, T. R., Grant, J., & Archambault, M. C. (2006). Accumulation of marine debris on an intertidal beach in an urban park (Halifax Harbour, Nova Scotia). *Water Quality Research Journal of Canada*, 41(3), 256–262.
- Zelezny, L. C., Chua, P.-P., & Aldrich, C. (2000). New Ways of Thinking about Environmentalism: Elaborating on Gender Differences in Environmentalism. *Journal of Social Issues*, 56(3), 443–457.
- Zhang, Y., Zhang, H. L., Zhang, J., & Cheng, S. (2014). Predicting residents' pro-environmental behaviors at tourist sites: Therole of awareness of disaster's consequences, values, and place attachment. *Journal of Environmental Psychology*, 40, 131–146.